BRIAN DERDOWSKI

January 30, 1997 Introduced By: Louise Miller
Larry Phillips

Proposed No.: 97-005

MOTION NO. 10083

A MOTION adopting the master plan for Moss Lake Regional Park.

WHEREAS, the King County Council has appropriated funds to prepare a master plan for Moss Lake Regional Park, and

WHEREAS, the King County division of capital planning and development in conjunction with the parks department has completed the preparation of the master plan, and

WHEREAS, the master plan will be used as the basis for a State Environmental Policy Act (SEPA) determination;

NOW, THEREFORE BE IT MOVED by the Council of King County:

The attached master plan for the Moss Lake Regional Park is hereby adopted, subject to the completion of the SEPA process, and provided that the project phasing section is

amended to include the installation of the entrance gate during Phase 1.

PASSED by a vote of 11 to 0 this 10th day of February, 1997.

KING COUNTY COUNCIL
KING COUNTY, WASHINGTON

Chair Jane Hague

ATTEST:

Gerald A. Peterson
Clerk of the Council

Attachment: Moss Lake Regional Park Master Plan Final Draft, November 7, 1996

M 10083

Moss Lake Regional Park Master Plan
Final Draft
November 7, 1996

97-005

Master Plan Prepared by:
King County Department of Construction and Facilities Management

Prepared For:
King County Parks Department

Moss Lake Regional Park Master Plan
Final Draft

Master Plan Prepared by:
King County Department of Construction
and Facilities Management

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Prepared For:
King County Parks Department

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MOSS LAKE REGIONAL PARK MASTER PLAN

SECTION 1. INTRODUCTION

Moss Lake Regional Park is located 5 miles southeast of Duvall and 1 mile east of Lake Joy in the Cascade foothills (Figure 1). The park is comprised of 320 acres of high-quality wetland and forested upland habitats. An extensive Class 1 wetland complex encompasses a large sphagnum bog, beaver dams, open water and forested wetland. First offered to the county for purchase in 1978, the park land was eventually acquired through two purchases -- 275 acres in 1990 and 45 acres plus a 3-acre conservation easement in 1995.

Planning Process

Master planning for Moss Lake Regional Park for passive recreation and environmental education began in 1994. The Program Development and Land Management Division of King County Parks developed a Program Plan for the park. Site goals and recommended activities were identified, and specific facilities were specified to achieve the activity goals of the Program Plan. However, site characterization studies conducted to support master planning indicated that the sensitivity of wetlands and permitting requirements for facilities construction would require some modifications to the Program Plan recommendations. Several additional properties were considered for acquisition to provide suitable sites for recommended facilities (Appendix A). Parcels were evaluated for the presence of wetlands and other sensitive areas constraints. Two parcels totalling 45 acres and a 3-acre conservation easement were ultimately purchased, increasing the total County ownership to 320 acres. Although the acquisition parcels are also highly constrained for development by wetlands, two potential supplemental parking lot locations were identified (Appendix B). The acquisition parcels are also strategically located to provide additional buffering from adjacent residential areas for the Moss Lake bog and its associated forested wildlife habitat.

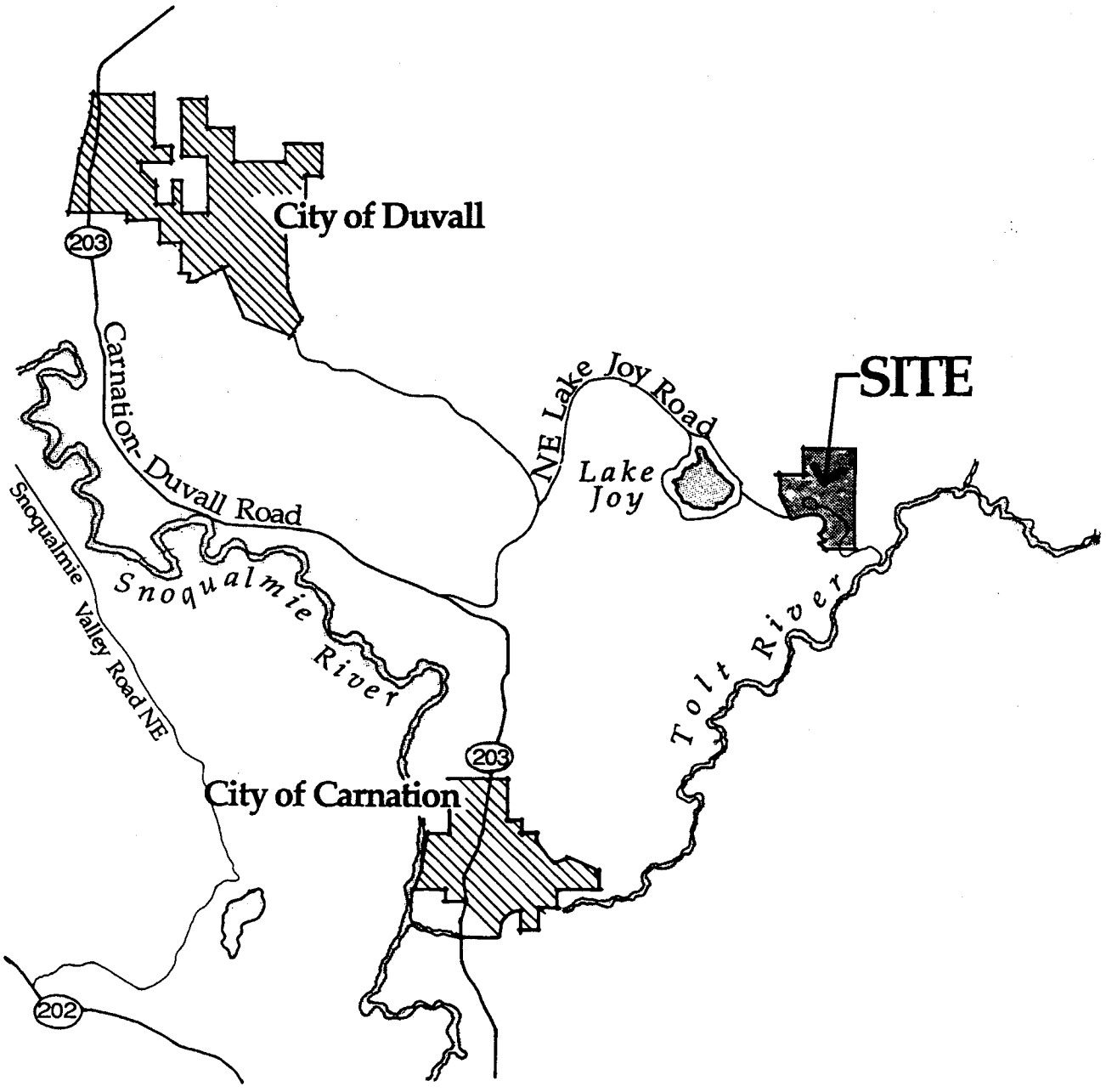
Several facility siting alternatives were reviewed with King County staff and a technical advisory committee to develop a Master Plan concept that respects the environmental sensitivity of the site, minimizes wetland impacts, and achieves the County's Program Plan goals to provide public use and access. An overview of alternatives considered during master planning is included in Appendix B. A preferred Master Plan was presented to the public for comment at an evening meeting at the Duvall City Library on May 29, 1996. Attendance lists and meeting notes for technical and public review meetings are included in Appendix C. Based on input from the public and additional King County staff review, some modifications were incorporated into the Master Plan. The resulting Moss Lake Regional Park Master Plan is described in Section 4 of this document. Section 2 provides an overview of existing site conditions (special studies reports are included in Appendix D). Section 3 summarizes the County's Program Plan for the Moss Lake Regional Park. Estimated development costs and construction phasing are discussed in Section 5.

SECTION 2. SITE INVENTORY AND ANALYSIS

Development of a passive recreation park with natural science learning opportunities required an understanding of the physical qualities and natural resources that currently exist at the site. Background information on site history, land use, access and infrastructure was compiled. Natural resource studies were undertaken to characterize the plant communities, wildlife habitat, and hydrologic conditions in the park to support development of the Moss Lake Park Master Plan. Natural resource studies reports are included in Appendix D. Overall plant community structure and special natural features were identified for protection or enhancement. More detailed field work will be conducted during the facilities design phase to support construction permit applications.

Moss Lake Master Plan

King County Parks Division



Vicinity Map

Figure 1
Moss Lake Regional Park Master Plan
October 7, 1996

Cultural Elements

Site History

The Moss Lake Regional Park site has been used for a variety of resource extraction activities since the Seattle area was settled in the late 1800s. Early timber harvesting in the virgin Northwest forests and subsequent second-growth harvest has left vast acreages of successional mixed coniferous and deciduous forests such as the Moss Lake property. Peat moss extraction and drying are also known to have occurred here. In the 1920s, a moss drying plant was constructed on the east end of the lake. It subsequently burned to the ground and was not replaced. Preparatory work for additional peat excavation occurred in 1953-54; however, the project was abandoned before work began. Anecdotal reports of peat extraction as late as the 1960s have been noted through conversations with long-time residents of the area. The location of a sunken peat dredge near the northwest edge of the bog mat was noted by King County staff during site studies for the King County Sensitive Areas Inventory in the early 1980s. No remaining evidence of the moss drying plant or dredge was found during site investigations for master planning.

The Moss Lake park property was first offered to the County for purchase in 1978, but acquisition funds were not available. In 1982-83, the property owner, Moss Lake Associates, proposed the construction of a planned unit development (PUD) and golf course around Moss Lake and initiated environmental analysis for the project. Although the PUD proposal was dropped, the property was subdivided into 20-acre parcels consistent with zoning and subdivision regulations in effect at that time. The bulk of the Moss Lake Associates holdings was eventually acquired by the County for development of Moss Lake Regional Park through two purchases -- 275 acres in 1990 with $2,339,449 from the 1989 King County Open Space Bond and 45 acres plus a 3-acre conservation easement in 1995 with $457,500 from the 1993 Conservation Futures Bond.

Existing Site Uses

The site currently receives light use by pedestrians and equestrians. Most are from the neighboring Lake Joy residential community with a relatively low number of people traveling from more distant communities. A small wooden directional sign at the turn-off to Moss Lake from the Lake Joy Road is currently the only indication to the casual passer-by that Moss Lake Park exists. Attendees at the public meeting reported that it has been known as a beautiful, quiet passive recreational destination as well as a remote, yet accessible "party spot" for many years. Remnants of old logging roads provide recreational access to the east side of Moss Lake and to an existing road and trail system beginning on adjacent Weyerhaeuser property that extends into the Cascade foothills. There are no existing structures or amenities on the site.

Access and Circulation

Located between 3 and 5 miles from the cities of Duvall and Carnation, Moss Lake Regional Park is reached from the Snoqualmie Valley via a network of arterial roads and a paved secondary County road that circles Lake Joy (Figure 2). Access to Moss Lake Regional Park is via a 10- to 12-foot gravel road extending east approximately 0.7 miles from Lake Joy Road and dead-ending several hundred feet inside the park boundary at a County-installed gate located a short distance from Moss Lake. The maintained portion of the gravel road continues beyond the gate along the west shore of Moss Lake and provides temporary access to adjacent properties still held by Moss Lake Associates for future residential development. This temporary access was a condition of purchase of the park land from Moss Lake Associates, and will continue until all of the Moss Lake Associates' property is sold or conveyed to other owners or until July 1, 2020, whichever comes first (refer to the purchase agreement in Appendix E). On-site parking is currently limited to a wide, flat area adjacent to the existing County gate that can accommodate three to four cars.

Land Use and Zoning

Figure 3 shows designated land uses in the vicinity of Moss Lake Regional Park. The park is immediately adjacent to the Forest Production District boundary for the large expanse of forest lands in eastern King County. It is located approximately 3 miles from the City of Carnation's Urban Growth Boundary (UGB) and 5 miles from the Duvall UGB. The park property and adjacent land to the west and south is designated by

Moss Lake Master Plan

King County Parks Division

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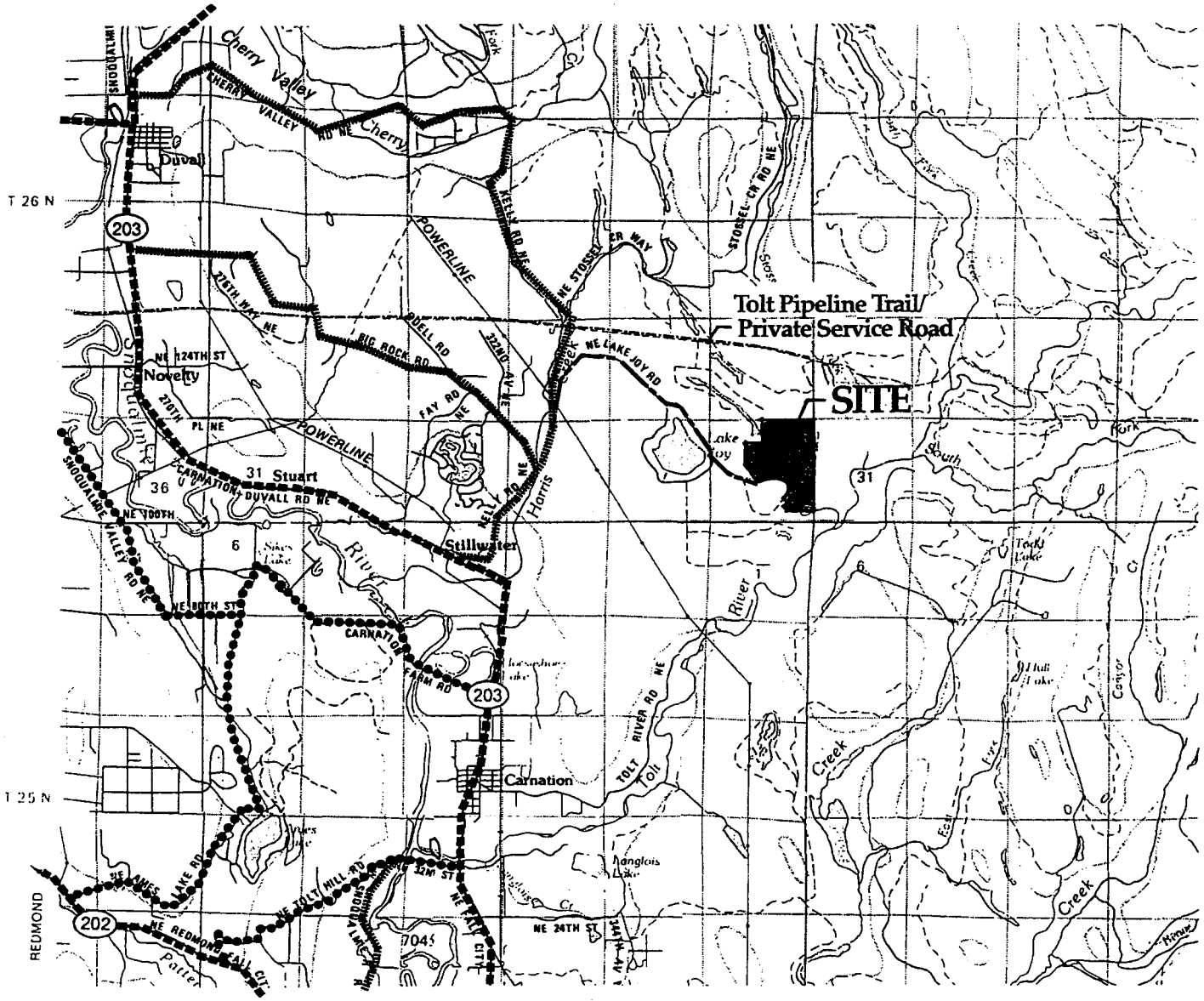


Transportation and Access

Legend

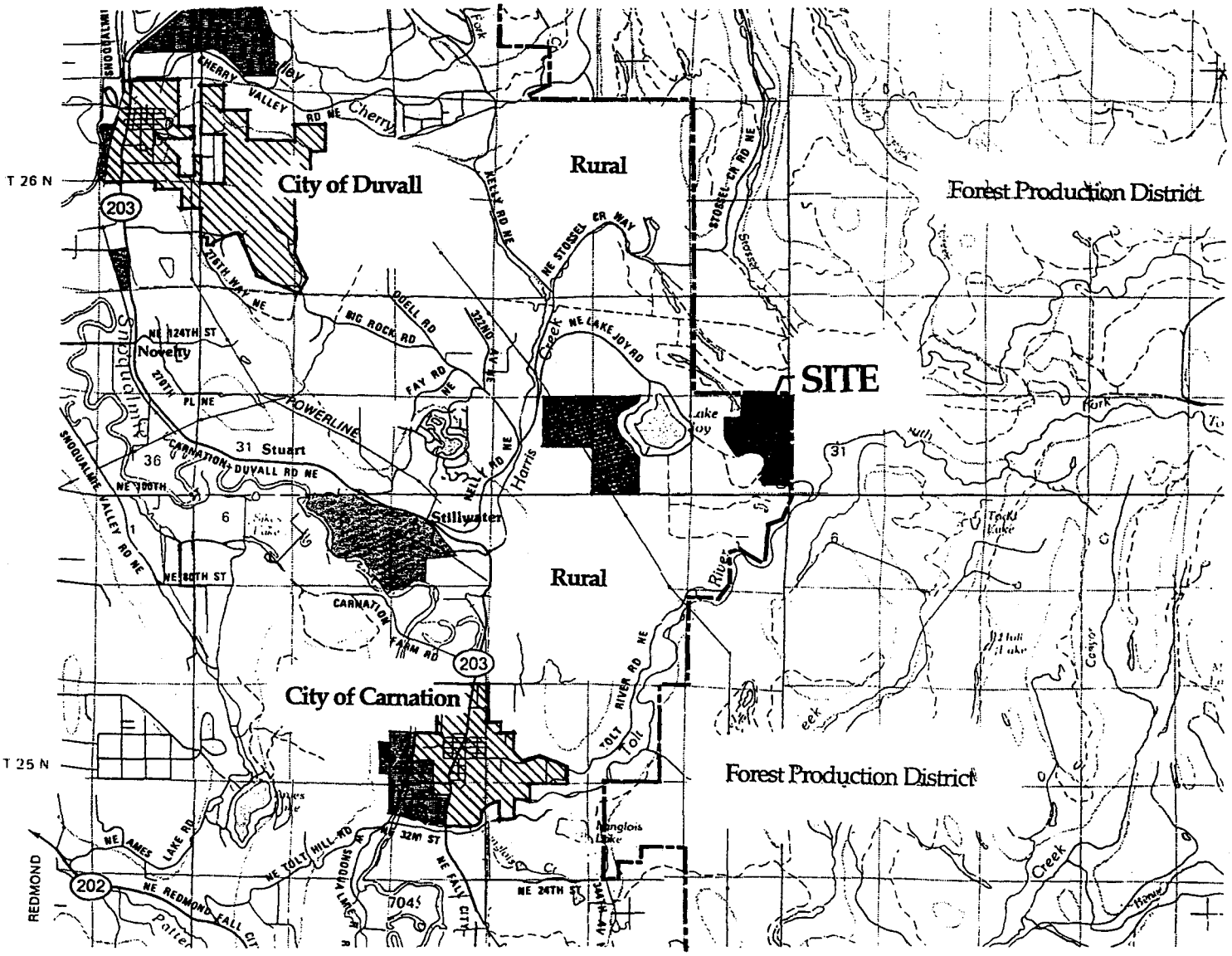
- Principal Arterials
- Minor Arterials
- Collector Arterials
- Site Access

Figure 2

Moss Lake Regional Park Master Plan
October 7, 1996

Moss Lake Master Plan

King County Parks Division



Land Use

Legend

- Forest Production District Boundary
- Public/Private Open Space
- Urban Growth Area

Figure 3

Moss Lake Regional Park Master Plan
October 7, 1996

the King County Comprehensive Plan for rural residential uses and is zoned RA-5 and RA-10. The area surrounding Lake Joy is zoned RA-2.5.

Infrastructure

No utility infrastructure currently services the site. The park is located within King County Water District #119. Water, power and phone service are available at Moss Lake Road. Sewer service is not available.

Physical Elements

Land Cover/Vegetation

The most significant natural feature of Moss Lake Regional Park is the 50-acre sphagnum bog community that surrounds the northern and northwestern edges of the lake (Figure 4). Bogs are unique and rare plant communities that support very specialized plants capable of surviving in nutrient-poor, acidic conditions. The plants in a bog form a "floating mat" of vegetation. Sphagnum bogs are very susceptible to impacts from intensive recreational use that can disturb the vegetative mat and from upstream development that can affect water quality.

The balance of Moss Lake Regional Park is mostly forested with wetland, upland and riparian plant communities. Extensive areas of forested wetland with a narrow shrub wetland border surround Moss Lake in all directions, except to the northeast where upland forest extends nearly to the edge of the bog. Riparian forest occurs along the outlet stream for Moss Lake. All of these areas have been logged in the last century and now support 40- to 70-year-old stands of mixed second-growth forest.

Watersheds

Moss Lake Regional Park is located in the Tolt River drainage basin (Figure 5). Surface water in the 575-acre Moss Lake drainage sub-basin flows southeasterly via an unnamed Class 2 stream to the Tolt River (refer to the site hydrology section of the Natural Resource Studies report in Appendix D). Approximately one-half of the Moss Lake watershed is contained within the park boundaries (Figure 6). The balance of the watershed extends to the northwest and includes largely undeveloped forest and a large wetland area. Portions of the upper watershed are included in a proposed large-lot subdivision, which could potentially affect water quality in Moss Lake in the future. The long-term well-being of the Moss Lake bog depends on maintaining current water quality and runoff rates both inside and outside the park.

Soils

Soils in upland portions of the park property are classified by the Soil Conservation Service (SCS) as Tokul Gravelly Loam, with slopes ranging from about 6 to 40 percent (Figure 7). These soils are well-suited to trail and road development, picnicking sites and viewing locations. A very slowly permeable subsurface layer can impede the downward percolation of surface water, requiring care in grading design, construction and re-vegetation to minimize erosion potential. Soils in wetlands include Mukilteo Peat and Seattle Muck which are classified by the SCS as wetland (hydric) soils, and areas of Tokul Gravelly Loam with slopes less than 6%. Tokul soils are moderately permeable in the upper part; however, perched water and saturated surface soils may occur in the early part of the growing season promoting the development of wetland characteristics.

Wildlife Habitat

The natural features of Moss Lake Park -- wetlands and bog, open water and streams, and extensive forested area -- provide excellent habitat for a wide range of wildlife. Numerous signs of beaver activity have been noted on the site, although King County DDES staff members have indicated that resident beaver were removed illegally sometime during 1995. A single adult beaver was reintroduced on the site in Spring 1996 by King County and State wildlife biologists.

The outlet stream for Moss Lake is tributary to the Tolt River and has been identified as an important potential habitat for coho salmon. However, the lower end of the stream near its confluence with the Tolt

Moss Lake Master Plan

King County Parks Division

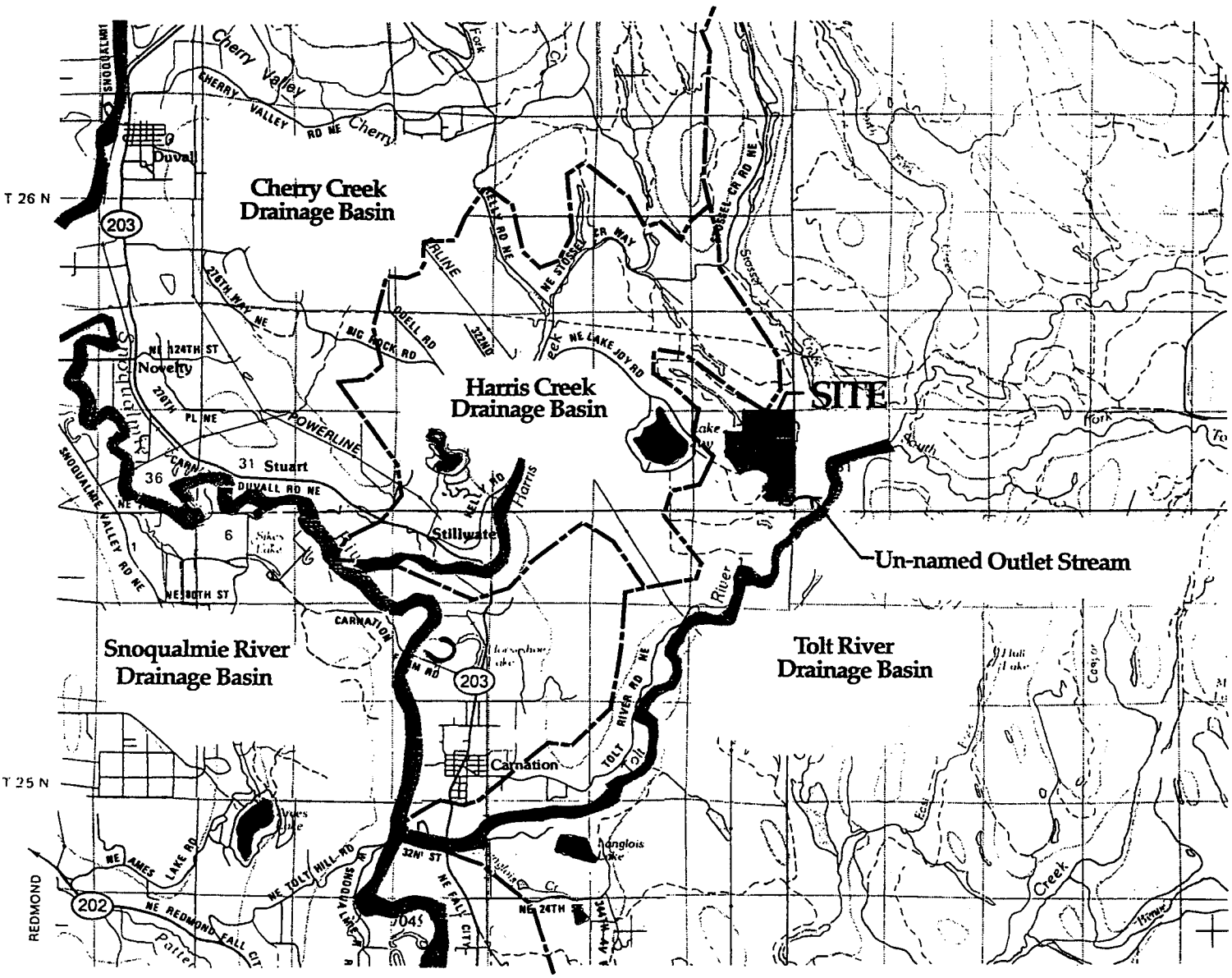


Figure 5

Moss Lake Regional Park Master Plan
October 7, 1996
Page 8

River exhibits poor flow conditions and is silty, providing poor habitat conditions for all salmonids. Habitat restoration at the confluence of the Moss Lake outlet stream with the Tolt River is needed to realize the full habitat potential of the outlet stream. The outlet stream is also designated by the Washington Department of Fish and Wildlife (WDFW) as a priority habitat for winter steelhead trout.

Moss Lake is identified by King County as a potential bald eagle habitat. However, WDFW, which monitors bald eagle activity in King County, has not observed eagles at the lake. Suitable habitat for pileated woodpecker, which is designated as a state candidate species in Washington, exists in the park property and a single individual was observed during site investigations. Other state and/or federally listed species that may use the site, but have not been observed, include band-tailed pigeon, Vaux's swift, red-tailed hawk and red-legged frog.

Many commonly occurring wildlife that were observed or are likely to occur on the site include salamanders, tree frogs, garter snakes, hawks, owls, woodpeckers, green-backed herons, wood ducks, mallards, red-winged blackbirds, songbirds, opossums, moles, squirrels, rabbits, black bears, raccoons, minks, muskrats, skunks, coyotes, foxes, bobcats and deer.

The Moss Lake Regional Park Master Plan is sensitive to these resources, providing opportunities for public viewing and enjoyment while incorporating design measures to assure their protection.

Opportunities and Constraints

Moss Lake Regional Park is located in relatively close proximity to numerous environmental and recreational opportunities. Figure 8 shows other parks, wildlife recreation areas, water access opportunities and schools in the greater Snoqualmie Valley area. On-site recreational and educational opportunities are shown in Figure 9.

While the site offers unique opportunities for passive recreation and environmental education, it also poses special challenges for development of facilities that will support desired activities *and* protect the environment. Provision of access and parking is probably the greatest siting challenge because of the extensive and especially sensitive wetlands associated with Moss Lake. Wetlands constrain portions of both sides of the existing access road, which will need to be widened and upgraded. There is limited 'dry' land for development of parking and restroom structures, conventional waste treatment is not feasible, and storm water management becomes challenging when everything is already wet. The potential for increased trail use can be expected as park access increases and will require ongoing monitoring to ensure that the highly sensitive ecosystem is protected from degradation. The Moss Lake Regional Park Program and Master Plan described in this document meet these challenges and will provide the public with opportunities to view and experience such a water habitat.

SECTION 3. MOSS LAKE REGIONAL PARK PROGRAM PLAN

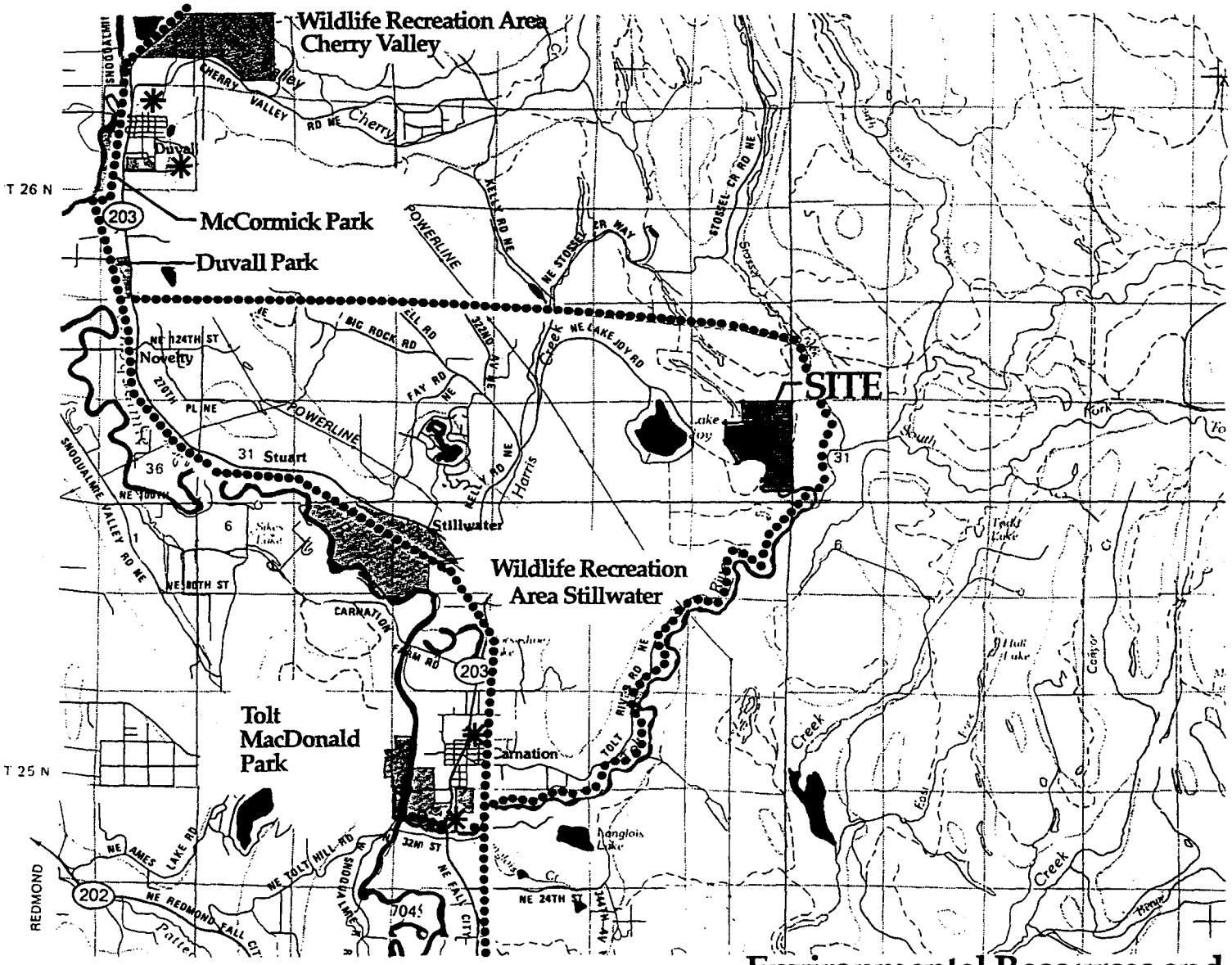
Site goals and recommended activities of the Program Plan for the Moss Lake Regional Park, developed by the Program Development and Land Management Division of King County Parks, are outlined below. Facilities recommended in the Program Plan reflect desired site improvements. Information obtained from further site inventory and analysis required modification of the program to reflect sensitive site conditions. A comparison of programmatic and master planning facilities recommendations follows the site goals and activity recommendations.

Land Use Classification

This site is classified as a regional park and will predominantly serve as a natural area site in the King County Parks System. Park use categories, based on the King County Park and Open Space Classification System contained in the Park, Recreation and Open Space Plan, include the Natural Area category (C-131) and the Staging Area category (C-135). The locations of these park use categories is shown in Figure 10.

Moss Lake Master Plan

King County Parks Division



Environmental Resources and Recreational Opportunities

Legend

- Public Parks
- Schools
- Existing and Proposed Trail Corridors
- Water

Figure 8

Moss Lake Regional Park Master Plan
October 7, 1996

Moss Lake Master Plan

King County Parks Division

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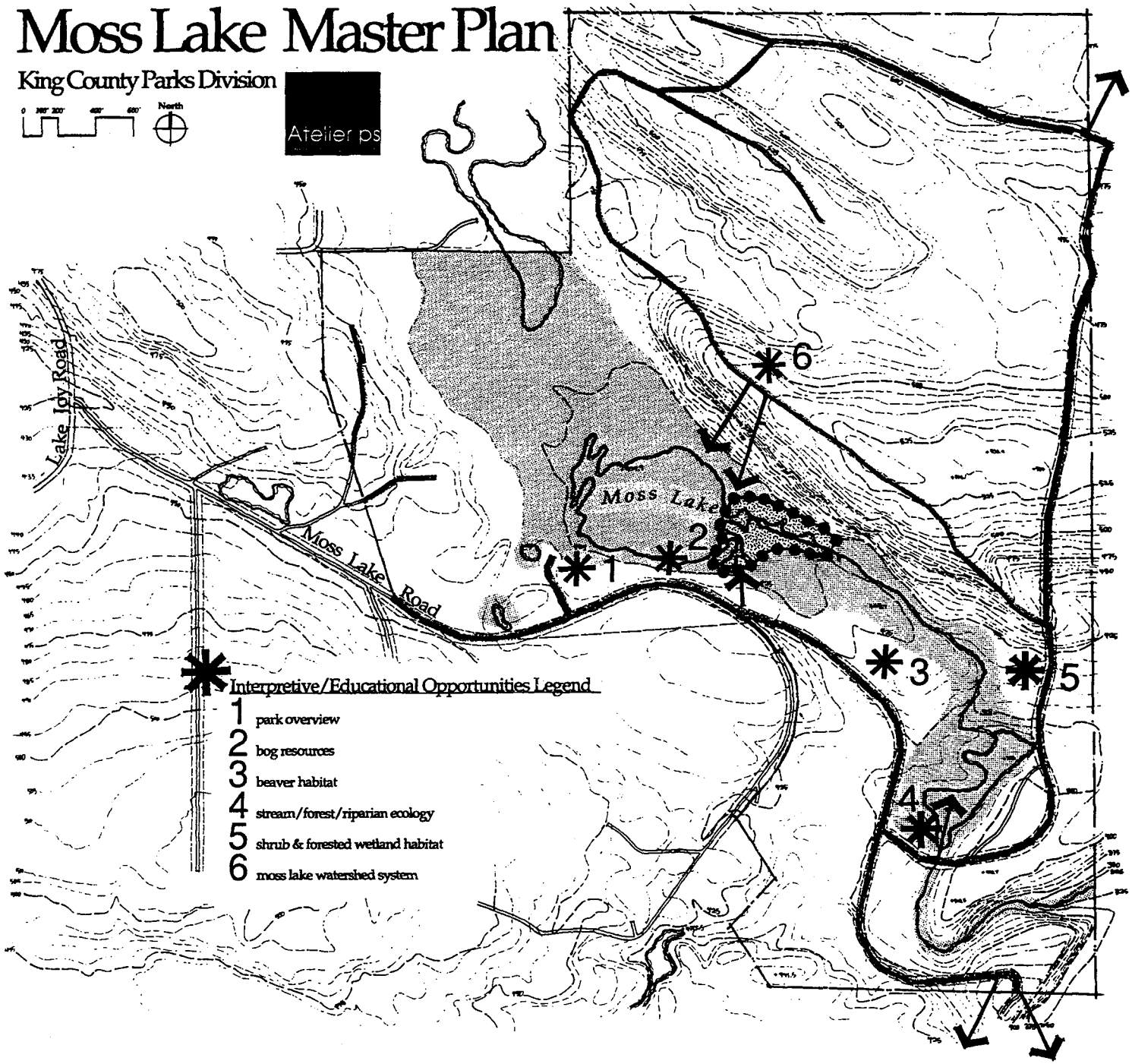

Interpretive/Educational Opportunities Legend

1 park overview
2 bog resources
3 beaver habitat
4 stream/forest/riparian ecology
5 shrub & forested wetland habitat
6 moss lake watershed system

Site Character and Opportunities

Legend

Water/ Wetland Resource

Beaver Habitats

Moss Lake Master Plan

King County Parks Division

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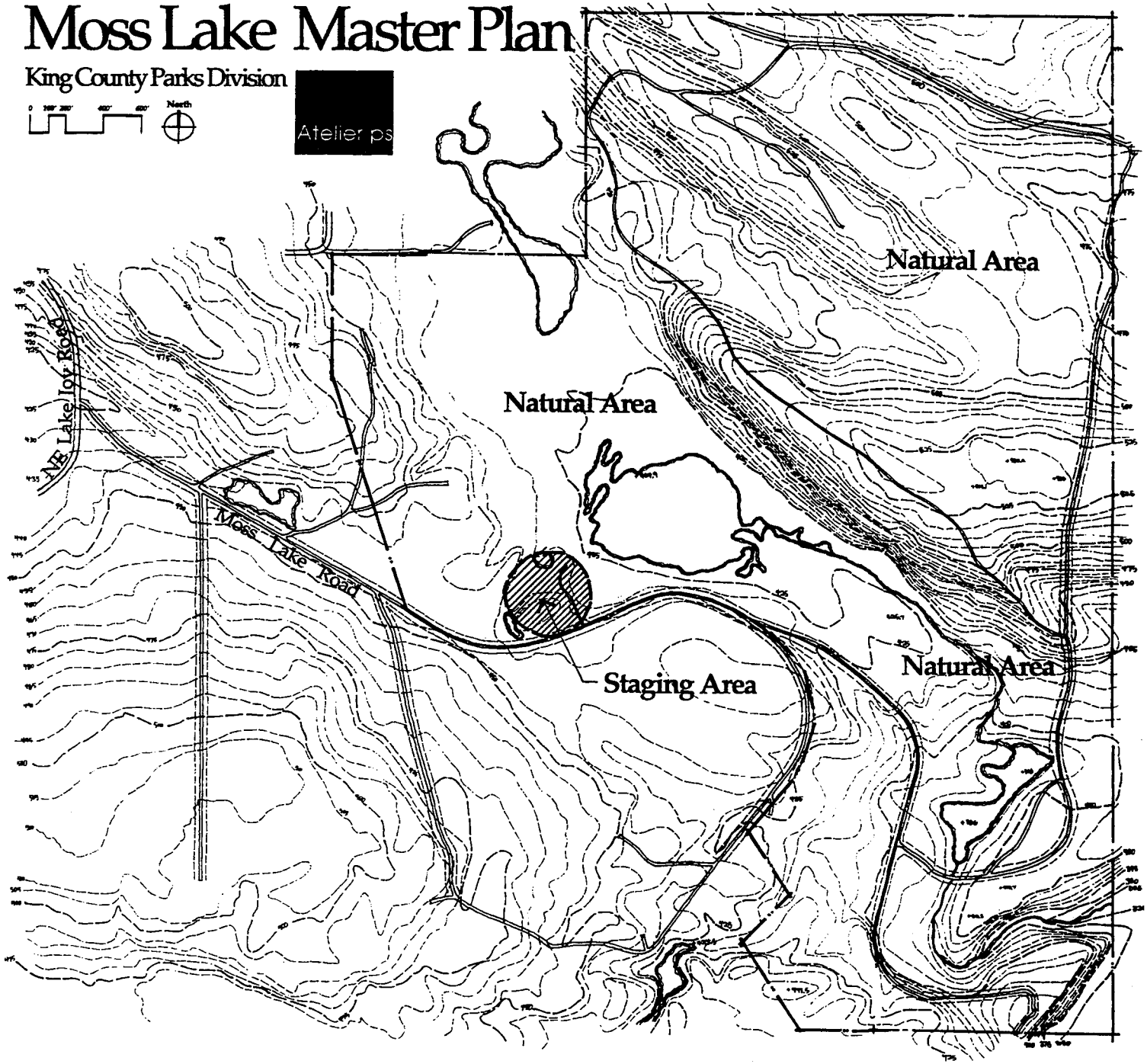

The entire site is covered by the Natural Area category which allows for development that "may include basic improvements necessary for trails, nature study and related outdoor activities". The parking lot and associated restroom and picnicking facilities are located in the Staging Area category.

Site Goals

The development and management of Moss Lake should provide for public use and access *and* conserve the natural environment for the enjoyment, education and appreciation of the community by:

- conserving the wetland and watershed functions;
- providing recreational use consistent with site resources; and
- offering education and interpretive opportunities to groups and individuals.

Recommended Activities

This large site provides the opportunity to accommodate a range of activities related to the site's natural character and resources. Activities are focused on low-impact uses, including:

• **Trail Use**	Trail use through various areas of the site. Individual trails will be designated and signed for appropriate use.
• **Nature Observation**	Informal, passive activity, non-scheduled.
• **Educational and Interpretive Activities**	Both directed and informal learning appreciation of site resources and processes. Areas of study might include wetlands, wildlife habitat, vegetation, watershed functions, plants and animals. School groups are considered an important user.
• **Picnicking**	Informal individual activity.
• **Boating**	Use of small kayaks, canoes, rafts, etc.
• **Catch and Release Fishing**	King County should consider this designation from the Washington Department of Fish and Wildlife in order to protect and preserve this resource.

Recommended Facilities

Many of the proposed activities for the site require facilities to support them and to direct users to the appropriate locations for their pursuit. Table 1 identifies the range of facilities recommended in the Moss Lake Regional Park Program Plan to provide for public use and enjoyment. They should be of a scale and design consistent with the natural character of the site. Table 1 also notes some minor modifications to the Program Plan facilities recommendations due to the especially sensitive nature of the site. Park facilities can be expected to be developed over time.

SECTION 4. MOSS LAKE REGIONAL PARK MASTER PLAN

The Moss Lake Regional Park Master Plan is shown in Figures 11 and 12. Recommended facilities are summarized in Table 1. The following pages detail the types of visitor experiences that facilities are intended to provide and the locations and character of these facilities.

Table 1. Recommended Facilities

	Program Plan	Master Plan
Internal Trail System	Include appropriate soft-surfacing and boardwalks, as needed, interpretive elements and overlooks/viewpoint platforms. Individual trails will be designated and signed for appropriate use. May include three types of trails: (1) accessible interpretive loop; (2) primary trails; and (3) secondary trails.	same as Program Plan
Picnicking Facilities	Individual picnic tables informally located near the parking and/or amphitheater areas.	Picnic tables will be located near the large amphitheater to provide lake views and activity areas for school groups.
Boating	Identify and improve area to launch small, cartop boats such as kayaks, canoes, and rafts.	same as Program Plan
Fishing	Fishing platform to be located a safe distance from trails and other uses and users, to allow for casting without potential of "catching" park users.	Separate fishing platform not included to reduce shoreline impacts around Moss Lake. Fishing will not be allowed from the viewing platform.
Interpretive Facilities	Rustic, covered amphitheater for lectures and presentations that will accommodate school groups.	Covered amphitheater not recommended due to vandalism potential, expressed concern from neighborhood about making shoreline area attractive to after hours party crowd, and high cost of construction. Small staging shelter will be provided near parking lot.
	Interpretive kiosk and interpretive signs to facilitate individual, self-directed education and understanding of the site.	Kiosk has high potential for vandalism. Vandal-resistant overview sign near park entrance recommended as alternative. School-based interpretive program will be self-directed with pre-printed materials for distribution directly to schools. Interpretive signs along boardwalk loop trail.
	Viewing tower to allow overview of site and viewing without disturbing sensitive site areas.	Tower has high potential for vandalism; will be constructed of vandal-resistant materials.
Parking	Parking suitable to serve estimated individual and school group use. Recommend approximately 30 spaces.	Available unconstrained land will limit parking to 16-20 cars or combination of cars and oversize vehicles such as buses.
Restrooms	Located near parking lot and visible from parking area; include some storage for interpretive program equipment. A second, rustic restroom facility may be desirable on northeast side of the lake.	same as Program Plan
Access Road	Road to access parking, preferably to include bike lanes.	Recommend half road, 20 feet wide without shoulders due to environmental constraints; may be paved or gravel depending on funding.
Service Road	Road to provide maintenance access, as needed.	same as Program Plan

Moss Lake M

King County Parks Division

0 100' 200' 400' 600'

North

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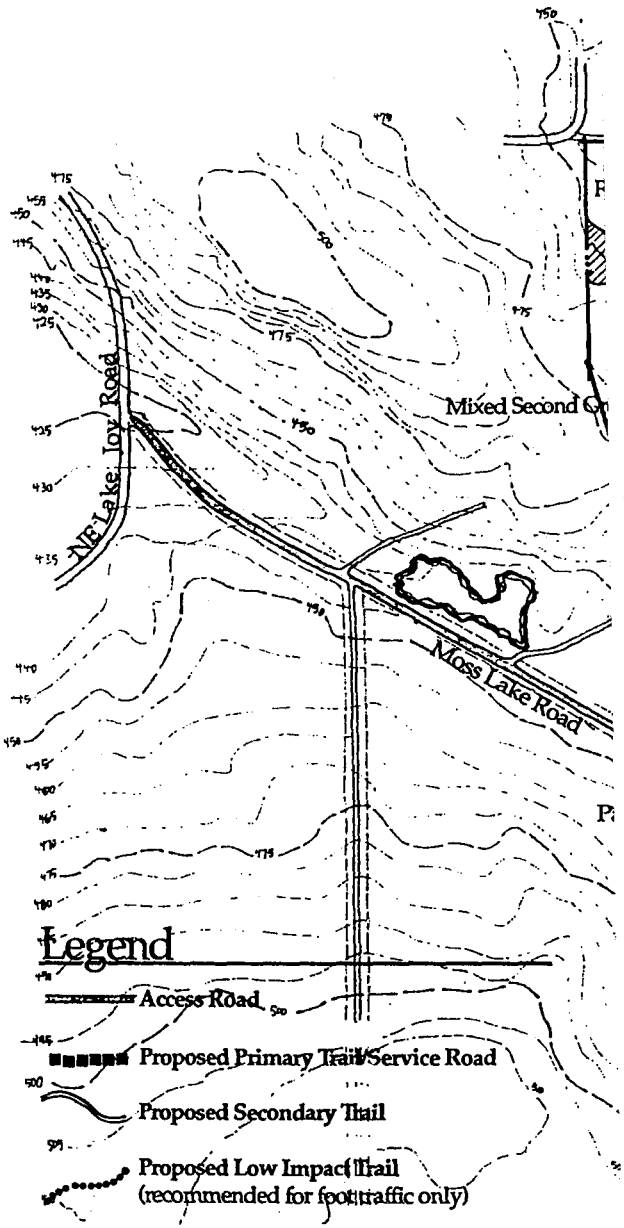

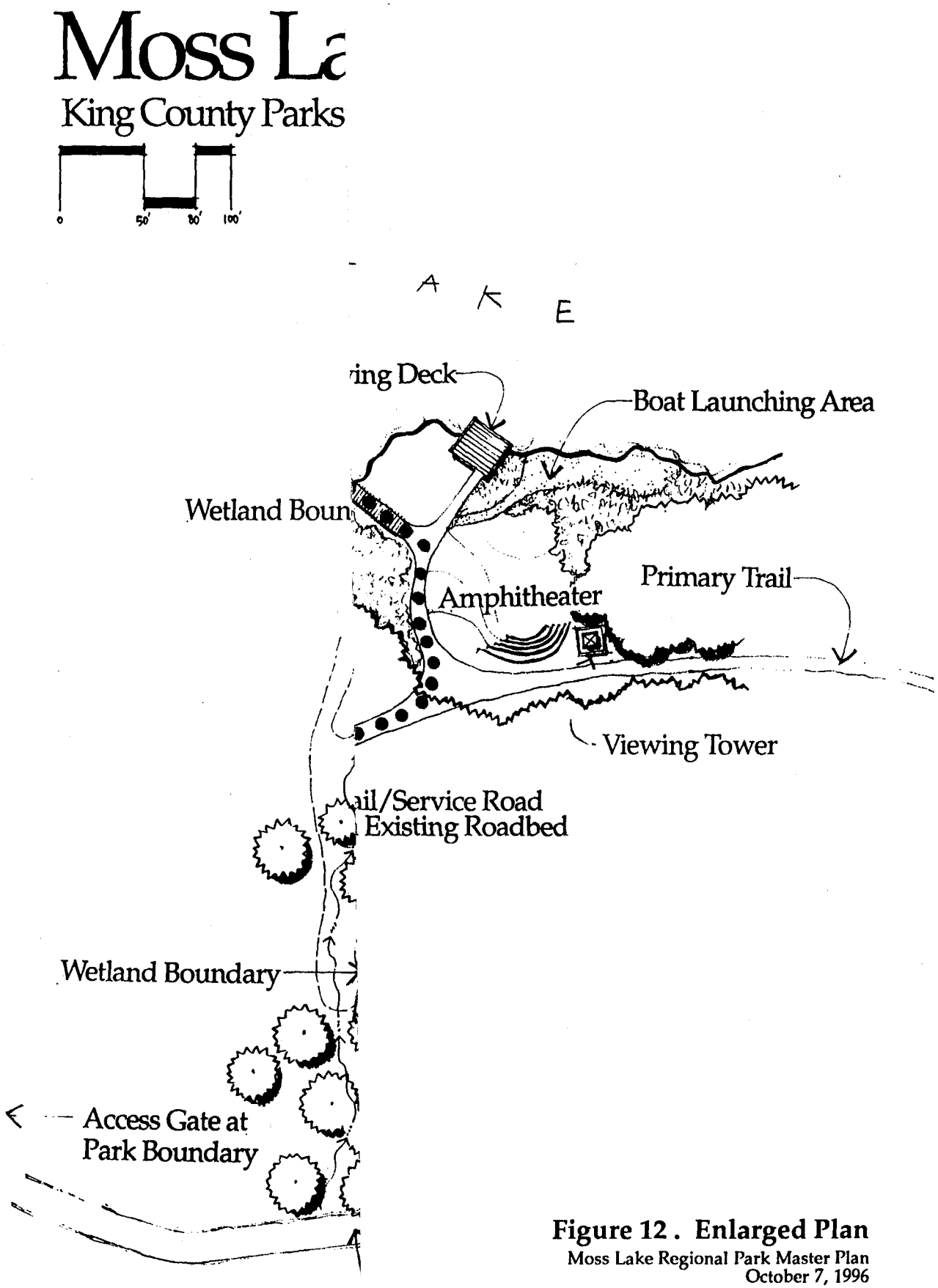

Figure 12. Enlarged Plan
Moss Lake Regional Park Master Plan
October 7, 1996

Park Visitor's Experience

The Moss Lake Regional Park Master Plan is designed to provide public access to an unusual and high-quality natural environment along a system of ADA-accessible and primitive trails, while preserving its beauty and integrity. Facilities and programmatic elements of the park master plan have been selected to promote and support user experiences that recognize the site's unique qualities and foster environmental awareness. The proposed uses of the park – as a **Natural Area**; as a site for **Environmental Learning**; and for **Passive Recreation** – allow for an appropriate balance between access and conservation. Facilities are sized and sited to: (1) provide an uncrowded visitor experience; and (2) minimize the potential direct and long-term impacts of enhancing public access to the site. At capacity, the parking facilities would accommodate a user population of up to about 190 people when large school groups are present (assuming 120 students in three buses, 56 visitors in sixteen cars, and 10 neighborhood residents simultaneously using the park). This equates to a park-wide user density of about 1 person per each 1.6 acres of park land. These conditions are not expected to occur on a regular basis. The core facilities, consisting of the parking area, restrooms and interpretive loop trail, are consolidated in a small area of the site. These facilities provide easy access to viewing platforms, focus public use on the environmental learning component of the park, and discourage development of social trails.

As a **Natural Area**, Moss Lake Park will:

- conserve the natural environment for enjoyment and education of the community;
- conserve wetland and watershed functions; and
- conserve wildlife habitat.

The park's unique natural features and relatively easy access make it an ideal site for **Environmental Learning**. The potential areas of study may include: (1) wetlands, wildlife habitat and watershed functions; (2) plant, animal and insect species; (3) catch-and-release fishing; and (4) innovative development techniques. As an environmental learning site, facilities should accommodate:

- visitors in organized groups of up to about 120 people (capacity of three school buses) on weekday school field trips;
- smaller school-sponsored or private groups on weekends;
- target population all ages; and
- groups arriving in buses or carpool caravans.

As a **Passive Recreation** site, facilities should accommodate:

- visitors alone or in small groups;
- trail use and nature observation; and
- enhanced user experiences with minimal interaction with people and maximum contact with nature.

Facilities to Support Recommended Activities

Access Road and Parking

The access road to Moss Lake will be widened to King County's half street standard of 20 feet without shoulders. Pre-application discussions with King County DDES regarding specific elements of the Master Plan indicate that the half street standard meets code for Moss Lake Regional Park. Ultimately, the Moss Lake access road may be paved; however, initial cost savings associated with a gravel surface may be desirable depending on available construction funds. A road standard variance would be required to maintain the access road with a gravel surface for the early stages of park establishment. According to DDES staff members, this approach has been used successfully in other King County parks.

The half street standard varies from the recommendations of the Program Plan to minimize initial construction costs and to minimize impacts to extensive wetlands along the existing roadway. Preliminary calculations of wetland impacts associated with road widening and parking lot development are approximately 0.9 acres (refer to Table 1 in Appendix B). If impacts exceed 1 acre, additional permit review and potential mitigation actions may be required by the U.S. Army Corps of Engineers, resulting in added expense and delays for first phase park construction.

The road may be expanded in width at a later date by the adjacent land owner from whom the Moss Lake Regional Park property was purchased. If roadway expansion becomes necessary to accommodate development on adjacent private property, the County's purchase agreement with the adjacent land owner obligates the County to pay a proportionate share of the cost of the expansion (Appendix E). Until that time, all work within the road easement necessary to access Moss Lake Regional Park will be borne fully by the County.

Suitable unconstrained land for development of a parking area is very limited. Site inventory studies and wetland delineations conducted in areas desirable for trailhead parking identified a 1.68-acre area that can accommodate parking for 16 to 20 cars. The wetland delineation report for the parking lot area is included in Appendix D. Parking spaces will be configured in a double stall arrangement to also accommodate large vehicles such as school buses and trailers. A handicapped parking space with adjacent load and unload area will be designated.

The 20-foot-wide road surface will be engineered to meet the King County Fire Marshall's access requirements for roadway width (20 feet), load-bearing support (25 tons), and road grade (less than 15 percent). Turning radiuses along the access road and within the parking lot will also meet fire access requirements.

Parking demand could periodically exceed availability. Because the park program and facilities are designed to provide an uncrowded visitor experience, most people will be likely to leave if the parking lot is full. However, they may also park on the side of the road. The narrow width of the access road will help minimize this potential. It may be necessary to sign the access road and nearby Lake Joy Road for no parking. Over time, it may be desirable to add more parking. Two potential sites located along the western park boundary north of the proposed parking lot could be utilized; however, these areas are not desirable for providing barrier-free access and some additional wetland impacts associated with access roads and connecting trails would occur (refer to Appendix B).

Storm Water Runoff and Water Quality Treatment

Under current regulations, the preliminary calculations for storm water flows from proposed impervious surfaces indicate that storm water detention facilities would not be needed. Biofiltration swales will collect roadway and parking lot runoff for water quality treatment prior to discharge to the Moss Lake system of wetlands. The potential for adverse water quality impacts will be minimized by locating the discharge point for treated surface water runoff well downstream of the most sensitive sphagnum bog habitat.

Water quality treatment facilities will be designed consistent with regulatory requirements in place at the time of permit applications. Proposed changes to King County's Surface Water Design Manual could impose additional water quality treatment requirements to protect the sphagnum bog.

Gates

Two gates may be located to control vehicle traffic into the park. An access gate should be located at the park boundary, approximately 700 feet from the parking lot. An interior service gate should be sited just beyond the entrance to the parking lot to restrict travel by unauthorized vehicles into the interior of the site.

Restrooms and Utilities
Restrooms will be located in close visual proximity to the parking lot and primary trailhead on the west side of Moss Lake. Facilities will include handicap accessible men's and women's double restrooms with privacy partitions. A smaller facility will be sited at the end of the primary trail on the east side of Moss Lake. Both sites will be accessible to emergency and service vehicles. On-site storage for maintenance and interpretive program materials will be provided adjacent to or within the restroom building at the parking lot.

Waterless vault privies will be installed because of the absence of suitable soils for on-site waste treatment coupled with the high cost of bringing utilities onto the site from Lake Joy Road. The term 'privy' is used in the County's health code to distinguish waterless facilities from holding tank facilities that function like conventional restrooms. In addition to the cost of bringing water onto the site to serve holding tank toilets, power and telephone would also be needed to operate a high water alarm for the holding tank, substantially increasing initial construction costs. Holding tank toilets must be pumped out on a weekly basis, contributing to long-term park maintenance costs. Vaults will need to be pumped out on an irregular, periodic basis depending on use. Several prefabricated models of aesthetically attractive and low-odor vault privies that have been used successfully in other park applications are available at reasonable cost. Composting toilets are not well suited to this site because of the anticipated seasonal use patterns. These types of facilities work best when used on a regular basis.

A variance from the King County Sewage Review Board will be required to install vault privies at Moss Lake. Pre-application discussions with King County Public Health Department staff indicate that environmental and cost constraints associated with developing conventional restrooms will justify the variance approval. Fire hydrants will not be required by the King County Fire Marshall because buildings are proposed to be less than 2,500 square feet in size and constructed of largely non-combustible materials.

Trails
An internal system of soft-surface trails and boardwalks will allow park users to travel throughout the site with varied opportunities to view wetlands and wildlife habitat, and to pursue other recreation endeavors such as birdwatching and picnicking. Trails will be designated to provide for a variety of users. A barrier-free interpretive loop trail and boardwalk starting near the parking lot will allow visitors to experience the major habitat types present in the park. A primary trail and service road will provide access around the eastern lake edge ending at an overlook, rustic amphitheater and second restroom. Secondary trails will provide for a variety of looped routes within the park. A third category of low impact trails are identified based on their high level of sensitivity. Appropriate uses of internal trails will be determined based on the criteria to be adopted as part of the Countywide Trails Plan and administered consistent with King County Park Rules. Consideration will be given to pedestrian, equestrian and mountain bike use. Trail use will be monitored for impacts to site resources and may be restricted when necessary to protect or restore resource values. For example, restrictions may relate to specific trails, users or to seasonal conditions.

Equestrians living in the vicinity of the park currently use existing trails on park property. Moss Lake is a sensitive site that can likely absorb low-level equestrian usage, provided that horses (and their trampling feet) stay out of the most sensitive areas. The proposed master plan allows for the option of continuation of equestrian use and provides a small amount of parking that could be suitable for horse trailers.

Observation and Viewing Areas
Two informal, rustic amphitheaters for educational programming will be developed along the primary trail -- a larger one along the shoreline adjacent to the interpretive loop trail and boat launch and a smaller one at the end of the primary trail on the eastern side of the lake. Both will be simply constructed of rough-hewn logs anchored in a semicircle. Roofs will not be constructed over these facilities because of the high cost and potential for vandalism. While school groups may not wish to linger on rainy days, weather elements may be a more distinguishable part of the learning experience on the site. Alternatively, a protective shelter for staging groups of visitors will be located adjacent to the parking lot.

High- and low-level viewing of the Moss Lake bog will be provided adjacent to the large amphitheater and boat launch area. A deck will be constructed over the lake shore in conjunction with the boardwalk loop trail to provide close viewing of shallow water and shoreline habitats. Fishing will not be allowed from this viewing deck due to the adjacent shallow water which is unsuitable for fishing and the potential for "hooking" other visitors (refer to the following discussions of catch-and-release fishing and the canoe and boat launch). A viewing tower will be located slightly back from the lake shore where suitable soils are available for structural support. The tower will provide an expansive overview of the sphagnum bog habitat to the north of the open water area of Moss Lake. As with all structures in the park, the remote location may prove to be attractive to after-hours visitors and vandals. Vandal- and fire-resistant design and materials will be used for all structures.

Several rest stops and view points with rough-hewn log benches will be located along the primary trail. They are located at intervals suitable for elementary school children.

Picnic Area
Individual picnic tables will be located informally in the area adjacent to the large amphitheater and viewing tower. This location will provide passive views of the lake and activity surfaces for school groups.

Interpretive Signage
Informational and interpretive signs will be posted at appropriate locations to orient park visitors to facility locations and to educate visitors about the sensitivity of the site. A vandal-resistant overview sign with a park map will be located near the parking lot and interpretive loop trail. Additional interpretive signs will be located along the boardwalk portion of the loop trail where unique features of the Moss Lake bog can be viewed. Directional and informational signs will be located throughout the park along trails and in viewing areas to identify appropriate trail uses and to highlight unique environmental features.

Catch-and-Release Fishing
Providing public access to Moss Lake for fishing and prohibiting motorized watercraft are King County designations supported by the Program Plan for Moss Lake and the sensitive character of aquatic resources in the park. The specific nature of fishing on the lake (such as seasons and catch limits) is regulated by the Washington Department of Fish and Wildlife. Catch-and-release fishing is a State designation that is desirable for Moss Lake because of the County's Natural Area designation for the site and the intent of the park program to protect and conserve its natural resources. The County should seek a catch-and-release designation from WDFW for Moss Lake.

Canoe and Boat Launch
An informal watercraft launching area will be provided along the shoreline adjacent to the large amphitheater. The launch area will consist of a small staging area on the shoreline and a narrow foot path connecting to the primary trail. The launch area will be designed to accommodate hand-carried watercraft such as canoes, kayaks, and float tubes for fishing. The use of internal combustion engines on Moss lake is contrary to the goals of conserving the natural resources of the site and their use should be prohibited. A separate ordinance prohibiting the use of internal combustion engines should be adopted. Areas adjacent to the footpath will be vegetated with dense native shrub vegetation to discourage development of social trails and inadvertent trampling of shoreline vegetation, which could increase the potential for soil erosion.

<u>Other Recommendations</u>

Habitat Enhancement and Revegetation
Opportunities for enhancing and restoring native vegetation will be incorporated into final project design. Specific examples include the area proposed for the large amphitheater and boat launch, which has traditionally been used for launching small boats. The disturbed area is substantially larger than needed for the types of craft that will be encouraged on Moss Lake.

The outlet stream at the southern end of the Moss Lake wetland system and downstream of the beaver dams flows through two metal culverts that are a partial barrier to fish. This area offers excellent opportunities for fish habitat enhancement by removing the metal culverts and restoring the streambed. The primary trail will cross the outlet stream on a simple bridge of adequate load-bearing capacity for service vehicles.

Additional vegetation enhancement opportunities, such as supplementing the type and density of understory plantings in successional forest areas along the lake shoreline, will be identified during project design and permitting.

Site Monitoring

A monitoring program should be implemented to ensure that site uses do not diminish the quality of the wildlife habitat and passive recreation experience. Intrusions into sensitive habitats could jeopardize the quality of the habitat. Overuse of trails can lead to erosion and changes to surface water flow. While the remoteness of the site will likely moderate the potential number of park visitors, the site should be monitored regularly to ensure that the park program does not result in adverse environmental impact. The monitoring program should include periodic trail inspection to assess general condition and any use conflicts. Inspections will occur frequently in the early stages of park use and may be scheduled less frequently as park use patterns establish and stabilize. A user survey may also be used to gain input from the public on perceived use conflicts. If adverse effects are noted, then specific remedial measures will be developed and implemented. This may include alteration of uses and users, and may mean closure of certain areas either in full or seasonally.

SECTION 5. PROJECT PHASING AND ESTIMATED DEVELOPMENT COSTS

Funding availability for development of Moss Lake Regional Park may require that park facilities are constructed in multiple phases. The recommended Phase 1 includes the major roadway, parking and comfort facilities that would allow park visitors to access the park and to utilize existing trails. Construction of the access road and parking area would result in the majority of natural resource impacts associated with full development of proposed park facilities. Therefore, several resource mitigation projects are also included in Phase 1, such as restoration of streambed habitat and construction of a footbridge where the primary trail is proposed to cross the unnamed outlet stream south of Moss Lake. Shoreline restoration and revegetation in the area of the large amphitheater, viewing deck and boat launch should occur during Phase 2 as part of the construction of those facilities. All major interpretive facilities, trails and viewing structures would be deferred to Phase 2. The following table shows the division of facilities proposed for Phase 1 and Phase 2 construction. If funding is available, it would be desirable to develop all park facilities at the same time.

Table 2. Development Phases for Moss Lake Regional Park

PROPOSED FACILITIES	PHASE 1	PHASE 2
Access Road (20 ' wide)/Gates	2,800 LF w/ interior service gate	park access gate
Parking Lot/Overview Sign	16 to 20 cars	-
Restrooms	double vault privy	single vault privy
ADA-Accessible Boardwalk/Loop Trail with Interpretive Signs	-	700 LF
Amphitheaters	-	2
Viewing Platform	-	625 SF
Viewing Tower	-	1
Hand-Carried Watercraft Launch	-	1
Picnicking Area	-	at large amphitheater
Primary Trail	-	7,500 LF w/ 5 rest stops
Secondary/Low Impact Trails	-	22,000 LF
Habitat Restoration	outlet stream/footbridge	lake shore restoration understory enhancement

The estimates of maximum allowable construction cost (MACC) for Moss Lake Regional Park were developed by the master planning consultant based on anticipated materials and quantities for Phases 1 and 2, and typical construction details for trails, boardwalks, footbridges, viewing towers, and roadways. Construction cost projections were prepared using Means' Site Work & Landscape Cost Data 1996 and estimates for specialized structures from local suppliers. All price data is stated in current U.S. dollars and inflation is not included. Construction costs may vary depending on final design and project timing. Construction cost estimates will be refined during project final design.

Cost estimates for permit fees, consultant design services, County administration, contingency funds and art were developed by King County Department of Construction and Facilities Management staff members using standard spreadsheet formulas and services estimates. These costs are subject to change depending on the complexity of site preparation work related to protection of sensitive areas, changes in regulations at the time of permit applications, and project phasing. The following table summarizes the estimated development costs for Moss Lake Regional Park as described in this Master Plan report. Detailed master-plan-level construction cost breakdowns are presented in Appendix F.

Table 3. Summary of Estimated Master Plan Phase Development Costs* for Moss Lake Regional Park

ELEMENT DESCRIPTION	Phase 1	Phase 2
Maximum Allowable Construction Cost *(MACC)*	$266,542	$457,608
Sales Tax *(8.20% of MACC)*	$21,857	$37,524
Building Permit Fees *(2.00% of MACC)*	$5,331	$9,152
Miscellaneous Fees**	$3,000	$5,000
CONSTRUCTION COST	**$296,730**	**$509,284**
Basic Design Consultant Fee** *(10.00 % of MACC)*	$26,654	$45,761
Extra Services Design Fee**	$20,500	$10,000
CONSULTANT DESIGN COST	**$47,154**	**$55,761**
COUNTY ADMINISTRATION COST *(3.50% of Construction Cost)*	**$10,500**	**$18,021**
CONTINGENCY *(10.00% of Construction Cost, Consultant Design Cost and County Administration Cost)*	**$35,438**	**$58,307**
ART *(1% of all categories)*	**$3,898**	**$6,414**
TOTAL PROJECT COST	**$393,721**	**$647,787**

* Cost estimates are stated in 1996 dollars.

** Subject to change depending on the complexity of site preparation related to protection of sensitive areas, changes in regulations at the time of permit applications, and project phasing.

10083

King County
Parks, Planning and Resources Department

97-005

Technical Appendices

Moss Lake Regional Park Master Plan
Final Draft
October 8, 1996

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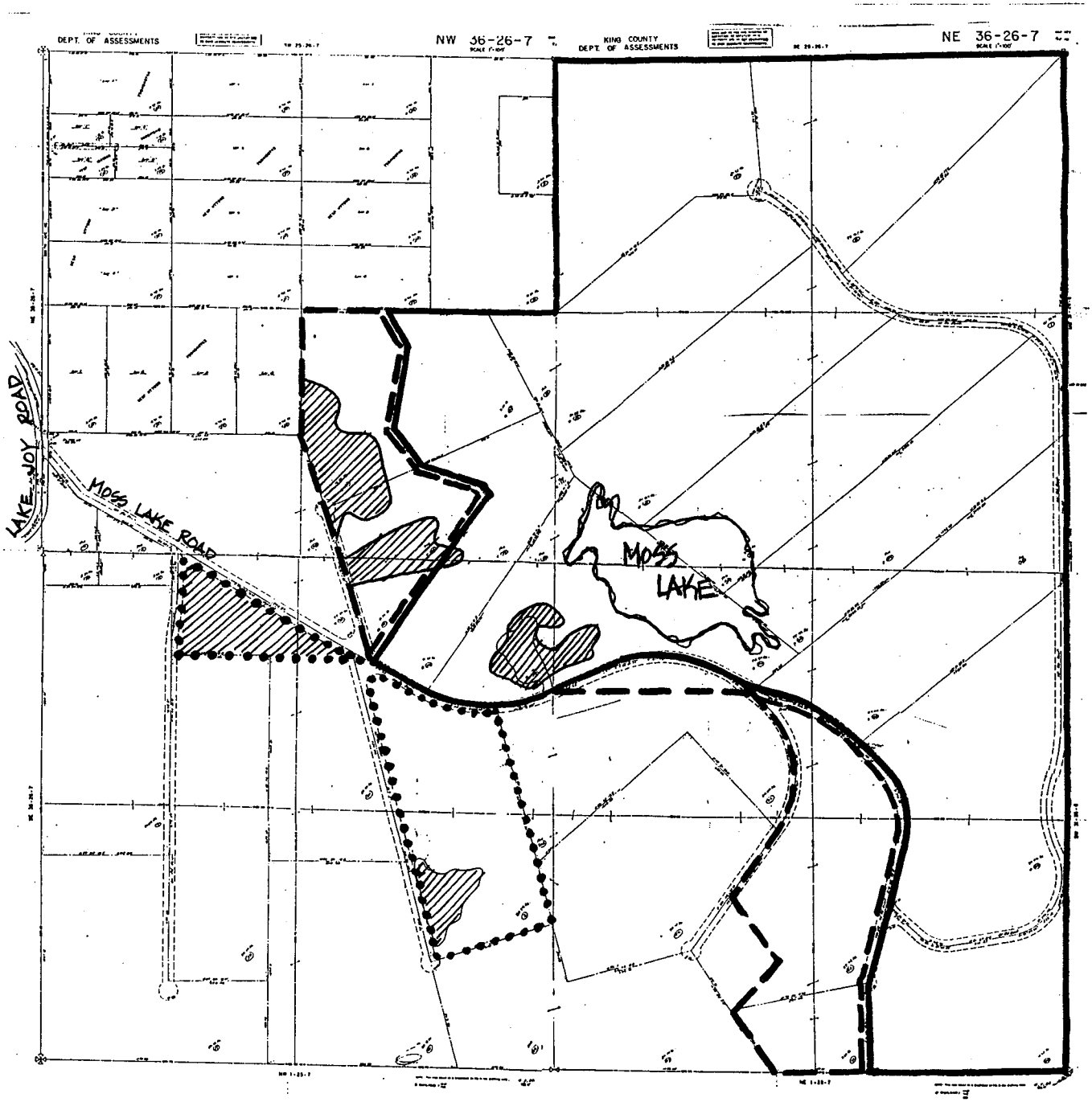


ORIGINAL ACQUISITION (1990) BOUNDARY — 258 ACRES

MOSS LAKE PARK MASTER PLAN PROJECT SUMMARY

Moss Lake Park is comprised of 333 acres of high quality sphagnum bog wetland and associated upland areas, and is considered by King County staff to be the largest and most pristine wetland of its type in the County. Land for the park was acquired through two purchases -- 286 acres in 1990 and 40 acres in 1995 -- and a 7-acre conservation easement. Planning for a passive recreation and environmental interpretive park began in 1994. Facilities would include a small parking area, barrier-free trail, wetland viewing area, and restrooms. The primary users would be supervised school groups of up to 120 students and other interested individuals. Access would be limited to an existing roadway (with minor improvements) and new boardwalk.

A preliminary master plan has been developed based on the draft park program identified in conjunction with King County Facilities staff and a technical advisory committee. Site characterization studies and an alternatives analysis to avoid and minimize impacts are complete and pre-application meetings with DDES and the U.S. Army Corps of Engineers are ongoing. This is a brief overview of our process for selecting a preferred Moss Lake Park Master Plan alternative and ongoing consultations with permit reviewers.

Alternatives Considered

Early site reconnaissance indicated that most of the park site to the west of Moss Lake and adjacent to the existing access road is wetland. Upland areas are largely restricted to the previously logged slopes to the east and northeast of Moss Lake (Figure 1). Small uplands along the western property boundary afforded some potential for siting a parking lot out of wetlands, and several access and layout alternatives were considered from the viewpoints of:

- impacts to wetlands and other surface water features
- traffic impacts associated with park access
- constructability (i.e., can permits be obtained)
- program compatibility (i.e., is the layout conducive to barrier-free access)

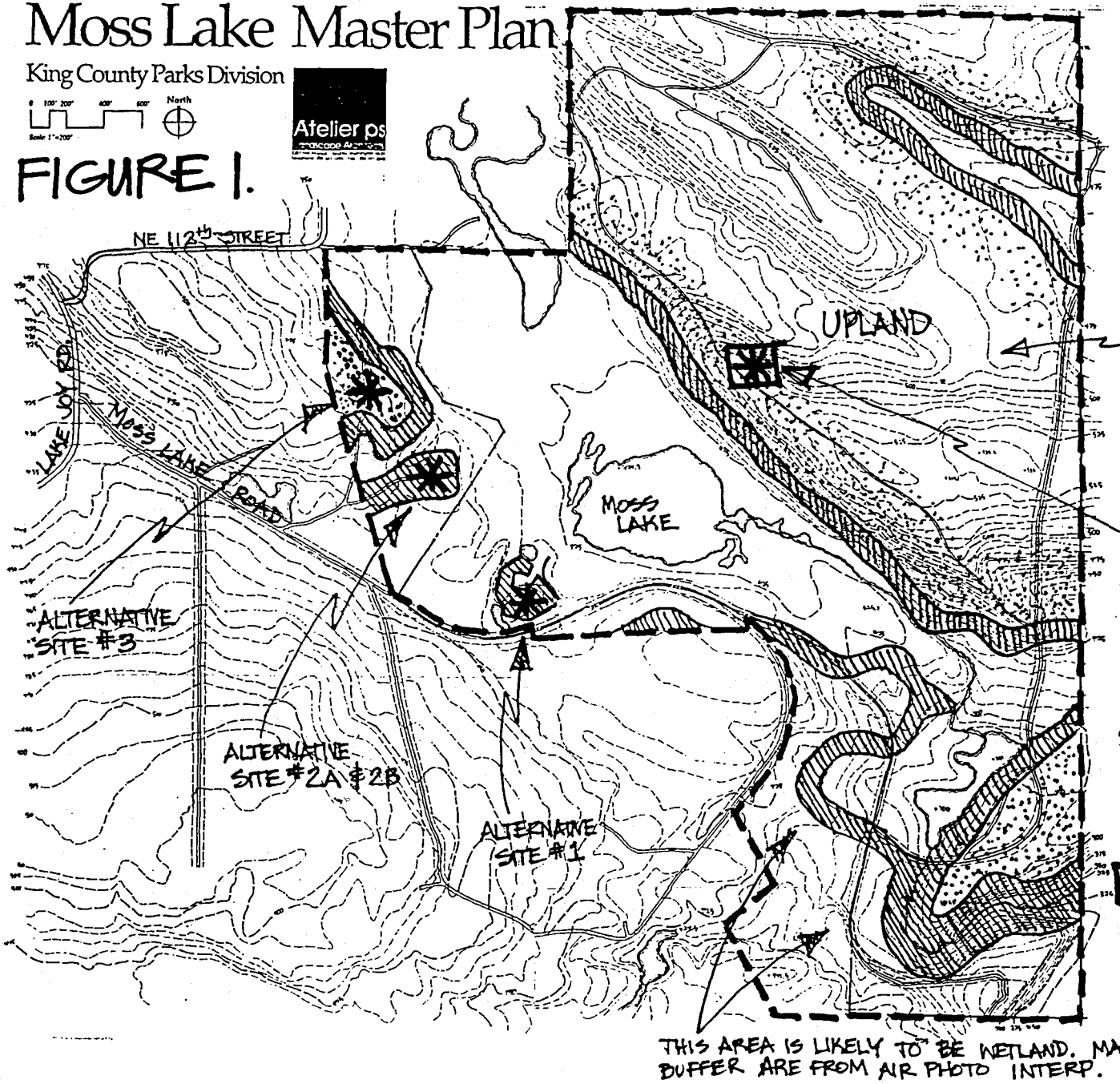
Figure 1 shows the general locations of several access and parking lot alternatives that were considered. Alternative 3 was eliminated from further consideration early-on because of constraints for access from N.E. 112th Street and the extent of barrier-free trail that would be required. Alternatives 2A and 2B (Figure 2) would provide a reasonable compromise between programmatic elements and wetland impacts, particularly if an easement along an abandoned roadbed could be obtained as shown for Alternative 2B.

Moss Lake Master Plan

King County Parks Division

Atelier ps

FIGURE 1.



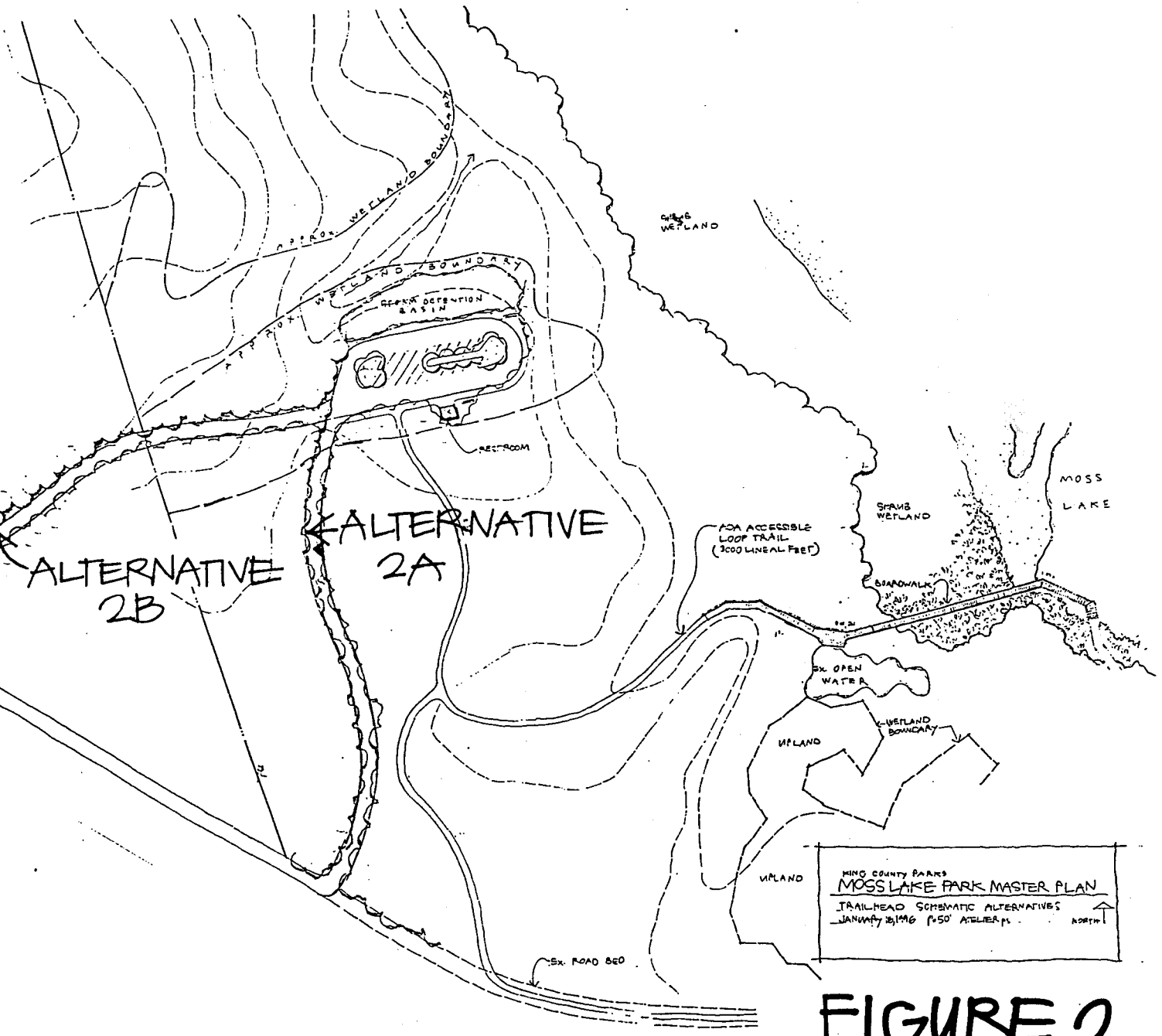

APPROX. WETLAND BOUNDARY
WETLAND BOUNDARY
APPROX.
RECENT DETENTION BASIN
RESTROOM
ALTERNATIVE 2B
ALTERNATIVE 2A
SCRUB WETLAND
ADA ACCESSIBLE LOOP TRAIL (3000 LINEAL FEET)
SCRUB WETLAND
MOSS LAKE
BOARDWALK
EX. OPEN WATER
WETLAND BOUNDARY
UPLAND
UPLAND
EX. ROAD BED
KING COUNTY PARKS
MOSS LAKE PARK MASTER PLAN
TRAILHEAD SCHEMATIC ALTERNATIVES
JANUARY 31, 1996 1"=50' ATELIER 5
NORTH

FIGURE 2.

Alternative 1 (Figure 3) was preferred from a programmatic viewpoint because of its close proximity to potential interpretive viewing areas, but developable upland in the vicinity of the proposed parking lot appeared to be limited based on a preliminary site reconnaissance. Because of the clear programmatic advantages of Alternative 1, additional intensive site work was conducted to delineate wetland boundaries and identify upland in the Alternative 1 parking lot area. Approximately 1.68 acres of upland were identified, providing sufficient area to site the parking lot and restroom facilities out of wetlands. As a result, Alternative 1 would have the least impact to wetlands and has been designated as the Preferred Alternative. Approximate impacts of the Preferred Alternative and Alternatives 2A and 2b are summarized in Table 1.

Preferred Alternative

The preferred alternative illustrated in Figure 3 and Plan Sheet 1 includes the following major elements:

- parking for 16 cars or 10 cars and 3 buses
- improved access road with 20-foot-wide paved surface
- adequate parking lot configuration and roadway load capacity for fire access
- restroom facilities
- drinking water
- barrier-free boardwalk, wetland viewing platforms and interpretive trail
- small group amphitheater
- secondary multiple-use and designated use trails for foot travel, mountain bikes and equestrians

This alternative combines the program advantages of clustering facilities to facilitate barrier-free access and encourage use by educational groups with the environmental advantages of minimizing wetland and wildlife habitat impacts.

Agency Consultations

We have maintained contact with numerous agency reviewers during development of the master plan concept to ensure that all regulatory issues are addressed.

Wetland boundaries in the vicinity of the preferred parking lot were delineated and flagged on March 27, 1996 and verified by the U.S. Army Corps of Engineers on March 27, 1996. The wetland/upland boundary was surveyed

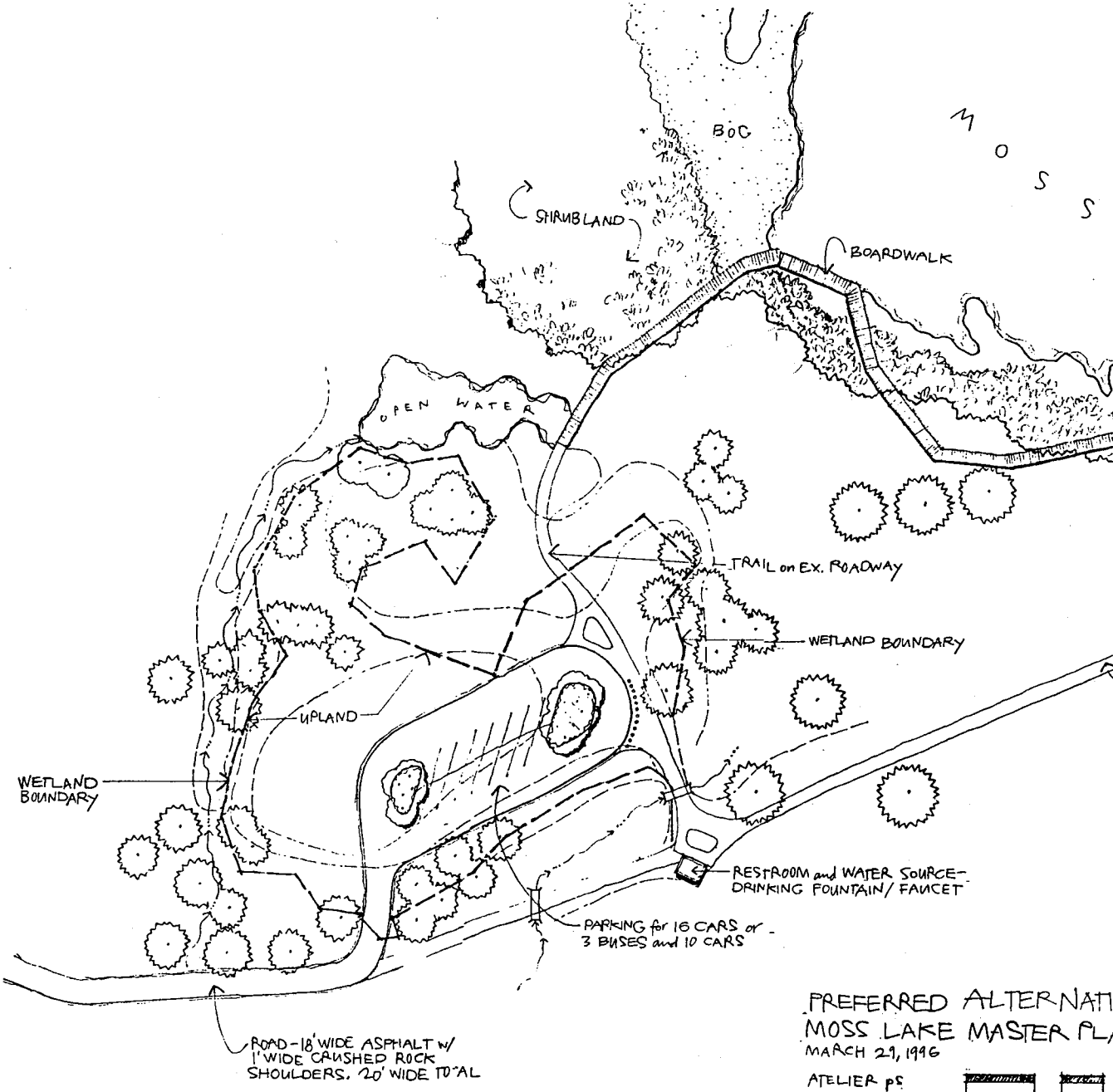

BOC
SHRUBLAND
BOARDWALK
OPEN WATER
TRAIL on EX. ROADWAY
WETLAND BOUNDARY
UPLAND
WETLAND BOUNDARY
RESTROOM and WATER SOURCE- DRINKING FOUNTAIN/ FAUCET
PARKING for 16 CARS or 3 BUSES and 10 CARS
ROAD - 18' WIDE ASPHALT w/ 1' WIDE CRUSHED ROCK SHOULDERS. 20' WIDE TOTAL
PREFERRED ALTERNATI
MOSS LAKE MASTER PL
MARCH 29, 1996
ATELIER ps
0
50
70
100'

FIGURE 3

Table 1. MOSS LAKE PARK ALTERNATIVES
APPROXIMATE WETLAND IMPACTS

	Preferred Alternative (Alternative 1)		Alternative 2A	
New Access Road	30 LF	960 SF	575 LF	18,400 SF
-32-foot road prism				
Improved Access Road				
-total length	2,800 LF		2,100 LF	
-fill on both sides w/ 16' impact	1,600 LF	25,600 SF	1,300 LF	20,800 SF
-cut/fill on one side w/ 4' impact	1,200 LF	4,800 SF	800 LF	3,200 SF
Trail - Boardwalk				
-10 foot total width	680 LF	6,800 SF	900 LF	9,000 SF
Trail - Surface				
-10 foot total width	110 LF	1,100 SF	1,175 LF	11,750 SF
Parking and Detention		0		0
APPROXIMATE TOTAL WETLAND IMPACT		39,260 SF		63,150 SF

and mapped by a King County survey crew and the surveyed boundary has been incorporated into the master plan drawings. A wetland report and field data sheets have been submitted to the Corps and King County, and reviewed by Mason Bowles of King County DDES. Wetland impacts associated with the Preferred Alternative have been conservatively estimated at approximately 0.9 acres. Site specific delineations and accurate wetland impact measurements will be prepared during final design.

In addition to preservation of the Moss Lake wetland system and recent acquisitions of additional buffer area, other mitigation concepts that could be incorporated into project design include:

- Clearly marking limits of construction
- Specifying construction and sequencing that would minimize impacts of trail and boardwalk construction
- Enhancing deciduous forested areas with underplantings of western red cedar, Sitka spruce and western hemlock
- Reintroducing beaver to Moss Lake
- Replacing two small-diameter round culverts at the Moss Lake outlet with large box culvert to improve fish passage
- Consolidating boardwalk development to discourage social trails
- Placing the entry gate as far from Moss Lake as feasible and closing it at night to discourage off-hours use of the park
- Developing a neighborhood adopt-a-park program to ensure ongoing stewardship of the area

Mason Bowles has indicated his general support of the current master plan concept. He has advised us that a Public Agency and Utility Exception (PAUE) will be required for constructing the boardwalk trail through wetlands. Other major elements of the plan would be largely located in wetland buffers.

The Seattle-King County Department of Public Health, represented by Ken Elliott, has indicated that application for a holding tank waste handling g system could require review by the King County Sewage Review Board. This approach is necessitated by the prevalence of wetlands and lack of suitable soils for on-site treatment. Ken has indicated that a holding tank would be feasible, provided that the siting is coordinated with Mason Bowles with regard to SAO requirements and setbacks from surface water features and seasonal water are observed.

Drainage review with Ronaldo Hoelscher during the DDES pre-application meeting indicated that the status of the County's stormwater manual will affect project drainage requirements. We have generally reviewed

requirements under both manuals and either set of regulations would be feasible. We will design stormwater facilities in accordance with the regulations in effect at the time of permit application. King County Facilities staff have also indicated an interest in designing to the innovative standards of the proposed manual even if it is not yet adopted.

Traffic review, provided by Aileen McManus, indicates that half street development would be appropriate for access to the park. The access road would be 20 feet side, paved and without shoulders. This configuration would also meet the fire department requirements for the project.

Water is available from King County Water District #119 at the intersection of Lake Joy Road and Moss Lake Road. The District has capacity to serve the site.

Technical Advisory Committee Meeting, October 19, 1995

Date: October 19, 1995

Project: Moss Lake Master Plan

Purpose: Moss Lake Technical Advisory Committee Meeting

Present: Dyanne Sheldon, Sheldon and Associates
Nick Masla, Department of Construction and Facilities Management
Nona Diediker, Herrera Environmental consultants
Janis Snoey, Atelier
Gerry Adams, Seattle King County Audubon Society
Christine Maxwell, Atelier
Troy Turner, Department of Construction and Facilities Management

MATTERS DISCUSSED:

1. Janis Snoey talked about the project history from inception through consultant selection and their finding of a preliminary analysis and finding of special problems.

2. The primary use of this property will be for organized outdoor education purposes. For this reason the development of Moss Lake may be more intensive than other open space parks classified as Class 1 wetland. Anticipated development would include parking lot, pedestrian and equestrian soft surface trails, two (2) miles of interpretive trails, signs, a picnic shelter with tables on the uplands and possible vault restroom facilities.

3. There are several public open spaces in the valley, but not many on the hillside such as Moss Lake. Moss Lake offers a totally different hydrological regime when compared with the numerous open spaces in the valley. This different regime allows the school districts the opportunity to interpret a hillside site rated the highest wetland in quality of habitat, abundance and diversity of plant and animal species in King County (King County Sensitive Area Mapping report).

4. The major problem anticipated for development is suitable location of parking lot. The discussion considered several approaches:

   A parking lot could be feasible by taking a path through the wetland in order to find a non-wetland area for parking. Although there would be no need to fill the parking area, the path taken in order to get to this area would be very long and have a major wetland impact. This route would have to meet all applicable accessibility and sensitive area codes.

   Another alternative for parking at Moss Lake would be to fill some borderline wetland for parking near the location of the first gate opening. This parking area would have efficient diameter to allow a bus to turn around. In this parking area there would be sufficient spaces for 20 cars to park. The parking lot would offer the least amount of distance through the wetland, with minimal fill. The fill for the proposed parking area would be half the amount when compared to taking a path through the wetland. The minimal fill would only be for the greater good of interpreting the site.

5. The other site plan issues include equestrian use and ADA routes. Equestrian use would only be allowed in certain areas due to the sensitive nature of the site. These areas would be signed as such. There will be at least one route for ADA. This route would allow access to the major areas of the site within reason.

6. The Technical Advisory Committee agreed that impact to the wetland may be unavoidable in order to open the site to public use. The committee discussed the possibility of constructing a 20-car, 3-bus parking area on a former logging landing site. This site would be classified as forested wetland. The committee agreed that given current information this may be the best alternative.

Please submit any additions or modifications at your earliest convenience.

cc: Dyanne Sheldon, Sheldon and Associates
Nick Masla, King County Facilities Management
Nona Diediker, Herrera Environmental Consultants
Janis Snoey, Atelier
Gerry Adams, Seattle King County Audubon Society
Christine Maxwell, Atelier
Troy Turner, King County Facilities Management
Kate Stenberg, Development and Environmental Services
Ruth Schaefer, Surface Water Management
Kern Ewing, CUH, University of Washington
Tony Angel, King County Environmental Education Group

Technical Advisory Committee Meeting, March 15, 1996

Date: March 15, 1996

Project: Moss Lake Master Plan

Purpose: Moss Lake Technical Advisory Committee Meeting

Present: Dyanne Sheldon, Sheldon and Associates
Kern Ewing, CUH, University of Washington
Kate Stenberg, King County Wildlife Program
Robin Cole, Department of Construction and Facilities Management
Ruth Schaefer, King County Surface Water Management
Chuck Lennox, King County Parks
Troy Turner, Department of Construction and Facilities Management
Nick Masla, Department of Construction and Facilities Management
Kittie Ford, Atelier
Janis Snoey, Atelier

MATTERS DISCUSSED:

1. Consider County's trail standards during master planning to ensure consistency and constructability.

2. Specify that the limits of construction will be flagged before any work occurs on-site to minimize impacts to sensitive environments.

3. Picnic shelters are typically about 450 square feet in area.

4. A park entrance gate should be located further back from Moss Lake than the existing gate.

5. Recommend investigating designation of the lake for catch-and-release fishing. Sometimes lakes are adopted by fly fishing clubs to encourage stewardship of the resource. Also recommend that boat access is limited to small non-motorized craft.

6. Recommend investigating an adopt-a-park program for community involvement.

7. Keep boardwalk/parking development consolidated to minimize impacts and reduce tendency for social trails. Utilize already disturbed areas.

8. As mitigation, recommend underplanting alder areas with cedar and hemlock.

9. Beaver have recently been reintroduced into Moss Lake. Recommend continuing with this to redevelop population.

Project Pre-Application Meeting, May 2, 1996

Date: May 2, 1996

Project: Moss Lake Master Plan, Project File No. A96M0012

Purpose: Pre-application Review

Present: John Rae, TST/Building
Ronaldo Hoelscher, TST/Drainage
Aileen McManus, Traffic Review Engineer
Anna Nelson, TST/Zoning
Ken Elliott, Seattle-King County Department of Health
Robin Cole, Department of Construction and Facilities Management
Nick Masla, Department of Construction and Facilities Management
Troy Turner, Department of Construction and Facilities Management
Janis Snoey, Atelier
Kittie Ford, Atelier
Steve Phelps, TST/Fire (represented by proxy)

Extensive one-on-one consultations with King County staff occurred over several months time to determine regulatory requirements for facilities at Moss Lake. Input received at the meeting was an encapsulation of previous conversations held with representatives of the various departments responsible for project input.

MATTERS DISCUSSED:

1. Holding tank toilets would be permissible for this project if water is brought in from Lake Joy Road. These facilities can be approved by the District office without special review through the variance process. Vault privies, which do not require water, will require a variance from the King County Sewage Review Board. Siting of either type of facility must meet setback requirements from seasonal and surface water, consistent with code. Any variation from setback requirements also requires variance from Sewage Review Board. The design for a holding tank toilet or vault privy should be submitted to district office by a licensed designer for review. Sewage Review Board process takes about 60 days.

2. Road requirement for the park will be a half street with 20-foot road surface and no shoulders. Alternative design would be minor access road with 20-foot road surface and 4-foot shoulders. If a gravel road surface is requested, a variance would be required. Application could occur prior to submittal of complete application, so issue can be resolved prior to completion of final design. The portion of the Moss Lake Park access road that extends from Lake Joy Road to the park boundary will likely be used for residential access in the future. Private homes may be developed on currently vacant land to the south of the park, which is currently zoned for one home per five acres. Road upgrade may be required depending on the number of homes developed.

3. Because of the unique character of the park and the lack of easily developable land for parking, the number of parking stalls required wil vary from usual standards. A suggestion is to look at other constrained parks for examples. ADA parking should include one van stall with appropriate drop off/unload area consistent with WAC 51.30, Section 11.07. Other WACs for ADA final design include WAC 51.30, Sec. 11.06 regarding accessible route and Sec. 11.03 regarding amphitheater. Recommend consulting with Steve Phelps (296-6786) regarding need for 20-foot emergency access road to amphitheater.
4. Mason Bowles, DDES, was unable to attend to discuss wetland issues. Consultant has coordinated extensively with Mason prior to the pre-application meeting. No master plan changes are anticipated resulting from wetland-related design issues.

5. Storm water management requirements for the project may change when a proposed new manual is adopted by the County. Requirements under the proposed new manual would include a 3-facility treatment train for protection of the sphagnum bog consisting of a biofiltration swale, leaf compost filter and sand filter. The use of porous pavement could be investigated as an alternative to one of the treatment filters. If the County choses to design to the possible new standards prior to adoption of the manual, it would require a variance for approval. Under current regulations, Detention would be required if runoff rates increase by more than 0.5 cfs. New impervious surfaces exceeding 5,000 square feet in area require water quality treatment in the form of a biofiltration swale. Filter strips have also been approved in some cases. A TIR is required addressing core and specific requirements. Floodplain regulations are not an issue.

6. Gates should provide a 20-foot clear width for fire access. Road surface must be paved if grades exceed 12 percent. If gate is closed and locked at night, the locking device must be approved by the King County Fire Marshall's office.

Public Review Meeting, May 29, 1996

Date: May 29, 1996

Project: Moss Lake Park Master Plan

Purpose: Obtain public input to plan

Present: Dick Buse, 9424 Carnation-Duvall Road, Carnation WA 98014
Cindy Druschba, 35633 N.E. Moss Lake Road, Carnation WA 98014
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(Lake Joy Community Club President)
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Kaimy Brasch, 11405 W. Lake Joy Drive N.E., Carnation WA 98014
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Terry Olson, 11203 E. Lake Joy Drive N.E., Carnation WA 98014
Nick Masla, King County Dept. of Construction and Facilities Management
Troy Turner, King County Dept. of Construction and Facilities Management
Janis Snoey, Atelier
Kittie Ford, Atelier

A public meeting on the draft Moss Lake Regional Park Master Plan was held at the City of Duvall Public Library Rose Room on May 29, 1996 at 7 PM. Comments received from the public include the following:

1. At least two peat operations have been undertaken at the site. The lake shore has been the same since the 1920s. Peat was excavated by hand for about 6 months in the 1940s in addition to mechanized operations.

2. It is a waste of money to limit access to the park. The plan should provide better access to the eastern upland.

3. How can the County limit night use of the park? Is it feasible to gate the park? Possibilities for gate attention include park staff, police, or local adopt-a-park program.

4. Small park being developed on Lake Joy parcel is funded through Surface Water grant.

5. Park on Lake Joy should not be advertised.

6. The original bond issue was for 411 acres. How can County acquire the balance of the land? Possibilities include eminent domain, land swaps and additional open space funds.

7. Mountain bikes - What will be the use pressure? Can they be excluded?

8. Horse use is primarily local. Will there be specific horse trail parking? Will you preclude horses because of land damage?

9. Park should be called an "educational" or "interpretive" park.

10. Include a high viewing tower.

11. If water is brought to the site, is the agreement strictly between King County Parks and Moss Lake Associates, or can others tie in?

12. Regarding the water level change in Moss Lake, is it caused by beavers or other source?

13. Can you provide a safe play area for toddlers?

14. What will be done if overuse becomes a problem? Include a monitoring plan for trail/wetland impacts.

15. Will there be an emergency phone? Emergency services currently come from Carnation.

16. Be aware of winter use of Moss Lake. People occasionally ice skate - a hazard.

17. Is there a fire hazard plan?

MOSS LAKE MASTER PLAN

Natural Resource Studies

Prepared for

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INTRODUCTION

This report presents a characterization of the plant communities, wildlife habitat, and hydrologic conditions in and around Moss Lake, to assist in development of a King County park master plan. King County purchased a 286-acre parcel, which includes the 30-acre Moss Lake, to develop a passive recreation park for county residents. Potential elements of park development include a parking lot for park visitors, trails, and interpretive signage. Final design elements will be determined during development of the park master plan and will be driven by the site's natural features and regulatory restrictions.

The Moss Lake site is located approximately 4 miles northeast of Carnation, Washington, in section 36, township 26 north, range 7 east. The site historically has been used for logging and peat mining activities. The forests have since regenerated into older second-growth forests. Moss Lake itself, which was created by extraction of peat from the large onsite bog, and its associated wetlands are recognized as an important natural resource in King County. The lake, its wetlands, and other wildlife habitats form a pristine environmental setting relatively untouched by human activity. Development of a passive recreation park with natural science learning opportunities requires an understanding of the natural resources that currently exist at the site and monitoring of these resources to ensure that they are not disturbed by park activities.

To ensure protection of the natural resources associated with the Moss Lake site, it is necessary to generally characterize the vegetation communities (habitats), sensitive areas (wetlands and nesting areas), and hydrologic patterns that currently exist at the proposed park and surrounding areas. This report presents the results of the site characterization study. Additional wetland delineations and hydrologic analyses should be conducted at site specific locations for each phase of park development.

The following sections of this report include descriptions of the existing natural resources at the Moss Lake site and recommendations for buffers, enhancement opportunities, and future studies, as well as a discussion of regulatory issues that may need to be addressed as the park development proceeds.

PLANT COMMUNITIES AND WILDLIFE HABITAT

Management of wildlife habitat and populations is an integral part of the park planning process. Habitat and population management is most important in undeveloped areas. The Moss Lake site covers approximately 286 acres that has been relatively undisturbed for the last 40 to 50 years. The site was openly accessible to the public until the fall of 1995, when King County erected a road gate to restrict access. The site historically has been used for off-road bike riding, horseback riding, and as an informal gathering place for late night revelry and campfires. These activities have resulted in the degradation of the wetland habitat at the south-southwest edge of the lake. During a site visit in October after the gate was erected, fresh bike and horse tracks were visible throughout the unimproved main trails around the perimeter of the lake.

Given the size of the site, its wildlife habitat diversity, and its relatively undisturbed character, Moss Lake is considered an important regional natural resource. The importance of the natural resources of the Moss Lake site will increase as development encroaches further upon the rural areas of King County. The following section describes the methods used to complete the first step to generally characterize the vegetation communities, sensitive areas, and hydrologic patterns that currently exist at the site.

MATERIALS AND METHODS

In order to assess the existing plant communities and wildlife habitat at the Moss Lake site, the following materials were reviewed:

- Color aerial photographs of the site (taken in fall 1992 and spring 1995) at a scale of 1 inch to 200 feet
- U.S. Geographic Survey (USGS) topographic map, 7.5-minute series (Lake Joy quadrangle)
- Topographic map of Moss Lake (produced by Atelier in 1995) at a scale of 1 inch to 200 feet
- Soil survey of Snoqualmie Pass area and parts of King and Pierce counties (U.S. Soil Conservation Service [U.S. SCS] 1992)
- King County Sensitive Areas Ordinance and Sensitive Areas Map Folio (King County 1990a,b)
- King County Wetlands Inventory (King County 1990c)
- King County Comprehensive Plan (King County 1994).
- Moss Lake Wetland Study (Sheldon 1983).

Limited field reconnaissance of the site was conducted to verify existing data and locate areas of special interest. The reconnaissance was conducted on several days between January and March 1995 and on October 30, 1995. Information concerning plant species, sensitive plant communities, drainage patterns, and signs of wildlife (e.g., scat, burrows, sitings, and tree excavations) were recorded in a field logbook as well as on the topographic map during the fieldwork. A map of hydrologic features and vegetation communities was created from information gathered in the field and comparison of this information to a recent aerial photograph (Figure 1). Because the fieldwork was limited in scope, additional plant communities on the site may not have been observed and therefore would not have been mapped.

This natural resource study was conducted to determine the overall structure of plant communities of Moss Lake and to identify special natural features that should be protected or enhanced. More detailed fieldwork should be conducted in specific areas of potential impact prior to each phase of park construction. This fieldwork should include delineation of potentially affected wetlands and their buffers, and identification and mapping of specific significant habitat features (e.g., snags and perching or nesting trees).

RESULTS

Each individual plant community creates distinct environmental conditions that fulfill the habitat requirements of certain populations of wildlife species. Brown (1985) describes a system by which standard forest inventories can be translated into information on wildlife habitat. This reference classifies habitats according to plant community designations. The habitat value is then determined by physical characteristics of the community (e.g., plant diversity, canopy, and structural diversity). The King County Open Space Program expanded on this concept to include habitat types in addition to forested community designations (King County 1987).

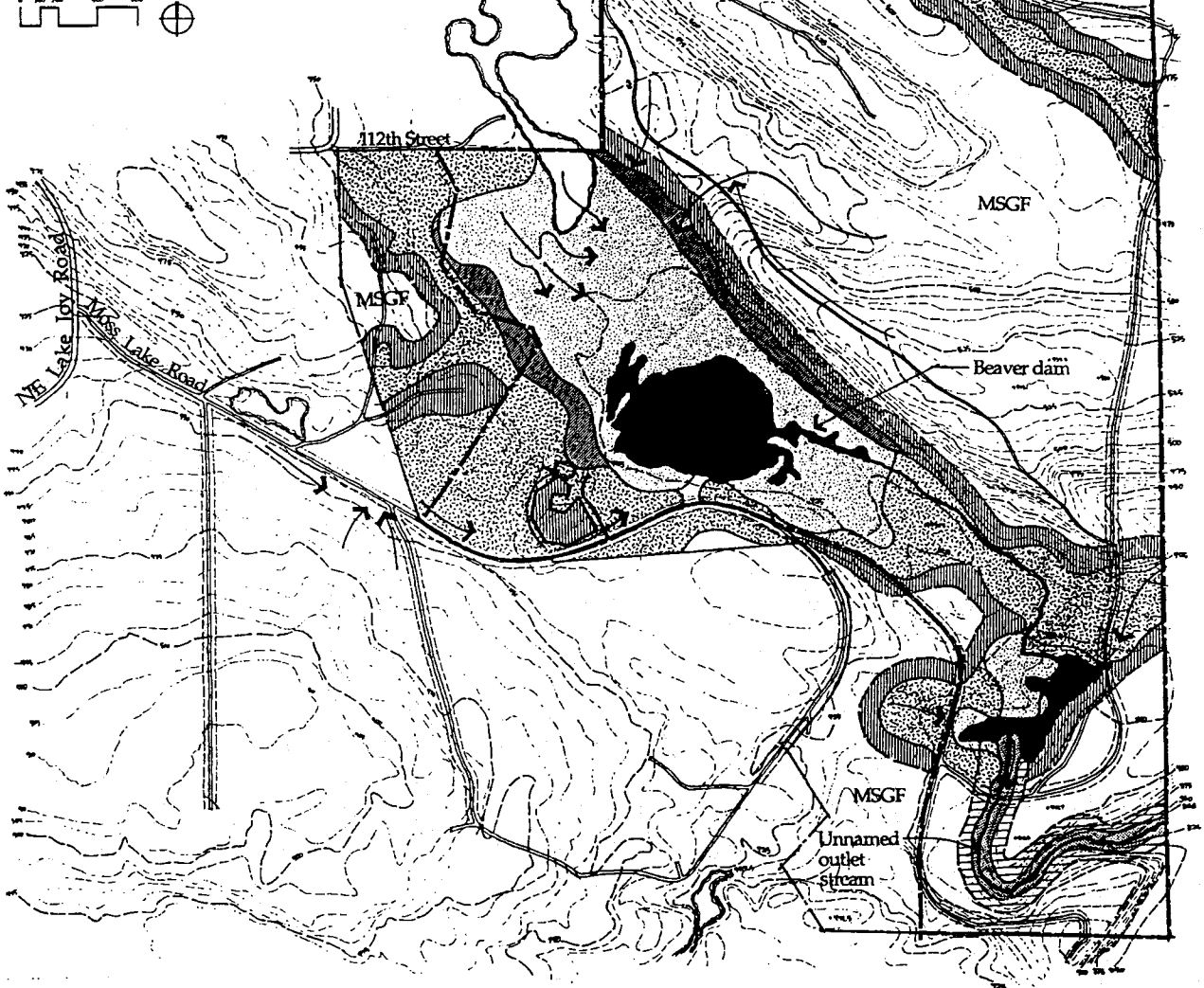
These classification systems enable effective management and conservation of wildlife habitats through identification of existing habitat values and potential areas for enhancement. Through identification of the existing plant communities at the Moss Lake site, the wildlife habitat potential can be determined, and effective planning for preserving and enhancing these habitats can be implemented during the park development process.

Plant Communities and Habitat

Plant communities were identified by field reconnaissance and review of existing information and aerial photographs. Dominant species were identified in the field, and their locations were recorded on a base map. This information was then translated for use within the King County wildlife habitat classification system.

Existing Plant Communities

Locations of the existing plant communities are presented in Figure 1. A list of dominant plant species representative of each community at the Moss Lake site is presented in table format in



Hydrology & Vegetation

Legend

- MSGF - Mixed Second Growth Forest
- Riparian Forest
- Shrub Wetland
- Bog
- Forested Wetland
- Open Water
- 100' King Co. Wetland Buffer
- 100' King Co. Stream Buffer
- Major Drainages

Appendix A. The following text gives general descriptions of each community and its value as wildlife habitat.

Shrub Wetland

Shrub wetland is a shrub-dominated freshwater wetland habitat. There are approximately 10 acres of shrub wetland habitat on the Moss Lake site. This type of wetland occurs on the east and west banks of the lake (Figure 1). Many areas of standing and running water were noted in these wetlands.

Shrub wetlands can constitute a successional stage or can remain stable communities if hydrologic conditions persist. The shrub wetlands that occur at the site are located in association with the lake and will likely remain wetlands unless the surface water hydrology patterns of the site are altered.

The shrub wetlands located on the perimeter of Moss Lake are dominated by hardhack and red alder and willow saplings. Dominant vegetation occurring beneath the cover of hardhack and tree saplings includes sphagnum moss, lady fern, and Labrador tea.

Shrub wetlands support few wildlife species compared to other wetland types (King County 1987). The most important function of the shrub wetlands at Moss Lake is to provide cover for aquatic species of wildlife. These wetlands, located immediately adjacent to open water, allow for quick escape from predators. In addition, these wetlands provide nesting opportunities for aquatic birds as well as resources for beaver activity. Numerous signs of beaver activity (i.e., gnawed down saplings) were noted in the shrub wetlands during the field reconnaissance. Other wildlife species that may use this habitat include frogs, snakes, aquatic birds, mink, and muskrat.

Bog

Bogs are unique plant communities that are formed in poorly drained lakes or ponds. The bogs are formed when dying sphagnum moss and other plants partially decompose under anaerobic conditions and accumulate as peat. Only very specialized plants can survive in bogs due to low concentrations of nutrients and acidic conditions. Bogs are rare vegetation communities and of limited distribution in King County and are very susceptible to impacts from development.

The Moss Lake bog covers approximately 50 acres (Figure 1) and receives its surface water runoff from the north, east, and west portions of the site. The runoff then drains into the lake, then into the outlet stream that feeds into the Tolt River downstream. The King County Wetlands Inventory (King County 1990c) identifies this bog as a palustrine scrub-shrub broad-leaved evergreen wetland. The dominant vegetation species present include hardhack, Labrador tea, marsh cinquefoil, and red-osier dogwood. In addition, species found around the perimeter of the bog immediately adjacent to open water include cattail, sedges, rushes, and cottongrass. All of these species exist on top of a thick layer of living sphagnum moss.

Vertebrate use of bog habitats is limited primarily to amphibians. However, the habitat value of this bog is increased due to its proximity to open water, the shrub wetlands, and surrounding forested communities, all of which together provide varied habitat structure and foraging opportunities. Additional wildlife species that may use the bog include green-backed heron, wood duck, mallard, red-winged blackbird, and muskrat. A beaver lodge was noted on the bog in the northernmost portion of the open water during the October 1995 site visit. A beaver report (the slapping of an individual beaver's tail on the water) was heard in this area during a spring 1995 visit.

Riparian Forest

Riparian forests occur in a typically narrow riparian zone along the shores of rivers, streams, lakes, or ponds. Riparian forests are generally dominated by deciduous trees rather than conifers because the soils in the riparian zone are typically saturated, a condition to which most conifers are not adapted.

The 5-acre riparian forest habitat in Moss Lake is located along the outflow stream to the south of the lake (Figure 1). This habitat is composed of a mixed forest community. The dominant tree species in this riparian zone are red alder, western hemlock, and big-leaf maple, with an understory of salmonberry, thimbleberry, and sedges.

The riparian forest typically is a valuable wildlife habitat due to its vegetation species diversity, which provides tree, shrub, and herbaceous layers, and the habitat's direct association with water, which is a critical wildlife resource. The riparian habitat along the Moss Lake outlet stream likely provides habitat for salamanders, treefrogs, garter snakes, opossums, rabbits, muskrats, raccoons, minks, coyotes, and deer.

Forested Wetland

Forested wetlands are plant communities that are dominated by deciduous or coniferous trees in areas where the soils are saturated for the majority or all of the year. Typically, in forested wetlands, the soil is saturated to within a few inches of the surface throughout the dry season. Some trees adapt well to these saturated areas, while others may die if the soils remain saturated for an extended period of time.

Hydrologic conditions must remain stable for forested wetland plant communities to remain at a stable successional stage. Extreme flooding or extreme drought can kill a mature forest and alter the natural succession. The forested wetlands at Moss Lake are older second-growth stands and therefore have experienced fairly stable hydrologic conditions. The youngest forested wetland at the site is to the southwest of the lake (Figure 1). This area is dominated by older red alder, which is typically the first species to reforest an area after removal of the existing forest. Other dominant tree species of the site's forested wetland communities include redcedar, cottonwood, and hemlock. Typical understory species include salmonberry, sword fern, lady fern, skunk cabbage, buttercup, and water parsley. The forested wetlands located west of the lake and north of the access road have numerous areas of standing water and flowing water migrating toward

the lake. These water-saturated areas have killed many trees, creating areas with numerous downed trees.

Forested wetlands provide habitat for a variety of birds, mammals, and amphibians. However, because the understory of forested wetlands is usually not well developed due to the wet conditions, other forested communities typically provide better habitat. The forested wetland communities at Moss Lake generally do not exhibit well-developed understories. These areas do not vary significantly in structure or species diversity. The most important wildlife function of these forested wetlands is that they provide shelter and serve as corridors for access to the lake and upland habitats. Some of the wildlife that may be found in the forested wetlands onsite include garter snakes, frogs, green-backed herons, wood ducks, woodpeckers, songbirds, raccoons, minks, bobcats, and deer.

There are approximately 50 acres of forested wetland on the 286-acre Moss Lake site.

Open Water

Moss Lake was created by extraction of peat from the large bog. The lake receives freshwater from surface flow around its east, north, and west perimeters. These hydrologic conditions appear to have been persistent for numerous decades, based on observations of the existing plant communities. Review of historical aerial photographs of the lake taken at different times of the year demonstrate that the lake experiences seasonal water level fluctuations.

Lake productivity is based in part on the level of photosynthetic activity. Up to a point, higher productivity generally supports a more diverse population of plants and animals. The overall clarity of water in Moss Lake is low due to the dark coloration of the water. This dark coloration is caused by tannins in the peat. Because sunlight does not penetrate very far into the water, photosynthetic activity (and thus productivity in the lake) is very low. In addition, the water in the lake tends to be acidic, which is also due to organic acids generated by the peat. Acidic conditions in these waters also tend to limit lake productivity.

Moss Lake consists of approximately 40 acres of open water. Wildlife use of Moss Lake is primarily as a water source for terrestrial animals and as foraging habitat for amphibians, aquatic birds, and mammals. The shrub wetland surrounding the open water increases wildlife use by providing shelter and nesting locations. Potential wildlife use of the lake includes numerous species of waterfowl, frogs, toads, salamanders, beavers, muskrats, raccoons, minks, and river otters. Of the many waterfowl species that could be users of the open-water habitat, few have been documented at the site. Low waterfowl use of the lake is likely due to low productivity, which in turn does not provide an adequate food source for many species.

Second-Growth Lowland Forest

Second-growth forest refers to a forest that is regenerating after being reduced to an early successional stage, generally through harvesting or forest fire. The second-growth generation begins to develop at a stand age of 20 to 30 years, and if undisturbed, it succeeds into a mature

forest at approximately 80 to 100 years of stand age. Trees of the second-growth forest are generally over 20 feet high with a crown cover generally exceeding 60 percent. Since most of the old-growth forest that once covered the majority of King County has been harvested, the second-growth forest has become the most common forest type in the county. The type of second-growth forest found at the Moss Lake site is composed of both deciduous and coniferous tree species. This type of community is called mixed second-growth forest.

The mixed second-growth community is composed of deciduous species and coniferous species with each group make up between 30 and 70 percent of the canopy area. This type of community occurs in large stands to the southwest of the lake and on the entire hillside east of the lake, covering approximately 130 acres of the site (Figure 1). The dominant tree species of this community include big-leaf maple, vine maple, Douglas fir, redcedar, hemlock, and red alder. Associated dominant understory species include osoberry, sword fern, Oregon grape, and blackberry.

Second-growth forest provides habitat for a wide variety of birds, mammals, and amphibians. The habitat quality generally increases with increases in structural levels and plant species, numbers of snags, the amount of downed woody material, and the extent of well-developed edges bordering on other habitat types. Wildlife likely to use the upland forests of the site include salamanders, frogs, garter snakes, hawks, owls, woodpeckers, songbirds, opossums, moles, squirrels, black bears, raccoons, skunks, coyotes, foxes, bobcats, and deer.

Unique or Sensitive Plant Species and Habitat

The Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species Information System was consulted for information concerning the occurrence of sensitive plant species or communities in the project area. This information was verified and supplemented through field observations. Features not appearing in the WDFW database but observed in the field were documented.

Moss Lake and its associated wetlands are identified by the WDFW database as Tolt River wetlands priority habitat. In addition, the unnamed outflow stream is identified as important habitat for anadromous fish runs and as a priority fish species habitat. Under the King County Sensitive Areas Ordinance, all of the streams and wetlands onsite are considered sensitive areas and priority habitats as defined by WDFW.

The most sensitive of these areas is the bog. Because bogs are such specialized plant communities and take thousands of years to evolve, they are very sensitive to changes in surrounding environmental conditions. Changes in hydrologic flow, water pollutants, and sediment deposition, as well as physical damage due to foot traffic, can alter a bog to the extent that it dies, succeeding into another more common plant community.

During the field reconnaissance, a beaver dam was observed at the southeast edge of the open-water habitat. The beaver dam appears to create the change in habitat along this edge from open water to bog community by restricting the open-water flow to a small stream that flows to the

southeast over the dam. This dam is actively being maintained by beavers, as signified by the beaver feces found on submerged logs and beaver tracks found on the dam itself during the October 1995 field visit. The existing beaver dam is an important habitat element associated with the Moss Lake system. Damming of the southern end of the lake slows water flow through the lake and allows stable hydrologic conditions to support the bog community. In addition, the beaver dam helps reduce sedimentation inflows entering the outlet stream.

Enhancement Potential

Wildlife habitat management should be considered a park function directed toward the goal of providing habitat to support a variety of viable wildlife populations. Management of the habitats should include consideration of habitat elements that provide special wildlife resources. The elements applicable to Moss Lake include snags, edges, and dead and down woody material (i.e., stumps, rootwads, bark, limbs).

Snags are dead or partially dead trees that have undergone various degrees of decay but are still standing. These snags serve as wildlife nesting sites and food sources. Cavities created in snags are used by nearly 100 species of wildlife throughout the forests of western Washington and Oregon, of which 39 species of birds and 14 species of mammals are cavity-dependent (Brown 1985). Woodpeckers feed on insects found under the bark and in the decaying wood of snags. Some large birds of prey use the tops of snags for nesting and for perches.

Edges are formed where two different plant communities meet. The edges form a transition zone between the two communities that often is composed of features of both communities. This zone adds structural diversity to wildlife habitat. A wide variety of wildlife species use the edge as well as the habitats on either side (King County 1987). Edges can fulfill some or all of the habitat requirements of a variety of wildlife species (Brown 1985). In general, the wider an edge and the more contrast in structure it provides, the greater number of wildlife species it can support.

Dead and down woody material is composed of fallen limbs, stumps, exposed root balls, and fallen logs. This material provides food sources for species that feed on the insects living in the wood and provides cover and nesting sites for many other species. In addition, down material contributes to mineral cycling, nutrient mobilization, and natural forest regeneration (Brown 1985).

Sensitivity of Plant Communities to Recreational Uses

The specialized plant species occurring in bogs are sensitive to changes in the microclimate or in the chemical and physical conditions of the water. Intensive recreational use can destroy the vegetative mat. Because regeneration occurs so slowly, bogs are not likely to recover from intrusive activities that destroy the vegetation. Therefore, the protection of bogs must include control over adjacent land uses and over the quality of water that enters them (King County 1987).

Activities on land can have significant impacts on rivers and streams, and the use of these aquatic habitats by wildlife depends on the nature and condition of adjacent habitats. River and stream habitats should be managed in conjunction with the riparian zone habitats that border them.

The existence of forest cover and associated vegetation along watercourses of the site can enhance the value of adjacent aquatic habitats by buffering them from disturbances. The forest serves to stabilize stream banks; decrease the amount of debris, soil, and organic material that enters the water in runoff; and shade potential fish-rearing areas. Riparian forest also provides protected access to water for forest-dwelling animals.

Recreational activities can result in the following direct and indirect impacts on riparian habitat elements required by fish and wildlife: increased surface water flow, stream channel scouring, increased sedimentation, altered microclimate, stream bank erosion, increased stream temperatures, reduced amount of large organic debris, stream channel changes, habitat conversion or loss, water contamination, removal of riparian vegetation, reduced vegetation regeneration, soil compaction, loss of habitat connectivity, and reduced structural diversity (WDFW 1994). Activities in proximity to riparian zones should be limited with very restrictive use guidelines.

Guidelines for Buffers

The King County Sensitive Areas Ordinance establishes minimum buffer requirements for sensitive areas that must be protected during development of the park. The buffer requirements that apply to Moss Lake natural resources are those established for wetlands and streams. Requirements for stream buffers, which are based on flow and salmonid use, range from 25 to 100 feet. Near the confluence with the Tolt River, the outlet stream is classified by the SAO as a class 2 stream with salmonids. The remainder of the stream up to the lake is unclassified. Class 2 streams used by salmonids must have a minimum buffer of 100 feet in order to comply with SAO requirements. Stream buffers are discussed further in the hydrology section of this report.

Moss Lake and its associated wetlands are classified by King County as class 1 wetlands, the highest wetland rating. The Moss Lake wetlands are assigned a class 1 rating based on the following attributes: presence of suitable bald eagle habitat, composition of 40 to 60 percent open water, coverage of more than 10 acres with more than three wetland classes, and presence of the bog. King County class 1 wetlands require a minimum buffer of 100 feet.

The WDFW is currently developing guidelines for management of all state-defined priority habitats. The guidelines are to be used as a tool by land owners, planners, elected officials, and the public, to minimize impacts on priority habitats and species (WDFW 1994). Currently, only the riparian management recommendations are completed and available for use. These management guidelines include recommendations for buffers in order to maintain the integrity of the habitats.

Riparian buffers should be of sufficient size to support and maintain productive fish and wildlife populations. The WDFW recommends that any new recreational facilities in riparian habitats

should be avoided. If such development cannot be avoided, the following guidelines are recommended:

- Limit high-impact recreational facilities in riparian habitat
- Retain natural vegetation and structures in recreational facilities
- Place new facilities in areas with lower potential for impact (e.g., stable slopes)
- Locate facilities well away from streams, using appropriate buffers (see hydrology section)
- Locate high-impact trails a minimum of 1,200 feet away from streams (WDFW 1994).

Wildlife Management

Wildlife Species

The 286-acre Moss Lake site provides a diversity of wildlife habitat from open water to second-growth forests. Shrub wetland edges form a transition zone between the open water and forested communities. Because the site is so large and diverse, and is adjacent to other undeveloped properties, it has a high wildlife usage potential.

Using the systems developed by Brown (1985) and King County (1987), wildlife use of the site can be estimated based on the types of habitat present. Appendix B presents a list of wildlife species that may be expected to use the Moss Lake site and the respective habitats in which they may be found.

Fisheries

There have been numerous studies of fish in the Tolt River and its tributaries, including the outlet stream of Moss Lake. However, fish use of Moss Lake has not been well documented. A *Catalog of Washington Streams and Salmon Utilization* (Williams et al. 1975) identifies the outlet as unnamed stream #0298 at river mile 7.5 of the Tolt and lists the stream as 1.15 miles in length. The Moss lake outlet stream is identified as coho salmon habitat.

In 1993, a fish resource assessment team was formed by the Weyerhaeuser Company to gather information and conduct stream surveys of the fish resources of the Tolt River and its associated streams. The study team consisted of persons from Weyerhaeuser, Washington Department of Fisheries, Washington Trout, Ebasco Environmental Consultants, Seattle Water Department, Washington Department of Wildlife, King County Surface Water Management Division, and Seattle City Light. Fieldwork was conducted from early January through mid-March of 1993.

The information gathered by the team is presented in the *Tolt River Watershed Analysis* (Weyerhaeuser 1993). The report states that historically, five species of salmon have been observed in the Tolt River basin, and currently, summer/fall chinook and coho are the most prevalent species found in the basin. The Moss Lake outlet stream was surveyed for salmonid use, and habitat concerns were noted. Field observations found that the lower end of the stream exhibits poor flow conditions, is silty, and presents poor habitat conditions for all salmonids. The outlet stream's key vulnerabilities are coarse and fine sediment deposition and potential scouring in the event that the beaver dam breaks. No salmonids were observed during the field survey.

Threatened and Endangered Species

The WDFW Priority Habitats and Species Information System was consulted for information concerning the occurrence of sensitive species in the project area. WDFW provided a map identifying priority habitats and species located on and in the vicinity of the site. The Moss Lake outlet is identified as habitat for priority fish species and anadromous fish runs. The priority and anadromous species listed for this stream by the WDFW is winter steelhead trout (Hudson 1995 personal communication).

King County (1990c) identifies the site as potential bald eagle habitat based on the availability of suitable snags, perches, and logs. The WDFW, which monitors bald eagle activity in King County, reports no known active nests within the general vicinity of the Moss Lake site, and no documented bald eagle activity at the lake (Bernatowicz 1995 personal communication). No bald eagle activity was observed during the fieldwork for this project.

In addition to the information provided in the WDFW database search, several priority species are likely to occur at Moss Lake, based on field observations and habitat characteristics. These species are discussed below.

Pileated Woodpecker

The pileated woodpecker is designated as a state candidate species in Washington (Washington Department of Wildlife 1993). Candidate species are those that are being considered for state or federally threatened and endangered species lists. Numbers of this species have been declining recently due to destruction of habitat used by this species for breeding and foraging.

Pileated woodpeckers inhabit mature and old-growth forest, as well as second-growth forest with significant numbers of large snags and fallen trees. These birds nest in cavities typically located in conifer snags with bark and broken tops. Nest trees are mostly snags greater than 27 inches in diameter at breast height and taller than 87 feet. For foraging and feeding, these woodpeckers depend on habitat containing large trees; large, abundant snags; diseased trees; and dense forest stands (Rodrick and Milner 1991). Individual pileated woodpeckers range widely, establishing territories as large as 600 acres (Brown 1985). Pileated woodpeckers are seen throughout the year in western Washington.

Oblong and rectangular excavations characteristic of this species were observed in the northwestern portion of the Moss Lake site. An individual was observed excavating a conifer during a field visit in spring 1995. The site is probably within the territory of one or more pileated woodpeckers. Dense forest vegetation with a significant number of conifers, habitat especially favored by pileated woodpeckers, occurs in numerous areas throughout the site.

Band-Tailed Pigeon

The band-tailed pigeon is designated as a state candidate species in Washington (Washington Department of Wildlife 1993). Band-tailed pigeons breed in coniferous and deciduous forests at elevations below approximately 1,000 feet in western Washington (Jeffrey 1989). This species winters mostly in areas from California to the south. Band-tailed pigeons were not observed during site visits but may use the site during the breeding season.

Principal food sources during the breeding season include cascara, elderberry, wild cherry, huckleberry, dogwood, and madrone (Sanderson 1977). A limiting factor in band-tailed pigeon usage of an area can be the availability of mineral springs. Band-tailed pigeons seek sources of mineral salts needed for crop-milk (milk created in the crop of some birds that is regurgitated into the mouth of their young) production during the breeding season. (Rodrick and Milner 1991).

Vaux's Swift

Vaux's swift is designated as a state candidate species in Washington (Washington Department of Wildlife 1993). Vaux's swifts nest in snags and trees with broken tops in mature coniferous forests (older than 100 years) and old-growth coniferous forests (Rodrick and Milner 1991). They winter south of the United States. Vaux's swifts were not observed during site visits but may use the oldest conifers onsite for nesting habitat.

Red-Tailed Hawk

The red-tailed hawk is designated a priority species in Washington (Washington Department of Wildlife 1993). Priority species are those that require protection because of their current population status, the sensitivity of their habitat to alteration, or their particular recreational importance. This species breeds in mature coniferous and deciduous forests. Individuals typically feed in or adjacent to open areas where prey visibility is good. Red-tailed hawks consume a variety of prey including small mammals, birds, reptiles, amphibians, fishes, invertebrates, and carrion (Palmer 1988).

Red-Legged Frog

The red-legged frog is a federal candidate species. Federal candidate species are formally proposed endangered or threatened species for which the U.S. Fish and Wildlife Service has information to indicate biological vulnerability and threat.

Red-legged frogs generally inhabit humid forests, woodlands, grasslands, and stream banks. They are most common in lowlands and foothills, and they tend to frequent permanent sources of water. Red-legged frogs can also be found in damp woods and meadows outside the breeding season (Stebbins 1985).

Although the red-legged frog is a federal candidate species, it currently is not a Washington state-listed priority species. State populations of the frog are generally stable; however, populations in some areas of western Washington are in danger due to competition from the more aggressive bullfrog. The state has no specific management recommendations for red-legged frog habitat because it is not a state priority species and its habitat is indirectly protected through other agency regulations (Larsen 1995 personal communication).

Wildlife Sensitivity to Recreational Uses

Wildlife sensitivity to recreational uses varies for each species. Many of the mammalian species that may occur on the Moss Lake site are commonly found in developed areas. Animals that are adaptable to human disturbances include opossums, moles, cottontails, raccoons, and skunks. In contrast, other animals, such as bobcats, deer, and black bears, are more sensitive to disturbances in their ranges and may relocate to less developed areas. A critical factor for protecting these shy species is provision of sufficient, thickly vegetated buffers between areas of human activity and areas these species are likely to use for foraging and breeding.

The birds listed in Appendix B vary substantially in their sensitivity to human activity. Birds such as rufous hummingbird, American robin, bushtit, and song sparrow adapt readily to urban situations and high levels of nearby human activity. By contrast, birds such as ruffed grouse and red-eyed vireo are typically less tolerant of nearby human activity and may desert seemingly appropriate habitat lying adjacent to human development. Some birds, such as red-tailed hawk, are tolerant of certain nearby human activities (e.g., vehicular traffic) but are intolerant of other human activities (e.g., a human walking or running nearby). Unless a substantial portion of the site can be preserved in its existing condition, species particularly sensitive to human activity and species requiring large areas of forested habitat (e.g., pileated woodpecker) may desert the site.

APPLICABLE CODES, REGULATIONS, AND POLICIES

Federal Requirements

- Federally listed threatened and endangered wildlife species are protected by the Endangered Species Act and associated laws (Code of Federal Regulations, Title 50, Part 17). No wildlife species known to inhabit the Moss Lake site are protected by federal law.

- If any work is to be conducted in wetlands, the project will be subject to Sections 401 and 404 of the federal Clean Water Act and Section 10 of the Rivers and Harbors Act. The U.S. Army Corps of Engineers (U.S. COE) must

be notified of any dredge or fill operations involving wetlands of 1 acre and greater required for park construction. Depending on the extent of the wetland disturbance, the U.S. COE may opt to give all wetland authority to the county to be regulated under its Sensitive Areas Ordinance.

Washington State Requirements

- Hydraulic project approval (HPA) may be required by WDFW prior to commencement of park construction. The HPA process allows state review of the project proposal to determine if there are potential impacts on fisheries resources. If the WDFW determines that impacts are likely, the agency may impose construction restrictions (e.g., timing of construction) and require mitigation measures. In association with the HPA, if there is the need to divert water from any of the streams onsite during construction, the diversion device must be equipped with a fish screen. The fish screen is necessary to prevent fish from entering the water-diversion device.

- Coastal zone management certification is required of all projects that require U.S. COE approval. The Washington Department of Ecology (Ecology) is responsible for issuing coastal zone management certification and reviews all projects for consistency with state environmental requirements.

- Because the park project may result in clearing of merchantable timber from forested land being converted to another use, forest practices approval must be obtained from the Washington Department of Natural Resource prior to any clearing on Moss Lake. This policy includes requirements applicable to riparian zones, wildlife habitat, and streams.

- The WDFW Priority Habitats and Species Program was developed to protect the natural resources of Washington state and to aid city planners in identifying and classifying critical areas as required by the Growth Management Act of 1990. WDFW maintains a database that contains information concerning priority habitats and species. The database is updated as new information becomes available. Through this program, WDFW has developed management recommendations for priority species and is currently developing recommendations for priority habitats. The habitat management recommendations applicable to the Moss Lake project are for riparian zones. WDFW recommends locating high-impact trails a minimum of 1,200 feet away from streams (WDFW 1994).

King County Requirements

- The King County Sensitive Areas Ordinance (King County 1990b) provides for legal protection of King County's sensitive areas. The protected sensitive areas applicable to this natural resources study include wetlands and streams.

The Sensitive Areas Ordinance definition of wetlands follows that of the U.S. COE (1987). The Sensitive Areas Ordinance divides wetlands into three classifications based on size and physical characteristics. Each classification has separate wetland standards that include requirements for buffers. Class 1 wetlands require a 100-foot buffer, class 2 wetlands require a 50-foot buffer, and class 3 wetlands require a 25-foot buffer. Additional buffer area can be required at the county's discretion.

- The Sensitive Areas Ordinance also provides a definition of streams as well as a three-tiered classification system based on flow and salmonid use. King County streams are protected through the Sensitive Areas Ordinance by development requirements for stream buffers, building and setback lines, and other stream standards. Buffer requirements for streams are as follows: class 1—100-foot buffer, class 2 with salmonid use—100-foot buffer, class 2 without salmonid use—50-foot buffer, and class 3—25-foot buffer. These requirements are discussed further in the hydrology section of this report. In addition, streams and wetlands each have specific mitigation requirements that are based on their classifications.

- The King County Comprehensive Plan provides policies regarding fish and wildlife habitat protection. The main goals of these policies are to conserve existing resources, to identify and protect critical habitats, and to provide for a system of habitat networks.

RECOMMENDATIONS

Based on field observations made to collect data for this report and guidelines for wildlife management provided by WDFW, Brown (1985), and King County (1987), the following elements should be considered for inclusion in the Moss Lake park master plan.

Plant Community and Habitat Recommendations

- Wildlife habitat areas to be preserved should be designated and mapped. This information should be incorporated into a habitat protection plan. The habitat designations would ensure protection from potentially harmful park development. Emphasis should be placed on protecting habitats such as the stream, major drainage paths, the bog, and other wetlands that are particularly sensitive.

- Habitats within the park should be regularly assessed for degradation and deterioration. Damaged habitats should then be restored, and the existing protection plan should be modified.

- Native plant species diversity should be maintained. Exotic and invasive plants should be removed where feasible.

- The site plan should retain large blocks of contiguous habitat.

- Snags should be left in place and not removed in developed areas of the park, unless they pose a safety hazard. Snags provide nesting and roosting sites for many wildlife species. Snags also serve as an important food source for numerous species of wildlife.

- Downed and decaying trees and woody material should be left as habitat for many species of insects and for the animals that feed on these insects. These materials also provide cover, nesting habitat, and nutrient cycling.

- Habitats of special-status species (including salmonids, pileated woodpecker, band-tailed pigeon, Vaux's swift, red-tailed hawk, and red-legged frog) should be protected and enhanced when habitat deterioration is identified.

- Beaver dams should be left intact in order to preserve the existing hydrologic conditions of the lake and bog, and to prevent scouring of the downstream salmonid habitat.

- The wetland vegetation community at the south-southwest edge of the lake near the entrance road should be restored.

- In order to preserve the sensitive ecosystems of the bog communities, trails should not be developed or allowed within those communities or their buffer areas. Instead, an elevated observation platform could be constructed at the south-southwest edge of the lake to allow viewing of the lake and its associated wetlands, including the bog.

- High-impact recreational facilities should be restricted in riparian habitat.

- New facilities should be placed in areas with lower potential for impact (e.g., outside wetlands and their buffers, or on stable slopes).

- Facilities should be located well away from streams, using appropriate buffers (see hydrology section).

- High-impact trails should be located a minimum of 1,200 feet away from the stream in order to protect riparian habitat.

Wildlife Management Recommendations

- Trails should be maintained to prevent erosion that would affect the major drainage paths, riparian zones, and fisheries habitat.

- Free-roaming domestic animals should not be allowed in the park, in order to protect the wildlife and sensitive vegetation areas. Informative literature should be provided to educate park users on the ecological reasons for regulations prohibiting free-roaming domestic animals. Recommended controls also include enforcement of leash laws, pooper-scooper laws, and regulations prohibiting the feeding of wildlife.

HYDROLOGY

This section presents a discussion of the existing hydrologic conditions on the site, potential impacts of park development on those conditions, and regulatory issues to be addressed as the park development project proceeds. Where appropriate, brief discussions of water quality issues are included in this section.

The proposed Moss Lake park site is relatively undisturbed from its natural condition and exhibits numerous hydrologic features that are desirable to maintain if any portion of the site is developed. Development on the site also must address the unique concern of protecting the fragile ecosystem of the Moss Lake bog, including its tributary inflow patterns. Therefore, the primary focus of this hydrologic evaluation is to determine the locations and functions of the important hydrologic features on the site so that development plans can incorporate appropriate precautions to avoid adverse hydrologic impacts.

Even with the best attempts at avoiding hydrologic impacts, it is inevitable that development will disturb some aspects of the natural drainage system on the site, and consequently, downstream water resources. Thus, it is useful at this stage of project development to outline regulatory considerations with regard to drainage impacts on the site and on areas downstream of the site.

MATERIALS AND METHODS

The evaluation of site hydrology and assessment of drainage-related impacts that may occur with project development are based on a review of available information on water resources in the project vicinity, studies of aerial photographs and site maps, and field observations of hydrologic processes. Specifically, the following references were used in this study:

- Information developed by King County on water resource protection requirements (King County 1990a) and flow conditions in small streams (King County 1995)
- Information developed by the Washington Department of Fisheries (Williams et al. 1975) and by Weyerhaeuser (1993) on the conditions of the outlet stream below Moss Lake
- The draft environmental impact statement for the Moss Lake Estates (King County 1986)
- Aerial photographs of the site (taken in fall 1992 and spring 1995) at a scale of 1 inch to 200 feet
- USGS topographic map, 7.5 minute series (Lake Joy quadrangle)

- Soil survey of Snoqualmie Pass area and parts of King and Pierce counties (U.S. SCS 1992)

- King County (1990d) Surface Water Design Manual, details on county regulations and review requirements pertaining to sensitive areas and drainage issues in development proposals

- The King County (1990a) Sensitive Areas Ordinance, buffer setback requirements associated with hydrologic features.

It is anticipated that the proposed park development project could affect Moss Lake, associated perimeter wetlands, and downstream waters as a result of altered runoff patterns and contributions of pollutants in runoff. Therefore, it is important to understand the present flow and water quality conditions of these surface water bodies and, to a lesser extent, the condition of underlying ground water. Based on a review of available maps and aerial photographs of the project area, the main surface waters of interest in this evaluation are Moss Lake, the unnamed outlet stream of Moss Lake, and the Tolt River. The King County Surface Water Management and Planning and Community Development divisions have produced most of the available information on the existing surface water and ground water resources in the site vicinity. Recent documents prepared by these agencies were referenced for the purposes of characterizing existing receiving water conditions.

Visual observations of hydrologic processes on the site were made on several visits over a period from January through March of 1995. Weather and storm conditions during these site visits and in the days preceding the site visits were generally wet. Thus, the field observations are representative of typical site drainage characteristics during the wet season.

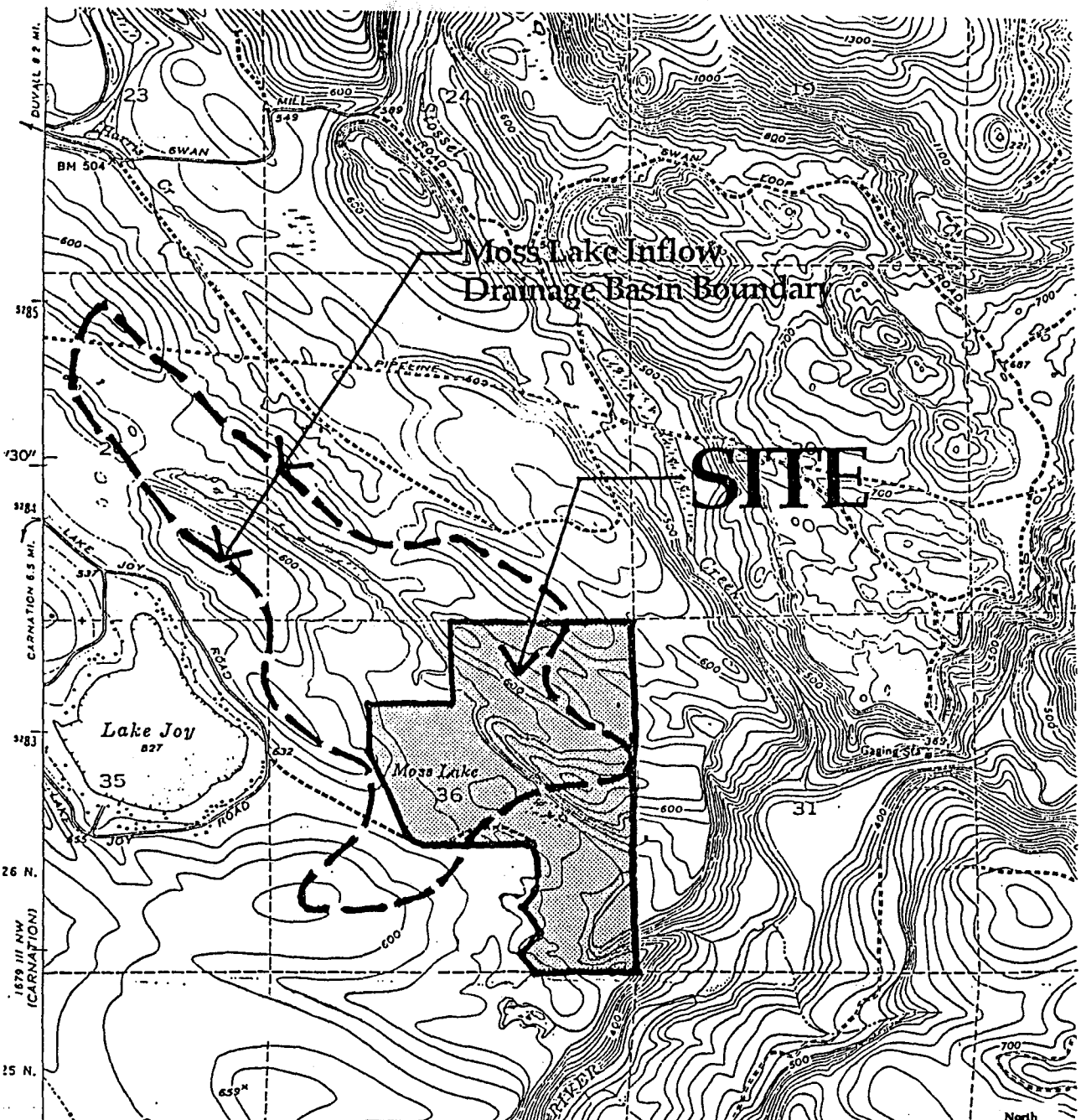
RESULTS

Existing Drainage Features in Moss Lake Drainage Basin

This description of existing hydrologic conditions is based mostly on observations made during field visits to the site area. The intention of the hydrologic field reconnaissance was to determine the locations and relative sizes of significant surface flow pathways into and out of Moss Lake, so that planning for Moss Lake park improvements can incorporate preservation of these features.

The total drainage basin that drains into Moss Lake comprises approximately 575 acres, of which approximately 270 acres are within the boundaries of the proposed park (Figure 2). Therefore, it is apparent that the hydrology of Moss Lake is dictated to a large extent by drainage from areas outside the proposed park site. Moss Lake receives inflows from several drainage channels around its perimeter. For clarity, the following discussion of hydrologic features progresses in a clockwise manner beginning in the southwestern corner of Moss Lake. Figure 1 shows the locations of many of the hydrologic features discussed in the following paragraphs.

Figure 2. Moss Lake drainage basin.



The relative density of surface inflow channels to Moss Lake is greatest along the southwestern and western edges of the lake. Runoff originating from a gradually sloped hillside draining through a shrub wetland to the southwest of Moss Lake drains toward the lake through a series of channels located north of the site access road. Throughout the west and southwest perimeter of Moss Lake, these inflow channels are seldom farther apart than 100 to 200 feet. The largest of these channels, which empties into a small open-water wetland located approximately 350 feet north of Moss Lake Road and 350 feet west of Moss Lake, appears to periodically convey a significant amount of storm flow (i.e., several cubic feet per second). Outflows from this small wetland disperse into several smaller channels flowing into Moss Lake.

The forested area along the southwest edge of the lake appears to be "floating" ground overlying water in many places. This shallow water table may be either an extension of the surface of Moss Lake or ground water flowing into the lake. Due to the shallow water table and the presence of numerous inflow channels, almost all of the site on the west edge of Moss Lake contains wetlands. This broad wet area serves as a natural buffer that slows the rate of surface runoff to Moss Lake from the west.

Farther north along the western edge of the Moss Lake bog (which is north of the open-water portion of the lake), the spatial separation of inflow drainage channels becomes greater. Only two distinct channels were observed in this vicinity, each flowing from west to east. These minor channels are located approximately 1,000 feet and 250 feet south of 112th Street, respectively. Small-open water sections in the forest near 112th Street are linked to the latter channel. In general, the forest in the northwest portion of the proposed park site is much drier than the area along the southwest edge of Moss Lake.

A culvert located beneath 112th Street near the northwestern corner of the Moss Lake park site discharges flows from a large pond to the north. In mid-March of 1995 this culvert was conveying a relatively significant amount of flow (estimated visually at approximately 2 cubic feet per second [cfs]) into a 5-foot-wide drainage channel that is the largest single inflow source to Moss Lake from the north. This drainage channel is well defined near 112th Street but appears to split into several meandering flow pathways as it enters the bog to the south.

East of the culvert beneath 112th Street, due north of Moss Lake, there are two flow channels that discharge runoff into the bog. The runoff in these two channels originates in a ravine located northeast of the lake, behind (i.e., east of) the ridge that is traversed by an existing public pedestrian and bridle path (Figure 1). The larger of these channels passes through a culvert beneath the path, and the other flows over the path. In mid-March 1995, approximately 1 cfs of flow was passing through the culvert. The other nearby channel, located approximately 200 feet north of the pathway culvert, was barely flowing. Thus, it appears that the pathway culvert carries most of the ravine outflow into the Moss Lake bog, and the channel flowing over the path is an overflow feature that appears during extreme wet weather.

Along the hillside between Moss Lake and the ridge to the east there are no significant surface flow features. Because the length of the slope between the ridge and the lake is not very great, and there are few topographic swales where flows would converge, surface drainage channels have not formed in this area. Most of the runoff on the eastern edge of Moss Lake probably

infiltrates into the forest soil and emerges from the ground at the base of the slope, or passes through the duff layer as shallow subsurface sheet flow. The minor amount of runoff that occurs on this slope is most likely spread evenly over the hillside.

Existing Characteristics of Moss Lake Outlet Stream

The outlet of Moss Lake at the south end is partially blocked by a beaver dam. The stream that begins below the beaver dam is approximately 50 feet wide during the wet season. The stream meanders over relatively flat terrain for approximately 1,500 feet until it reaches an open-water section that was created by the damming effect of another beaver dam and a road embankment crossing the stream. Two drainage channels of note discharge into this open-water area upstream of the road embankment. One of these channels, located at the tail of the ridge along the pedestrian/bridle path, carries flows from the east. This channel does not flow through a culvert, although it conveys a relatively significant amount of flow. In mid-March 1995, it appeared that greater than 1 cfs was flowing over the path from this channel. On the western side of the open-water area, a culvert is located beneath the north-south continuation of Moss Lake Road, approximately 200 feet north of the gate blocking vehicle access to the road passing over the lake outflow stream. This culvert was also conveying what appeared to be greater than 1 cfs of flow in mid-March 1995.

The unnamed Moss Lake outlet stream continues downstream of the open-water area, passing through two concrete culverts beneath the road embankment. Downstream of the culverts, approximately midway between the culverts and the confluence with the Tolt River, the stream channel gradient steepens, dropping approximately 160 feet over 2,000 feet, before it once again flattens near the confluence. This small stream is a very minor contributor to the total flow in the main stem of the Tolt River.

According to the *Tolt River Watershed Analysis* (Weyerhaeuser 1993), the Moss Lake outlet stream is susceptible to degradation via sediment deposition. The Washington Department of Fisheries (Williams et al. 1975) classify the outlet stream as supporting coho salmon. King County (1986) states that Moss Lake supports populations of shiners and cutthroat trout. The King County (1990b) Sensitive Areas Map Folio identifies the outlet stream as "unclassified" for most of its length from Moss Lake to the Tolt River, except for a short class 2 section with salmonids near the confluence with the Tolt River. To be conservative, the entire length of the outlet stream should be considered class 2 (with salmonids), so that more stringent buffer requirements apply.

General Assessment of Existing Hydrologic and Water Quality Conditions

Information is not available on flow rates in the unnamed outlet stream of Moss Lake (King County 1995), so it is difficult to determine the seasonal patterns of hydrologic response in the Moss Lake basin. Similarly, aside from general inferences that can be made concerning the water quality of Moss Lake, its inlet sources, and its outlet stream, there is no available information specific to these waters to help in this assessment. However, based on visual

observations and available information on soils, it is possible to understand the likely patterns of hydrologic response, as well as probable water quality characteristics, on the proposed park site.

The soils on the park site are primarily of two types: Tokul gravelly loam and Mukilteo peat (U.S. SCS 1992). The Mukilteo peat soils are located exclusively in the Moss Lake bog, and the Tokul gravelly loam underlies most of the remainder of the park property. The Tokul soils (which were identified as Alderwood series soils by King County [1986]) have a hardpan layer of glacial till at depths of less than 5 feet, which acts to restrict downward percolation of infiltrated runoff.

Because most of the site has forest cover, except for Moss Lake and the associated bog, it can be expected that stormwater runoff generally infiltrates into the organic layer on the ground instead of flowing over the ground surface. However, infiltrated runoff cannot penetrate the hardpan layer in the soil and therefore moves laterally until it resurfaces aboveground or reaches shallow ground water at the edge of Moss Lake. This natural hydrologic pattern, common in many areas of western Washington, is quite effective at attenuating peak rates of runoff that could otherwise cause flooding. In addition, pollutants in infiltrated runoff are removed by the soil. The saturation that occurs during the wet season in the subsurface soil also sustains prolonged discharges of base flows into downstream waters well into the dry season, supporting aquatic habitat.

The slow delivery of runoff to the Moss Lake bog is probably also important for the bog's survival. Bogs contain vegetation species that are uniquely adapted to acidic waters with low dissolved oxygen content (Mitsch and Gosselink 1986). If the runoff entering the Moss Lake bog occurred at a faster rate, it is possible that the acidic waters would be flushed more quickly and replaced by water with higher pH levels and dissolved oxygen content. This change in the chemistry of the bog's water could alter the vegetation community that has adapted to the natural hydrologic conditions, potentially resulting in a shift to another type of plant community. It is inferred that the drainage basin contributing flows to the Moss Lake bog is presently providing hydrologic conditions supportive of bog formation and survival.

APPLICABLE CODES AND REGULATIONS

Washington State Requirements

The state regulations and associated permit requirements applicable to the proposed project are summarized below.

- If greater than 5 acres of land is disturbed during construction, the Washington Department of Ecology (Ecology) would require that a National Pollutant Discharge Elimination System (NPDES) permit be obtained. Specifically, the application would be for coverage under the Baseline General Permit for Stormwater Discharges Associated with Industries and Construction. The conditions of the permit include preparation of a stormwater pollution

prevention plan for all construction-related activities. The major emphasis of the plan is on detailed erosion and sedimentation control planning for all areas of the site affected by construction. The plan also includes information on prevention and control of other types of pollutants (e.g., oil spills and waste materials) on the construction site.

- Ecology may require that a Temporary Modification of Water Quality Standards permit be obtained for potential construction-induced violations of state water quality standards in Moss Lake and the unnamed outlet stream. No specific requirements accompany the permit, but it does enable Ecology to review the proposed project prior to initiation of construction work, and thus may trigger additional restrictions based on Ecology's knowledge of existing water quality problems in nearby waters.

- The Washington Department of Fish and Wildlife may require that a hydraulic project approval (HPA) be obtained prior to beginning construction work on the site. The purpose of this permit and the application process is to allow WDFW to review the project proposal with a focus on potential impacts on fishery resources and habitat in receiving waters, and accordingly impose restrictions on construction activities as necessary. If the park improvements include construction work immediately adjacent to, in, or over a stream, wetland, or tributary channel, the HPA permit may incorporate substantial restrictions (e.g., restricted timing of construction work to avoid impacts on fish migration, rearing, or spawning; careful applications of stream protection measures tailored to the exact conditions involved; or modified designs of project improvements, such as altering a trail alignment, to lessen impacts on fisheries). Significant concerns associated with the HPA permit process are not anticipated with the types of improvements proposed for development of the Moss Lake park, unless a new parking lot is constructed that affects a tributary stream.

King County Requirements

- The King County Department of Development and Environmental Services (DDES) requires that a clearing and grading permit be obtained prior to initiating construction work. The emphasis of the DDES review in the application process is on proper planning and design to prevent and minimize impacts on existing drainage systems and sensitive areas in the project vicinity. The clearing and grading permit application requires preparation of a technical information report (TIR) that provides details on the project proposal, receiving waters that will be affected by drainage from the project, other sensitive areas (e.g., steep slopes, wetlands, and floodplains) in the vicinity, and existing drainage systems that will receive project site runoff. In addition, detailed plans regarding temporary erosion as well as sedimentation control facilities, and permanent stormwater treatment and detention facilities,

must be provided (in accordance with county standards) with the technical information report. For the proposed improvements associated with creation of the Moss Lake park, the technical report would likely be fairly brief in detail. A new parking lot and its associated drainage would be the focus of the report, and trails and other facilities could be discussed in lesser detail. The stormwater management facilities for a parking lot and interpretive center would require allocation of sufficient land area and design effort to provide effective treatment and detention of runoff.

- In compliance with the State Environmental Policy Act (SEPA), King County DDES requires preparation of an environmental checklist to ensure that the county Sensitive Areas Ordinance is not violated by the project proposal. The checklist provides information on sensitive areas potentially affected by the project on and adjacent to the site, and mitigation measures designed to prevent or minimize project-induced impacts on those sensitive areas. If DDES determines, based on the checklist, that the project could cause significant adverse environmental impacts on sensitive areas, more extensive mitigation measures may be required. DDES could further call for preparation of an environmental impact statement (EIS), if the potential impacts are considered major.

- The King County (1990b) Sensitive Areas Ordinance requires that developments avoid protected buffer areas adjacent to wetlands and streams. Figure 1 illustrates the buffer requirements for the lake outlet stream and wetlands on the site. Class 2 streams used by salmonids are required to have at least a 100-foot buffer. If the Moss Lake outlet stream is conservatively assumed to be class 2 throughout its length, this 100-foot buffer requirement applies. According to recommendations by WDFW (1994), the outlet stream should have a 1,200-foot setback from high-impact trails. This setback exceeds the required buffer of 100 feet. The major drainage courses shown in Figure 1 that are tributary to Moss Lake are unclassified according to the Sensitive Areas Map Folio (King County 1990a). These drainage courses would be protected indirectly through the regulatory protection of the associated wetlands. Crossings of streams can be made, for example for a recreational trail, with special provisions for protection of the underlying waterway.

- Depending on the proposed wastewater disposal plans for the site, the Seattle/King County Department of Public Health may also regulate the project. If an onsite wastewater disposal system (i.e., a septic system) is proposed, an onsite sewage disposal permit is required from the health department. The application for this permit requires design details, prepared by a professional engineer, indicating that the proposed sewage disposal facilities are sized and located appropriately and are constructed with acceptable materials. This permit application also requires testing of onsite soils to verify that good conditions exist for septic drain fields. Based on

available soil survey information for the site (U.S. SCS 1992), it may be necessary to conduct extensive soil testing to verify that a suitable location can be found for a septic system drain field.

RECOMMENDATIONS

The proposed Moss Lake park is located in the vicinity of receiving water resources that demand special attention in the development planning process. Moss Lake and its associated wetlands exhibit excellent natural characteristics that are increasingly rare in King County. Most of the proposed park area would drain into and through Moss Lake. Nearly all of the proposed park area would drain ultimately to the unnamed outlet stream of Moss Lake.

The natural hydrologic processes occurring on the site are extremely difficult to replicate in constructed drainage systems, and therefore it is most desirable to minimize disruptions to the natural hydrology of the site. Thus, the proposed park improvements should avoid disturbance of existing wetlands and drainage courses. Where it is necessary for a trail or roadway to pass through or over a wetland or drainage channel, the shortest possible path of disturbance should be selected.

Although there is concern for protecting the natural drainage system and receiving water quality, possibilities exist for development of park facilities without adversely affecting those resources. Certainly, clearing forested areas and converting them to roads, parking lots, and additional trails cannot be achieved without affecting drainage patterns on the site. However, King County DDES would impose stormwater management requirements on the development to ensure that receiving waters are protected. In addition, site planning can take into account unique surface hydrologic features on the site, such as sensitive tributaries flowing into Moss Lake and drainage courses connecting wetlands, and can avoid them or incorporate necessary protective measures.

It is recommended that development on the site be confined to flat or mildly sloped areas, to minimize or prevent erosion on slopes that could readily result in degradation of downstream water quality. This measure would also minimize the amount of earthwork (i.e., cut and fill) necessary to create park facilities. The significant drainage courses requiring protection on the site are shown in Figure 1. Many of these drainage courses pass through topographic swales that have relatively steep side slopes. By avoiding development on these slopes, the associated drainages can be protected with suitably sized natural buffers that can filter and reduce the velocity of runoff before it enters the wetlands of Moss Lake.

It is not anticipated that drainage-related permit applications for the proposed project would be subject to severe restrictions or extremely lengthy reviews. However, given the natural condition of the site and the sensitive receiving water environment within which it lies, the reviewing agencies are likely to require a well-conceived development plan that seeks to prevent impacts on hydrology and water quality to the maximum extent feasible. Given the amount of available space at the Moss Lake site and the minimal development proposed, it should be relatively easy to provide such a plan for the reviewing agencies.

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APPENDIX A

Species Representative of Plant Communities at Moss Lake

SPECIES REPRESENTATIVE OF PLANT COMMUNITIES AT MOSS LAKE.

Open Water

yellow pond lily	*Nuphar polysepalum*
watershield	*Brasenia schreberi*
bladderwort	*Utricularia minor*
duckweed	*Lemma minor*
horned pondweed	*Zannichellia palustris*
floating-leaf pondweed	*Potamogeton natans*
flat-stem pondweed	*Potamogeton zosteriformis*
short-seed water-wort	*Elatine brachysperma*

Bog

hardhack	*Spiraea douglasii*
Labrador tea	*Ledum groenlandicum*
marsh cinquefoil	*Potentilla palustris*
purple loosestrife	*Lythrum salicaria*
willow	*Salix* sp.
red-osier dogwood	*Cornus stolonifera*
common cattail	*Typha latifolia*
sedges	*Carex* sp.
soft rush	*Juncus effusus*
peat moss	*Sphagnum* sp.
small-fruit bulrush	*Scirpus microcarpus*
bog laurel	*Kalmia microphylla*
small cranberry	*Vaccinium oxycoccos*
round-leaf sundew	*Drosera rotundifolia*
cottongrass	*Eriophorum chamissonis*
common spike rush	*Eleocharis palustris*

Shrub Wetland

peat moss	*Sphagnum* sp.
salal	*Gaultheria shallon*
hardhack	*Spiraea douglasii*
red alder	*Alnus rubra*
Labrador tea	*Ledum groenlandicum*
skunk cabbage	*Lysichiton americanum*
foxglove	*Digitalis purpurea*
lady fern	*Athyrium distentifolium*
rush	*Juncus* sp.
common cattail	*Typha latifolia*

willow	*Salix* sp.
Pacific crabapple	*Malus fusca*
marsh cinquefoil	*Potentilla palustris*

Riparian Forest

red alder	*Alnus rubra*
western hemlock	*Tsuga heterophylla*
big-leaf maple	*Acer macrophyllum*
salmonberry	*Rubus spectabilis*
thimbleberry	*Rubus parviflorus*
sedges	*Carex* sp.

Forested Wetland

salmonberry	*Rubus spectabilis*
red alder	*Alnus rubra*
western redcedar	*Thuja plicata*
black cottonwood	*Populus trichocarpa*
sword fern	*Polystichum munitum*
western hemlock	*Tsuga heterophylla*
red-osier dogwood	*Cornus stolonifera*
lady fern	*Athyrium filix-femina*
skunk cabbage	*Lysichiton americanum*
water parsley	*Oenanthe sarmentosa*
creeping buttercup	*Ranunculus repens*
devil's club	*Oplopanax horridus*
trailing blackberry (dewberry)	*Rubus ursinus*

Mixed Second-Growth Forest

osoberry	*Oemleria cerasiformis*
swordfern	*Polystichum munitum*
Pacific bleeding heart	*Dicentra formosa*
Oregon grape	*Berberis aquifolium*
Robert geranium	*Geranium robertianum*
big-leaf maple	*Acer macrophyllum*
vine maple	*Acer circinatum*
western hemlock	*Tsuga heterophylla*
red alder	*Alnus rubra*
black cottonwood	*Populus trichocarpa*
western redcedar	*Thuja plicata*
Douglas fir	*Pseudotsuga menziesii*
salmonberry	*Rubus spectabilis*
Himalayan blackberry	*Rubus discolor*
red huckleberry	*Vaccinium parvifolium*
red elderberry	*Sambucus racemosa*

APPENDIX B

Wildlife Likely to Occur on Moss Lake Site

Appendix B. Wildlife likely to occur on Moss Lake site.

	OPEN WATER	SHRUB WETLAND	BOG	FORESTED WETLAND	RI F
AMPHIBIANS					
northwestern salamander *(Ambystoma gracile)*	X	X	X	X	
long-toed salamander *(Ambystoma macrodactylum)*	X		X	X	
pacific giant salamander *(Dicamptodon ensatus)*	X				
rough-skinned newt *(Taricha granulosa)*	X			X	
ensatina *(Ensatina eschscholtzii)*					
western red-backed salamander *(Plethodon vehiclum)*					
western toad *(Bufo boreas)*	X				
pacific treefrog* *(Hyla regilla)*	X	X	X	X	
red-legged frog *(Rana aurora)*	X	X	X	X	
bullfrog* *(Rana catesbeiana)*	X		X		
REPTILES					
northern alligator lizard *(Gerrhonotus coeruleus)*					
common garter snake* *(Thamnophis sirtalis)*	X	X	X	X	
western garter snake* *(Thamnophis elegans)*	X	X	X	X	
northwestern garter snake* *(Thamnophis ordinoides)*					
BIRDS					
pied-billed grebe *(Podilymbus podiceps)*	X				
horned grebe *(Podiceps auritus)*	X				
great blue heron* *(Ardea herodias)*	X				
green-backed heron *(Butorides striatus)*	X	X	X	X	
Canada goose *(Branta canadensis)*	X				
wood duck* *(Aix sponsa)*		X	X	X	
green-winged teal* *(Anas crecca)*	X				
mallard* *(Anas platyrhynchos)*	X	X	X		
northern shoveler *(Anas clypeata)*	X				
gadwall *(Anas strepera)*	X				
American wigeon *(Anas americana)*	X				

***presence documented**

Appendix B. Wildlife likely to occur on Moss Lake site (continued).

	OPEN WATER	SHRUB WETLAND	BOG	FORESTED WETLAND	RI F
ring-necked duck *(Aythya collaris)*	X				
common goldeneye* *(Bucephala clangula)*	X				
Barrow'sgoldeneye *(Bucephala islandica)*	X				
bufflehead *(Bucephala albeola)*	X				
hooded merganser* *(Lophodytes cucullatus)*	X			X	
common merganser *(Mergus merganser)*	X				
ruddy duck *(Oxyura jamaicensis)*	X				
osprey *(Pandion haliaetus)*	X				
bald eagle* *(Haliaeetus leucocephalis)*	X				
northern harrier *(Circus cyaneus)*	X		X		
sharp-shinned hawk *(Accipiter straitus)*					
Cooper's hawk *(Accipiter cooperii)*					
red-tailed hawk *(Buteo jamaicensis)*				X	
merlin *(Falco colombarius)*					
ruffed grouse* *(Bonasa umbellus)*					
american coot *(Fulica americana)*	X	X			
killdeer *(Charadrius vociferus)*	X				
common snipe *(Gallinago gallinago)*	X		X		
band-tailed pigeon *Columba fasciata)*					
western screech-owl *(Otus kennicottii)*				X	
great horned owl *(Bubo virginianus)*				X	
rufous hummingbird *(Selasphorus rufus)*					
belted kingfisher *(Ceryle alcyon)*	X				
red-breasted sapsucker *(Sphyrapicus ruber)*					
downy woodpecker *(Picoides pubescens)*				X	
hairy woodpecker* *(Picoides villosus)*					
northern flicker *(Colaptes auratus)*				X	
pileated woodpecker* *(Dryocopus pileatus)*				X	
western wood-pewee *(Contopus sordidulus)*					
willow flycatcher *Empidonax traillii)*				X	

***presence documented**

Appendix B. Wildlife likely to occur on Moss Lake site (continued).

	OPEN WATER	SHRUB WETLAND	BOG	FORESTED WETLAND	RIP FO
western flycatcher *(Empidonax difficilis)*					
steller's jay* *(Cyanocitta stelleri)*					
American crow* *(Corvus brachyrhynchos)*	X			X	
black-capped chickadee* *(Parus atricapillus)*				X	
bushtit* *(Psaltriparus minimus)*				X	
red-breasted nuthatch* *(Sitta canadensis)*					
brown creeper *(Certhia americana)*					
rufous-sided towhee* *(Pipilo erythrophthalmus)*				X	
fox sparrow *(Passerella iliaca)*				X	
song sparrow* *(Melospiza melodia)*		X	X	X	
dark-eyed junco* *(Junco hyemalis)*				X	
red-winged blackbird *(Agelaius phoeniceus)*		X	X		
brown-headed cowbird *(Molothrus ater)*				X	
MAMMALS					
common opossum *(Didelphis marsupialis)*					
vagrant shrew *(Sorex vagrans)*			X		
dusky shrew *(Soex obscurus)*					
northern water shrew *(Sorex palustris)*	X				
pacific water shrew *(Sorex bendirei)*	X				
shrew-mole *(Neurotichus gibbsi)*					
pacific mole *(Scapanus orarius)*					
snowshoe hare *(Lepus americanus)*				X	
eastern cottontail* *(Sylvilagus floridanus)*					
aplodontia (mountain beaver)* *(Aplodontia rufa)*					
Townsend's chipmunk *(Eutamias townsendi)*					
Douglas's squirrel *(Tamiasciurus douglasi)*					
northern flying squirrel *(Glaucomys sabrinus)*					
beaver* *(Castor canadensis)*	X				
deer mouse *(Peromyscus maniculatis)*					

***presence documented**

Appendix B. Wildlife likely to occur on Moss Lake site (continued).

	OPEN WATER	SHRUB WETLAND	BOG	FORESTED WETLAND	RIP FC
bushy-tailed woodrat *(Neotoma cinerea)*					
boreal redbacked vole *(Clethrionomys gapperi)*			X		
Oregon vole *(Microtis oregoni)*					
muskrat* *(Ondatra zibethica)*	X	X	X		
pacific jumping mouse *(Zapus trinotatus)*				X	
porcupine *(Erethizon dorsatum)*					
black bear *(Ursus americanum)*					
raccoon* *(Procyon lotor)*	X			X	
fisher *(Martes pennanti)*					
short-tailed weasel *(Mustela erminea)*					
long-tailed weasel *(Mustela frenata)*					
mink *(Mustela vison)*	X	X		X	
river otter *(Lutra canadensis)*	X				
spotted skunk *(Spilogale putorius)*					
striped skunk *(Mephitis mephitis)*					
coyote* *(Canis latrans)*					
red fox *(Vulpes fulva)*					
bobcat* *(Lynx rufus)*				X	
mule deer (blacktail deer)* *(Odocoileus hemionus)*		X		X	

Table adapted from King County (1987), Appendix Table 1.

***presence documented**

TO: NICK MASLA
FROM: KITTIE FORD
DATE: June 19, 1996
SUBJECT: Moss Lake Park - Site Characterization of Recent Acquisition Parcel

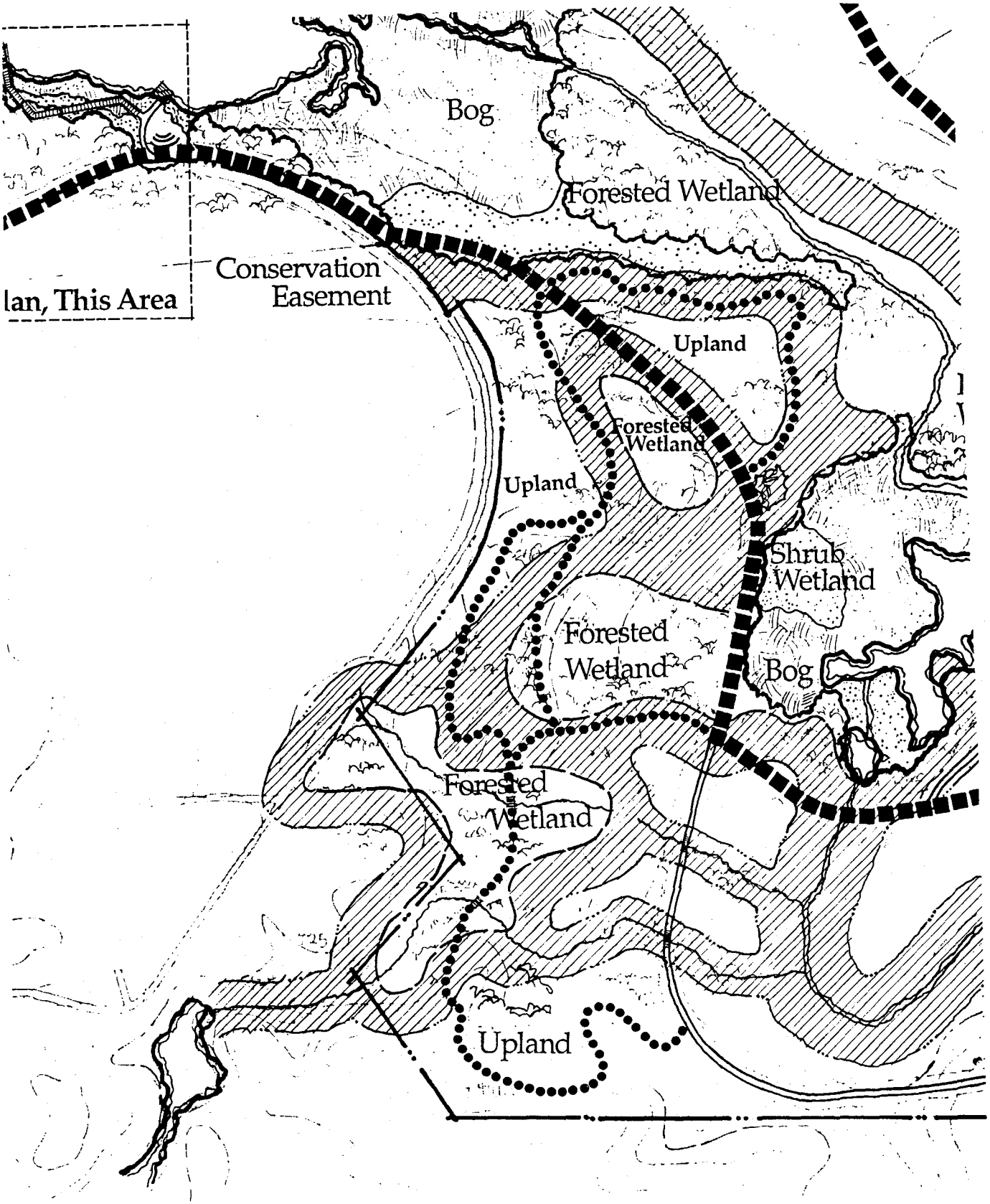
Natural resources on approximately 286 acres of the 306-acre Moss Lake Park were characterized by Herrera Environmental Consultants (HEC) in 1995. This memorandum presents a characterization of the plant communities, wildlife habitat and hydrologic conditions on the remaining 20 acres.

PLANT COMMUNITIES AND WILDLIFE HABITAT

Atelier staff visited the 20-acre parcel on May 31, 1996 to verify plant community and wildlife habitat similarities with the rest of the park and the presence of surface water features. True color and infrared aerial photos were also used to map the general boundaries of vegetation types and stream corridors.

The parcel is entirely forested with a mix of upland, wetland and riparian plant communities (Figure 1). Species composition is similar to the forested community types in the remainder of the park, as described in the *Natural Resource Studies* report prepared by HEC (December 1995). However, because this parcel slopes uphill from the Moss Lake bog, the deep organic and acidic soils that promote growth of Sitka spruce are not as widely present and this species is not present on large numbers on the 20-acre acquisition parcel. These forests are older second-growth stands that have experienced relatively stable hydrologic conditions and the distribution of wetland and upland forests should remain consistent over time.

The forested habitats on this 20-acre parcel are a continuation of the Moss Lake complex of wildlife habitat that extends offsite into other undeveloped areas. This large and diverse habitat complex has high wildlife usage potential. Wildlife habitat structure on the 20-acre parcel and its overall function is similar to other forested areas of the park that do not border directly on the Moss Lake bog. Because this parcel is entirely forested and is bordered on all sides by forest, it does not provide any added habitat value associated with "edges" between habitat types such as described by HEC (1995) (e.g., edges between forested areas and the shrub wetland and open water areas of Moss Lake). However, two tributary streams support additional riparian forest habitat, which is highly valuable for wildlife.

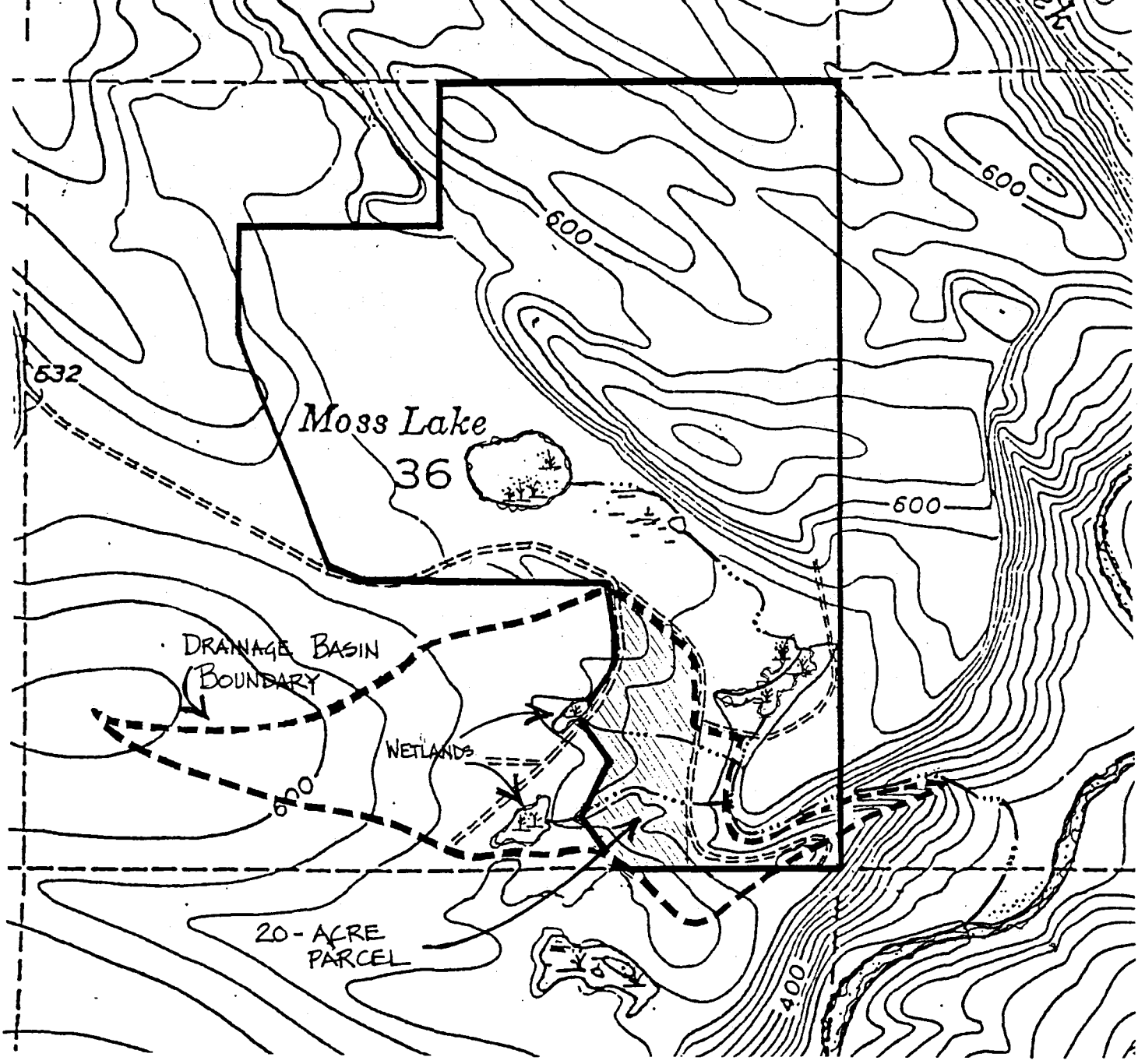

Bog
Forested Wetland
lan, This Area
Conservation Easement
Upland
Forested Wetland
Upland
Shrub Wetland
Forested Wetland
Bog
Forested Wetland
Upland

Expected wildlife species use is similar to other areas of the park. No unique habitat features or Priority Habitat types occur on the parcel. The tributary streams described in the next section could provide habitat for salmonids if fish passage is improved.

HYDROLOGY

The 20-acre parcel lies in the lower reaches of a relatively small drainage basin that slopes downgradient from west to east and discharges easterly via two small streams (Figure 2). Both streams originate from separate wetlands located just outside the parcel boundary to the west and drain through culverts under an existing trail to the Moss Lake outlet stream. Surface runoff from this parcel does not enter the Moss Lake bog.

These streams would likely be categorized as Class 2 based on the King County Sensitive Areas Ordinance because they appear to flow year around. However, the area experienced above-normal rainfall during the Spring of 1996 when site investigations were conducted. If flows are intermittent during more normal rainfall years, a Class 3 categorization may be appropriate. Fish were not observed in either stream and the existing culverts under the proposed secondary trail currently function as barriers to fish passage. Required buffers for Class 2 streams that are not used by salmonids is 50 feet, which is portrayed on Figure 1. However, buffers could range downward to 25 feet for a Class 3 stream depending on normal rainfall conditions or upward to 100 feet for a Class 2 stream used by salmonids if fish passage is improved.


600
600
632
Moss Lake
36
600
DRANAGE BASIN
BOUNDARY
WETLANDS
600
20-ACRE
PARCEL
400

TO:	Mason Bowles, King County DDES Muffy Walker, U.S. Army Corps of Engineers
FROM:	Kittie Ford, Atelier
DATE:	March 28, 1996
SUBJECT:	Moss Lake Park Wetland Delineation
K.C. PREAPP #:	A95P0259
CORPS APP. #:	96-4-00228

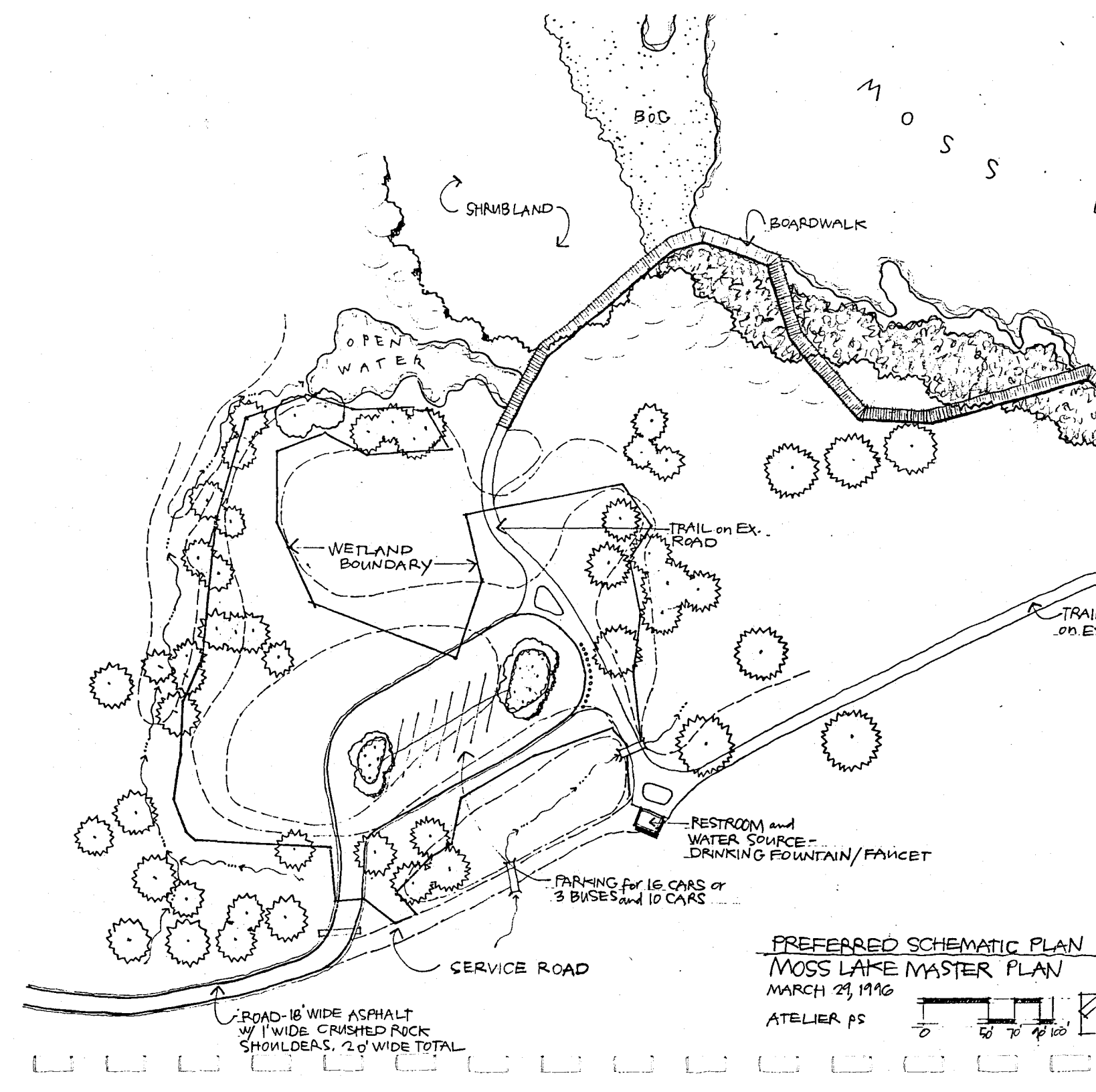
This memo summarizes the results of a recent wetland delineation conducted on a portion of the Moss Lake Park site to support selection of a parking lot location for the Moss Lake Park Master Plan. Extensive additional site work will be conducted during the future project design phase.

INTRODUCTION

King County is currently preparing a master plan for development of an environmental learning park at Moss Lake. Proposed park facilities include a small parking area, barrier-free boardwalk and trail, viewing platforms, a small program amphitheater, and restroom facilities (refer to Figure titled *Preferred Schematic Plan.*). Several alternative sites for the parking area have been evaluated for impacts to wetlands and wildlife habitat, as well as for compatibility with the Park's draft environmental learning program). Evaluations were based on a "planning-level" reconnaissance of sensitive areas, including review of air photos, characterization of dominant plant communities, and spot checking of soils to determine the general locations of wetlands.

Three parking and access alternatives were considered. Based on the reconnaissance map of sensitive areas, all would result in some impact to wetlands, ranging from about one to two acres. The preferred parking lot location would provide significant advantages to the environmental learning program. However, based on the preliminary sensitive areas reconnaissance, it initially appeared that the preferred parking lot location would also result in the greatest amount of wetland disturbance. Additional soils analysis in the vicinity of the preferred parking lot location indicated that a previously unidentified area of upland may be large enough to substantially reduce the wetland impacts of this alternative, resulting in equal or less impact than the other parking and access alternatives.

Because of the significant programmatic advantages of the preferred alternative and the potential for identifying a substantial upland area for development, a wetland boundary delineation was performed in the vicinity of the proposed parking lot. We typically conduct delineations during project design rather than during the master planning process because of the relatively short "shelf life" of delineations. However, it is appropriate for this


BOG
MOSS
SHRUBLAND
BOARDWALK
OPEN WATER
WETLAND BOUNDARY
TRAIL on Ex. ROAD
RESTROOM and WATER SOURCE - DRINKING FOUNTAIN/FAUCET
PARKING for 16 CARS or 3 BUSES and 10 CARS
SERVICE ROAD
ROAD - 18' WIDE ASPHALT w/ 1' WIDE CRUSHED ROCK SHOULDERS, 20' WIDE TOTAL
PREFERRED SCHEMATIC PLAN
MOSS LAKE MASTER PLAN
MARCH 29, 1996
ATELIER ps
0
50
70
100'

project to assure that the selected master plan alternative: 1) can be successfully designed, permitted and constructed; and 2) represents an appropriate balance between unavoidable impacts to natural resources and requirements of the environmental education program..

The purpose of this report is to characterize delineated wetlands and adjacent upland habitat in the vicinity of the preferred parking lot site at Moss Lake Park. The delineated boundary was flagged on March 24, 1996 by Kittie Ford and verified on March 27, 1996 by Muffy Walker, U.S. Army Corps of Engineers (refer to Figure titled *Approximate Wetland Boundaries*). The boundary will be surveyed by a King County survey crew and an accurate wetland map will be submitted as an addendum to this report. The wetland map included in this report is approximate, based on field measurements with a 100-foot tape and hand-held compass, and a current color infrared air photo.

Wetlands on the remainder of the 320-acre site have not been delineated, consistent with the usual and customary approach to master planning studies. Additional wetland delineations will be conducted as part of project design, following approval of the Moss Lake Park Master Plan by the King County Council.

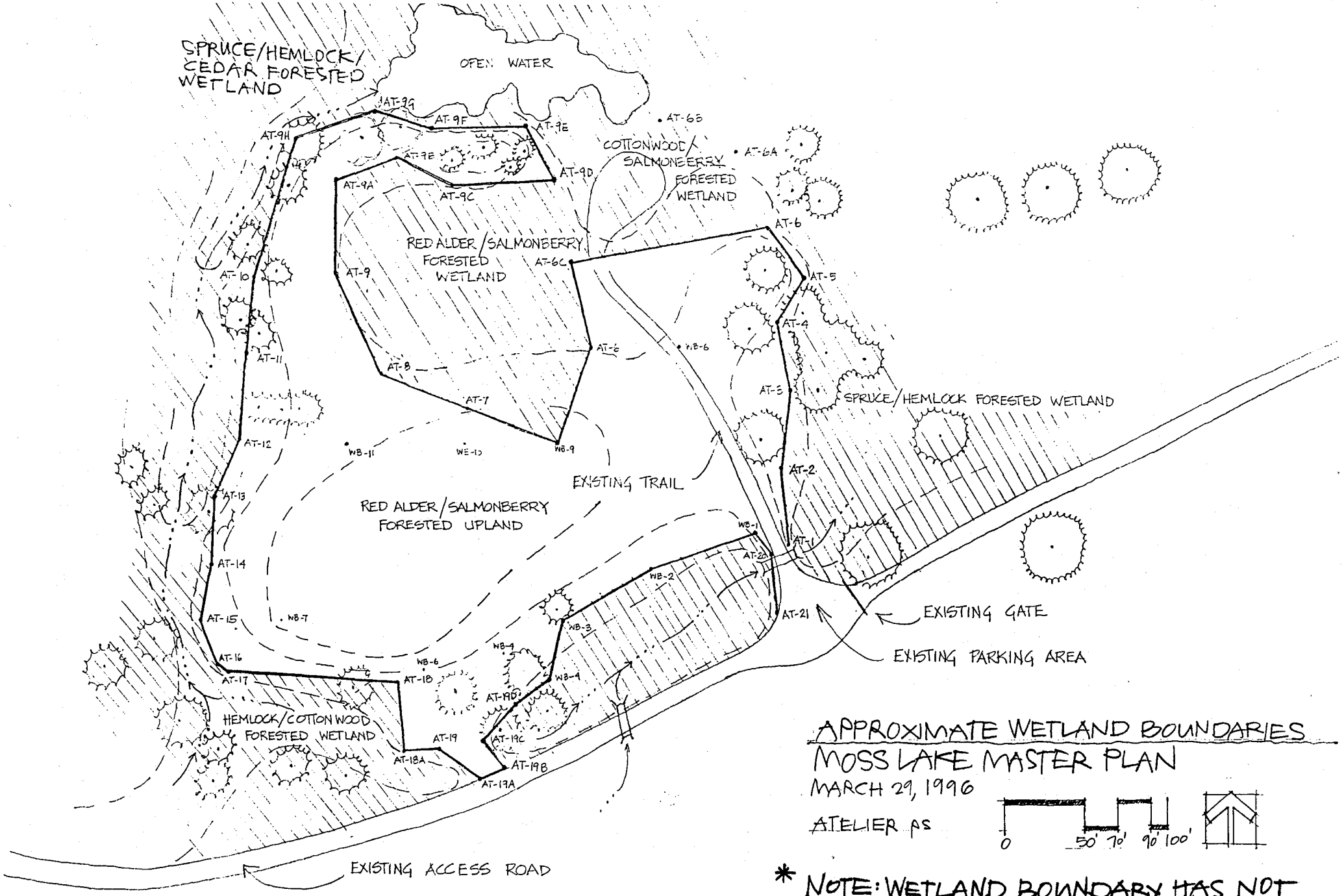
FINDINGS

SOILS

Soils in the vicinity of the proposed parking lot are classified by the Soil Conservation Service as Tokul Gravelly Loam 0-6% and Mukilteo Peat, which is listed as a hydric soil by the SCS (see Figure titled *Soils*). Although Tokul Gravelly Loam soils are not listed as hydric, hydric soil characteristics will form in Tokul soils where a very slowly permeable layer of orstein occurs at shallow depth, impeding the downward percolation of surface water. Tokul soils are moderately permeable in the upper part and perched water may occur in the early part of the growing season. Occasionally, Tokul Gravelly Loam soils also include areas of poorly drained Norma soils, which are listed by the SCS as hydric.

Most of the area identified as upland has been graded and/or filled during past peat excavation activities. The approximate boundary of fill is shown on the Figure titled *Existing Fill Area.*

Soil characteristics indicative of hydric conditions include a low chroma matrix with distinct mottles within 18 inches of the soils surface, and observance of continuously saturated soils during a two-week period in March 1996. Soil colors in wetland areas range from dark gray (5Y4/1) to mottled very dark grayish brown (10YR3/2), mottled dark grayish brown



APPROXIMATE WETLAND BOUNDARIES

MOSS LAKE MASTER PLAN

MARCH 29, 1996

ATELIER 5

0 50' 70' 90' 100'

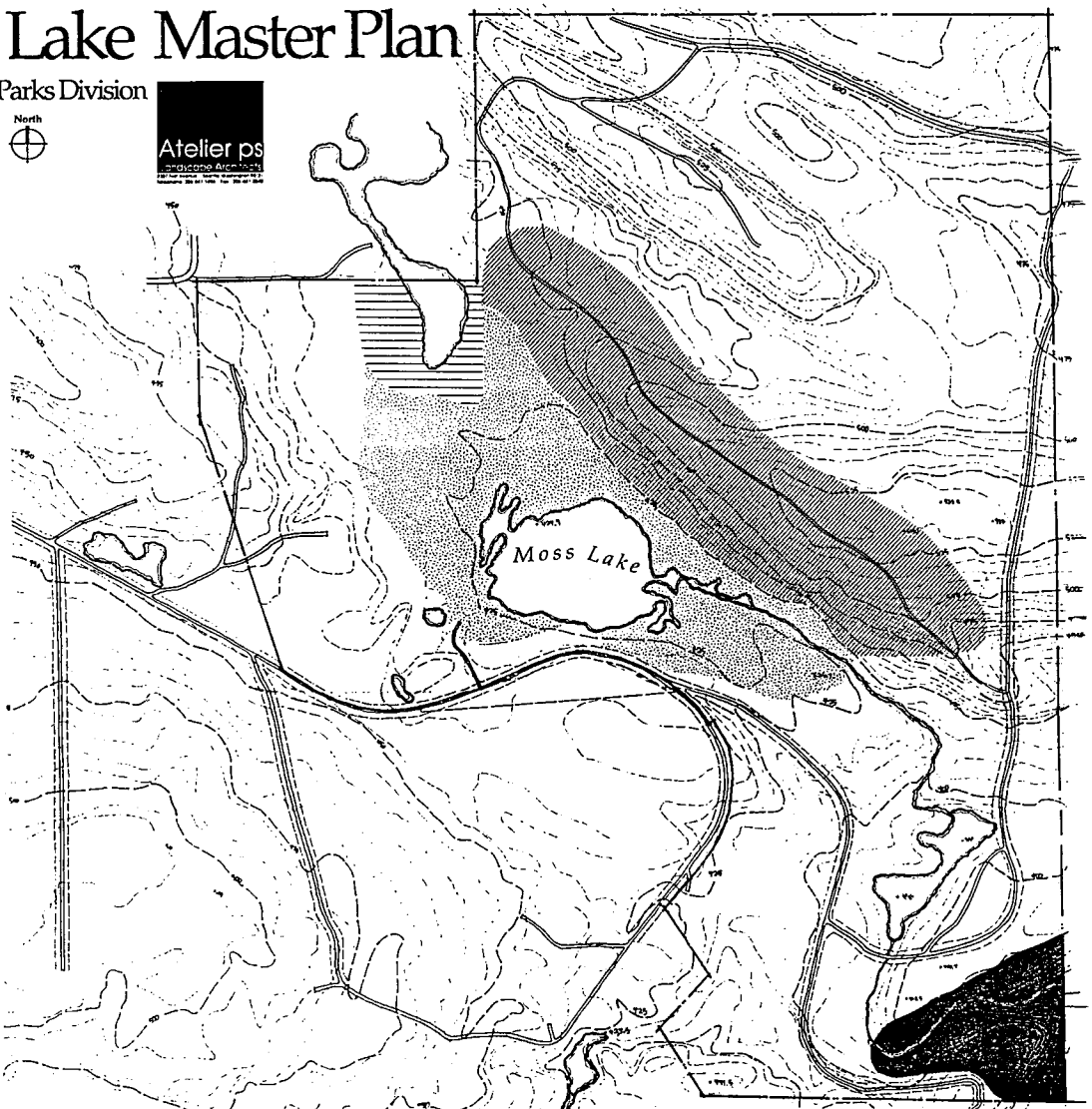
* NOTE: WETLAND BOUNDARY HAS NOT BEEN SURVEYED.

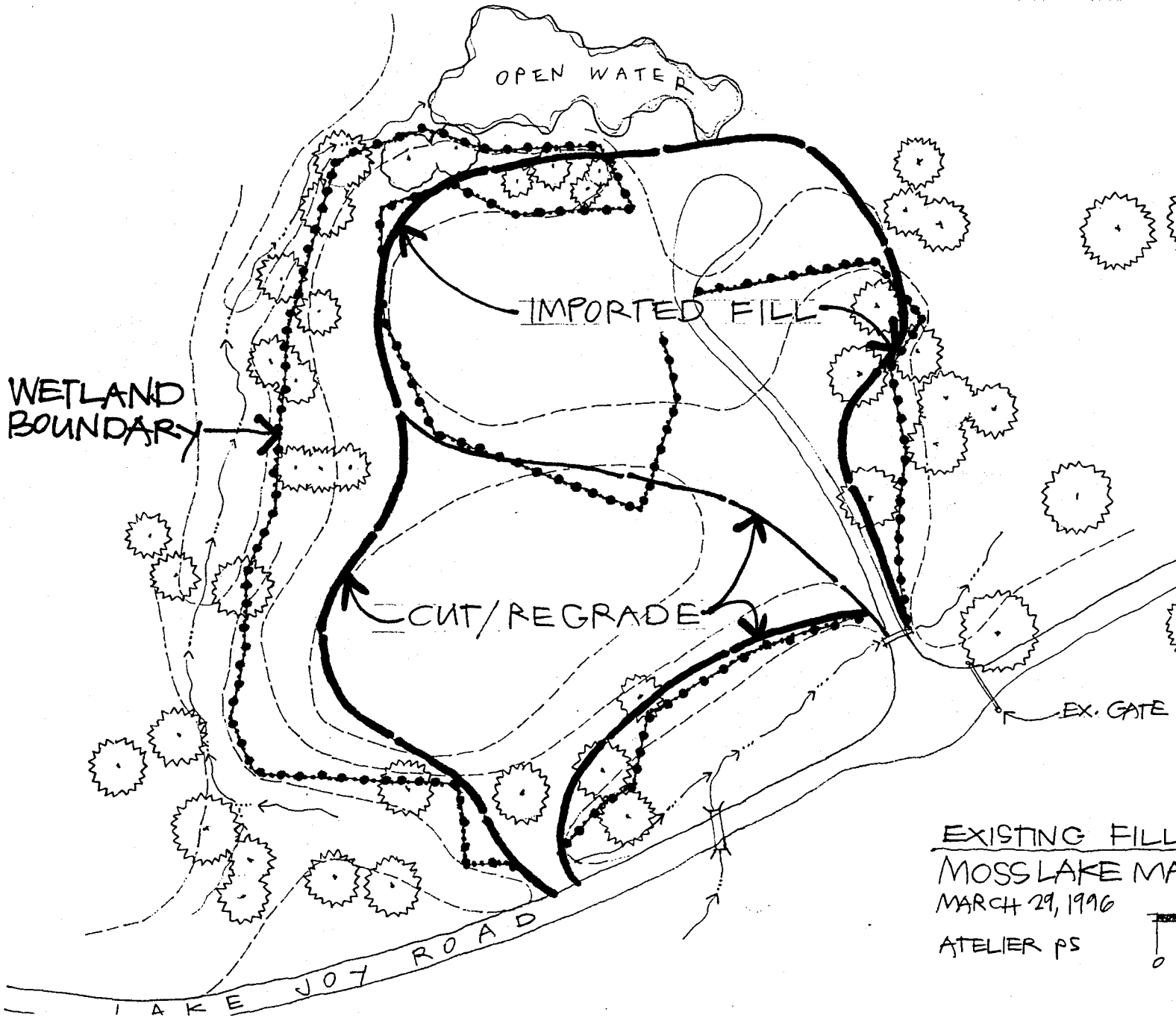
Moss Lake Master Plan

King County Parks Division

North

Atelier ps
landscape Architects




OPEN WATER
IMPORTED FILL
WETLAND BOUNDARY
CUT/REGRADE
EX. GATE
LAKE JOY ROAD
EXISTING FILL
MOSS LAKE MA
MARCH 29, 1996
ATELIER PS

(10YR4/2) and mottled grayish brown (2.5Y5/2). Upland soils are faintly mottled with matrix chromas of 3 or higher and at greater depth than in wetland areas. Soil data sheets are attached at the end of this memo.

VEGETATION

The Moss Lake Park site totals approximately 320 acres and includes both wetland and upland habitats. The Moss Lake wetland system encompasses a high quality sphagnum bog with associated shrub and forested wetlands. The Figure titled *Hydrology and Vegetation* shows the general locations of vegetation types on the park site. Forested wetland communities can generally be divided into two categories: 1) red alder/cottonwood/ salmonberry; and 2) western red cedar/western hemlock/Sitka spruce. These species also occur in the forested upland areas in the vicinity of the preferred parking lot site.

Vegetation in the vicinity of the proposed parking lot site has been disturbed through the years by logging and placement of fill for heavy equipment staging associated with a peat excavation operation at Moss Lake. Peat excavation ended in the mid-1950s and the site has remained relatively undisturbed since that time.

Previously filled areas have naturally revegetated with a predominance of deciduous species that occur in both wetlands and uplands, including red alder (*Alnus rubra*), cottonwood (*Populus trichocarpa*), and salmonberry (*Rubus spectabilis*). Some scattered, small western hemlock (*Tsuga heterophylla*) and Sitka spruce (*Picea sitchensis*) also occur in this zone. Sword fern (*Polystichum munitum*) and scattered salal (*Gaultheria shallon*) occur in the understory of the upland deciduous forest.

Unfilled areas have remained undisturbed for a longer time than filled areas and support a more established and diverse plant community. Unfilled areas are largely vegetated with a mixed evergreen forest, including western hemlock, Sitka spruce, western red cedar (*Thuja plicata*), and scattered red alder. These species occur in both wetlands and upland. Understory species include skunk cabbage (*Lysichitum americanum*), false lily-of-the-valley (*Maianthemum dilatatum*) and salmonberry in wetland areas, and sword fern, salal, false lily-of-the-valley, bleedingheart (*Dicentra* sp.), and western trillium (*Trillium ovatum*) in upland areas.

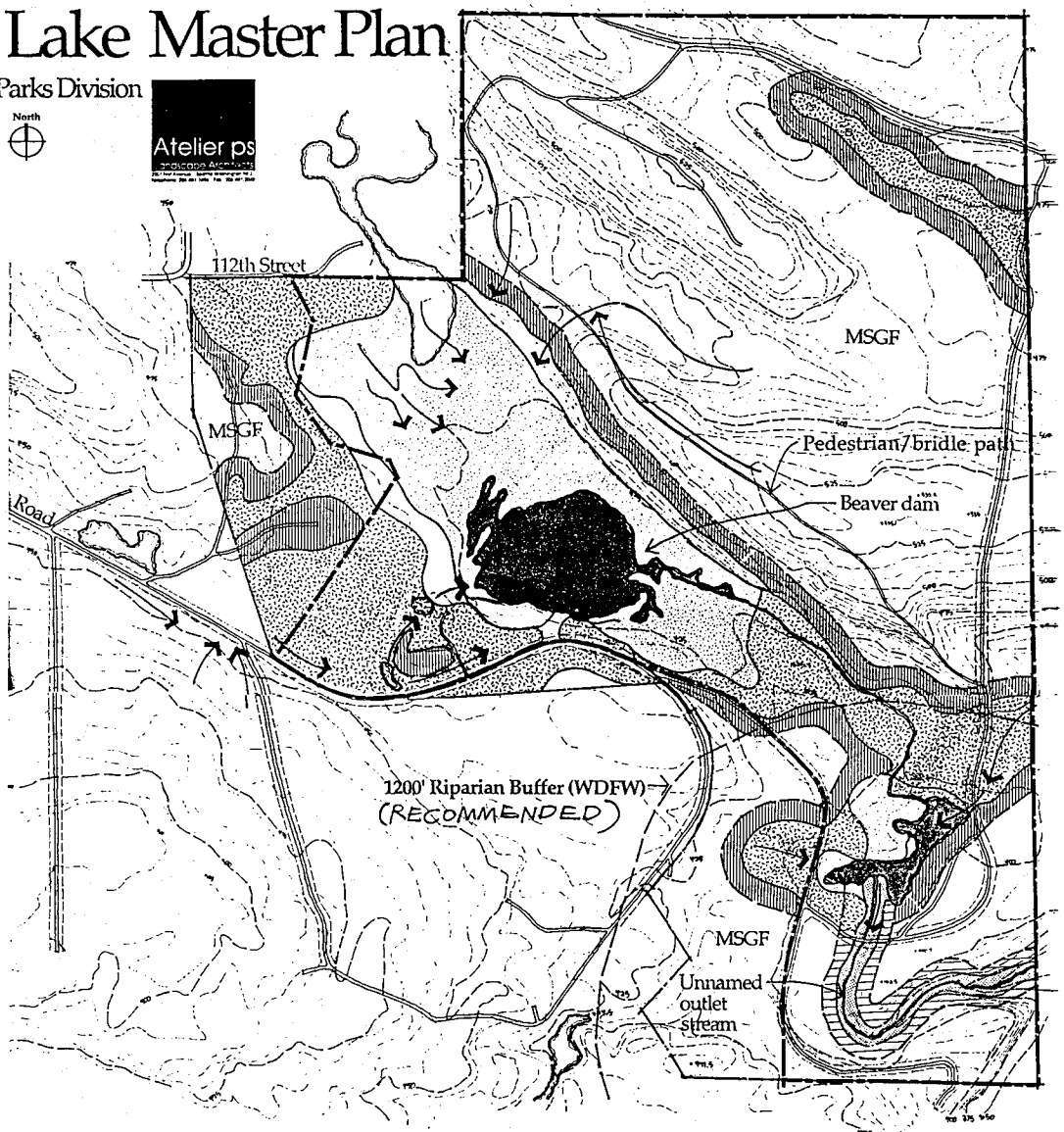
HYDROLOGY

The area of upland identified on the Figure titled *Approximate Wetland Boundaries* slopes gently downhill toward the northeast. There is no evidence of subsurface sources of water (i.e., seeps or springs) in the area investigated. Runoff from the surrounding upslope areas drains around the

Moss Lake Master Plan

King County Parks Division

Atelier ps
landscape Architects



Hydrology & Vegetation

Legend

- MSGF - Mixed Second Growth Forest
- Riparian Forest
- Shrub Wetland
- Bog
- Forested Wetland
- Open Water
- 100' King Co. Wetland Buffer
- 100' King Co. Stream Buffer
- Major Drainages

upland via two seasonal drainage channels that discharge into Moss Lake. The discharge point for these drainages is downstream of the majority of the sphagnum bog complex associated with Moss Lake. Flows in these small channels during site investigations in March 1996 were estimated between 0.5 and 1.0 cfs.

Soils in evergreen forested wetland areas were saturated to within about 12 inches of the surface during site investigations in March, 1996. Soil moisture in the deciduous forested wetland varied from very wet, with standing water at a depth of 8 inches to slight moisture at about 16 inches below the surface. The source of saturation appears to be rainfall and runoff.

WETLAND CLASSIFICATION

Wetlands in the vicinity of the proposed parking lot are part of a very large and diverse wetland complex that includes a high-quality sphagnum bog surrounding Moss Lake. The Moss Lake wetland complex is classified by King County as a Class 1 wetland, due to the presence of the sphagnum bog plant association and the overall size of the wetland complex.

POTENTIAL IMPACTS AND MITIGATION MEASURES

Wetland impacts of the proposed parking lot, which is the single largest construction feature proposed for Moss Lake Park, is the subject of this report. Other planned elements include an interpretive boardwalk and trail system, group amphitheater, and small restroom building. The mitigation measures outlined below would offset impacts of both the proposed parking lot and other park facilities. Additional impact analysis of other park features and exact locations of conceptual mitigation measures will be finalized during the future construction design phase.

The Moss Lake wetland system provides significant habitat for aquatic, terrestrial and avian wildlife species; moderates surface water flows from surrounding uplands during major storm events; and improves water quality in the outlet stream that discharges to the Tolt River. Direct impacts to these wetland functions would be minimized by utilizing the substantial upland area identified in this report for parking lot development. The estimated unavoidable impact to wetlands associated with construction of a parking lot in the preferred location would be approximately 200 to 300 square feet.

Because of the sensitivity of bogs to changes in water chemistry, the water quality treatment functions of the surrounding wetlands require a high level of protection. Development within the watershed of a bog must utilize specialized methods to protect water quality, which are reflected in proposed changes to the King County Surface Water Manual. Siting of a parking

facility at Moss Lake Park would result in increased impervious surface that would generate some additional runoff and potential for contamination to Moss Lake.

Construction of the parking lot in the preferred location would not result in changes to local drainage patterns.

Clearing and grading for the new parking area would occur largely within deciduous forested upland. This vegetation type is widely represented in the Moss Lake area. Removal of one-half to two-thirds of an acre of upland deciduous forest would not significantly impact the overall habitat value of the area, particularly when offset by mitigation enhancement as outlined below.

In the immediate vicinity of the proposed parking lot, mitigation measures would be incorporated into project design to assure a high level of water quality treatment and maintenance of existing drainage patterns. A three-facility treatment train consistent with the requirements of the draft Surface Water Design Manual will be used to treat parking lot runoff prior to discharge to the Moss lake wetland system. The entry point from the existing access road to the new parking area would be constructed using a box culvert or large-diameter round culvert to maintain current drainage patterns.

In addition to preservation of the Moss Lake wetland system and recent acquisitions of additional buffer area, other mitigation concepts that could be incorporated into project design include:

- Clearly marking limits of construction
- Specifying construction methods and sequencing that would minimize impacts of trail and boardwalk construction
- Enhancing deciduous forested areas with underplantings of western red cedar, Sitka spruce and western hemlock
- Reintroducing beaver to Moss Lake
- Replacing two small-diameter round culverts at lake outlet with large box culvert to improve fish passage
- Consolidating boardwalk development to discourage social trails
- Placing the entry gate as far from Moss Lake as feasible and closing it at night to discourage off-hours use of the park
- Developing an neighborhood adopt-a-park program to ensure ongoing stewardship of the area

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): FORD Date: 3/8 and 3/24/96
Project/Site: Moss Lake Park State: WA County: King
Applicant/Owner: King County Cap. Facilities Plant Community #/Name: SL-1 (Red Alder/Salmonberry)
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes X No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ No X (If yes, explain on back)

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. red alder	FAC	T	11.		
2. cottonwood	FAC	T	12.		
3. salmonberry	FAC	S	13.		
4.			14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Percent of dominant species that are OBL, FACW, and/or FAC 100%
Is the hydrophytic vegetation criterion met? Yes X No ____
Rationale: ____

SOILS

Series/phase: Tokul gravelly loam 0-6% Subgroup:[2] ____
Is the soil on the hydric soils list? Yes ____ No X Undetermined ____
Is the soil a Histosol? Yes ____ No X Histic epipedon present? Yes ____ No X
Is the soil: Mottled? Yes X No ____ Gleyed? Yes ____ No X
Matrix Color: 10YR3/2 Mottle Colors: ____
Other hydric soil indicators: ____
Is the hydric soil criterion met? Yes X No ____
Rationale: ____

0-8 10YR3/2
8↓ 10YR3/2(M)

HYDROLOGY

Is the ground surface inundated? Yes ____ No X Surface water depth: ____
Is the soil saturated? Yes X No ____
Depth to free-standing water in pit/soil probe hole: moist at 16"
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes X No ____
Rationale: ____

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes X No ____
Rationale for jurisdictional decision: meets all criteria

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): FORD Date: 3/8 and 3/24/96
Project/Site: Moss Lake Park State: WA County: King
Applicant/Owner: King County Cap. Facilities Plant Community #/Name: SL-2 (red alder/salmonberry)
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes X No _____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes _____ No X (If yes, explain on back)

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. red alder	FAC	T	11.		
2. cottonwood	FAC	T	12.		
3. salmonberry	FAC	S	13.		
4.			14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Percent of dominant species that are OBL, FACW, and/or FAC 100%
Is the hydrophytic vegetation criterion met? Yes X No _____
Rationale: _____

SOILS

Series/phase: Tokul gravelly loam 0-6% Subgroup:[2] _____
Is the soil on the hydric soils list? Yes _____ No X Undetermined _____
Is the soil a Histosol? Yes _____ No X Histic epipedon present? Yes _____ No X
Is the soil: Mottled? Yes _____ No X Gleyed? Yes _____ No X
Matrix Color: 10YR 4/4 - 4/5 Mottle Colors: _____
Other hydric soil indicators: none
Is the hydric soil criterion met? Yes _____ No X
Rationale: bright matrix - no mottles

0-3 10YR 3/2
3↓ 10YR 4/4-4/5

HYDROLOGY

Is the ground surface inundated? Yes _____ No X Surface water depth: _____
Is the soil saturated? Yes _____ No X
Depth to free-standing water in pit/soil probe hole: NA
List other field evidence of surface inundation or soil saturation.
NA
Is the wetland hydrology criterion met? Yes _____ No X
Rationale: _____

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes _____ No X
Rationale for jurisdictional decision: doesn't meet soils and hydrology criteria

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): FORD Date: 3/8 and 3/24/96
Project/Site: Moss Lake Park State: WA County: King
Applicant/Owner: King County Cap. Facilities Plant Community #/Name: SL-3 (red alder salmonberry)
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes X No _____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes _____ No X (If yes, explain on back)

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. red alder	FAC	T	11.		
2. cottonwood	FAC	T	12.		
3. salmonberry	FAC	S	13.		
4.			14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Percent of dominant species that are OBL, FACW, and/or FAC 100%
Is the hydrophytic vegetation criterion met? Yes X No _____
Rationale: _____

SOILS

Series/phase: Tokul gravelly loam 0-6% Subgroup:[2] _____
Is the soil on the hydric soils list? Yes _____ No X Undetermined _____
Is the soil a Histosol? Yes _____ No X Histic epipedon present? Yes _____ No X
Is the soil: Mottled? Yes X No _____ Gleyed? Yes _____ No X
Matrix Color: 10YR 4/3 Mottle Colors: 10YR 5/4
Other hydric soil indicators: NA
Is the hydric soil criterion met? Yes _____ No X
Rationale: bright matrix

0-6 10YR 3/2
6↓ 10YR 4/3 (M)
some fire evidence

HYDROLOGY

Is the ground surface inundated? Yes _____ No X Surface water depth: _____
Is the soil saturated? Yes _____ No X
Depth to free-standing water in pit/soil probe hole: NA
List other field evidence of surface inundation or soil saturation.
NA
Is the wetland hydrology criterion met? Yes _____ No X
Rationale: _____

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes _____ No X
Rationale for jurisdictional decision: doesn't meet soils or hydrology criteria

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): FORD Date: 3/8 and 3/24/96
Project/Site: Moss Lake Park State: WA County: King
Applicant/Owner: King County Cap. Facilities Plant Community #/Name: SL-7 (red alder/salmonberry)
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes X No _____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes _____ No X (If yes, explain on back)

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. red alder	FAC	T	11.		
2. salmonberry	FAC	S	12.		
3.			13.		
4.			14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Percent of dominant species that are OBL, FACW, and/or FAC 100%
Is the hydrophytic vegetation criterion met? Yes X No _____
Rationale: _____

SOILS

Series/phase: Tokul gravelly loam (mapped) Subgroup:[2] _____
Is the soil on the hydric soils list? Yes _____ No X Undetermined _____ 0-16 5Y4/1 (M)
Is the soil a Histosol? Yes _____ No X Histic epipedon present? Yes _____ No X
Is the soil: Mottled? Yes X No _____ Gleyed? Yes _____ No X
Matrix Color: 5Y4/1 Mottle Colors: _____
Other hydric soil indicators: _____
Is the hydric soil criterion met? Yes X No _____
Rationale: This area has been filled. Soil matrix is gray and mottled

HYDROLOGY

Is the ground surface inundated? Yes _____ No X Surface water depth: _____
Is the soil saturated? Yes X No _____
Depth to free-standing water in pit/soil probe hole: 8"
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes X No _____
Rationale: _____

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes X No _____
Rationale for jurisdictional decision: meets all criteria

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): FORD Date: 3/8 and 3/24/96
Project/Site: Moss Lake Park State: WA County: King
Applicant/Owner: King County Cap. Facilities Plant Community #/Name: AT-6A (Cottonwood/Salmonberry)
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes X No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ No X (If yes, explain on back)

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. cottonwood	FAC	T	11.		
2. Salmonberry	FAC	S	12.		
3.			13.		
4.			14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Percent of dominant species that are OBL, FACW, and/or FAC 100%
Is the hydrophytic vegetation criterion met? Yes X No ____
Rationale: ____

SOILS

Series/phase: Tokul gravelly loam (mapped) Subgroup:[2] ____
Is the soil on the hydric soils list? Yes ____ No X Undetermined ____
Is the soil a Histosol? Yes ____ No X Histic epipedon present? Yes ____ No X
Is the soil: Mottled? Yes X No ____ Gleyed? Yes ____ No X
Matrix Color: 10YR4/2 Mottle Colors: ____
Other hydric soil indicators: NA
Is the hydric soil criterion met? Yes X No ____
Rationale: ____

0-12 10YR3/3
12↓ 10YR4/2(M)

HYDROLOGY

Is the ground surface inundated? Yes ____ No X Surface water depth: ____
Is the soil saturated? Yes X No ____
Depth to free-standing water in pit/soil probe hole: very moist at 16"
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes X No ____
Rationale: ____

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes X No ____
Rationale for jurisdictional decision: ____
meets all criteria — but borderline. This area has been filled and evidence of fluctuating water table & moist soils are well below surface.

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): FORD Date: 3/8 and 3/24/96
Project/Site: Moss Lake Park State: WA County: King
Applicant/Owner: King County Cap. Facilities Plant Community #/Name: AT-3 (hemlock/salmonberry/swordfern)
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes X No _____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes _____ No X (If yes, explain on back)

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. Western hemlock	FAC	T	11.		
2. Salmonberry	FAC	S	12.		
3.			13.		
4.			14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Percent of dominant species that are OBL, FACW, and/or FAC 100%
Is the hydrophytic vegetation criterion met? Yes X No _____
Rationale: _____

SOILS

Series/phase: Tokul gravelly loam Subgroup:[2] _____
Is the soil on the hydric soils list? Yes _____ No X Undetermined _____
Is the soil a Histosol? Yes _____ No X Histic epipedon present? Yes _____ No X
Is the soil: Mottled? Yes _____ No X Gleyed? Yes _____ No X
Matrix Color: 10YR 3/3 Mottle Colors: NA
Other hydric soil indicators: NA
Is the hydric soil criterion met? Yes _____ No X
Rationale: bright matrix – no mottles

HYDROLOGY

Is the ground surface inundated? Yes _____ No X Surface water depth: _____
Is the soil saturated? Yes _____ No X
Depth to free-standing water in pit/soil probe hole: NA
List other field evidence of surface inundation or soil saturation.
NA
Is the wetland hydrology criterion met? Yes _____ No X
Rationale: _____

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes _____ No X
Rationale for jurisdictional decision: only meets veg. std – no evidence of soils or hydrology

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-2255

REPLY TO ATTENTION OF
Regulatory Branch

JUN 21 1996

RECEIVED
JUN 26 1996
Ans'd.....

Ms. Kittie Ford
Atelier ps
217 Pine, Suite 720
Seattle, Washington 98101

Reference: 96-4-00228
King County Parks
and Recreation

Dear Ms. Ford:

We have confirmed the wetland delineation for the area surrounding the proposed parking lot at the Moss Lake Park site located near Carnation, King County, Washington. We are in agreement with the delineation you prepared and depicted on the map dated May 23, 1996. We consider these wetland to be adjacent to and above the headwaters of Moss Lake. Because wetlands are dynamic ecosystems highly subject to change and Federal regulations governing development are also subject to change, this wetland determination may be considered valid for only 5 years from the date of this letter. This verification does not include any wetlands next to the existing access road which may be impacted through road improvements.

We have also evaluated your three proposed alternatives to discharge fill material in wetlands. Department of the Army regulations dated November 22, 1991, authorize certain activities under nationwide permits, provided certain conditions are met. Appendix A to Part 330, Paragraph B (26) of these regulations authorizes discharges of dredged or fill material into nontidal rivers, streams, and their lakes and impoundments, including adjacent wetlands, that are located above the headwaters where the average annual flow is less than 5 cubic feet per second . . .

The entire text of Nationwide Permit 26 is enclosed.

All of the alternatives appear to generally meet the conditions of NWP 26. However, Alternative A appears to impact between 1 and 2 acres and would require notification to the Corps as described in General Condition 13 (see enclosure 2). No notification to the Corps is required if the impacts are less than 1 acre, as appears to be the case in the Preferred

Alternative and Alternative B. For us to issue a verification of NWP 26, you need to submit a site plan which shows all of the wetlands to be impacted, including those next to the access road.

This letter is not a verification of NWP 26 and does not authorize the placement of fill into wetlands greater than 1 acre. If you have any questions, please contact Muffy Walker, telephone (206) 764-6915.

Sincerely,

Robert H. Martin
Chief, Processing Section

Enclosures

FILED FOR RECORD AT THE REQUEST OF
AND AFTER RECORDING RETURN TO:

Serena M. Schourup
Bogle & Gates
Two Union Square
601 Union Street
Seattle, Wa 98101-2346

Filed for Record at Request of
FIRST AMERICAN TITLE
FOURTH & BLANCHARD BLDG
SEATTLE, WA 98121

1ST AM-S

9507190763

SECOND MODIFICATION OF EASEMENT AND ROAD MAINTENANCE AGREEMENT

THIS AGREEMENT is made this 19 day of ~~May,~~ JULY 1995 by and between MOSS LAKE ASSOCIATES, a Washington general partnership (the "Partnership") and KING COUNTY, WASHINGTON, a governmental subdivision ("King County").

1. Recitals.

1.1 The Partnership is the former owner of all of the real property situated in King County, Washington which is outlined on Exhibit A hereto and legally described in Exhibit A-1 hereto (the "Total Property"). The Partnership is the current owner of the portion of the Total Property legally described in Exhibit B hereto (the "Partnership Parcel"). As used herein, the "owner of the Partnership Parcel" shall include the owners of all or any part of the Partnership Parcel.

1.2 During the period of its ownership of the Total Property, the Partnership designated and mapped a road network throughout the Total Property (the "Road Network"). In order to establish the Road Network of record, the Partnership executed and recorded a Declaration of Easement under King County Recording No. 8808170980 (the "Declaration"), in which the Partnership granted and conveyed to all present and future owners of lots within the Total Property an easement for ingress, egress and for installation, operation, maintenance of utilities over, under, across and through the Road Network generally as shown on Exhibit C hereto. The Declaration also provides that responsibility for the maintenance of the Road Network and the associated costs shall be borne equally by the property owners of any lots within the Total Property having legal access therefrom.

1.3 In anticipation of developing for resale those portions of the Total Property identified as Lots 1, 2, 3, 4, 5, 6 and 22, and legally described in Exhibit B to the Declaration (the "Phase I Lots"), the Partnership executed and recorded Covenants, Conditions and Restrictions and an Easement Maintenance Agreement under King County Recording Nos. 890206523 and 8902060524 (collectively, the "Phase I Agreements") in which provisions and procedures were established for the maintenance,

repair and improvement of that section of the Road Network to be used by the present and future owners of Phase I Lots.

1.4 A portion of the Total Property was sold to King County pursuant to that certain Statutory Warranty Deed dated July 19, 1995 and recorded under King County Recording No. 9507190762. Concurrently with such transfer, a Modification of Easement, and Road Maintenance Agreement was recorded under King County Recording No. 9009051674 (the "Modification Agreement").

1.5 The Declaration, the Phase I Agreements and the Modification Agreement are collectively referred to as the "Road Network Documents."

1.6 King County has requested that the Partnership sell additional real property to King County, which property is outlined in Exhibit D and legally described in Exhibit D-1 ("Additional Parcel"). The property owned by King County, together with the Additional Parcel are collectively referred to herein as the "County Parcel").

1.7 The Partnership intends to develop the Partnership Parcel to the highest and best use allowed, which use may involve construction of more than one single family residence on each Lot.

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1.8 Certain portions of the Road Network shall be relinquished as part of the consideration for such transfer.

1.9 NOW, THEREFORE, in consideration of the mutual promises, covenants and agreements set forth herein, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto declare and make the following covenants and agreements:

2. Effective Date. The effective date of this Agreement shall be the date of recording of a deed conveying the Additional Parcel from the Partnership, as grantors, to King County, as grantee (the "Effective Date") and the recording of this Agreement. All terms and conditions of this Agreement shall take effect and all of the Road Network Documents shall be deemed amended immediately upon but not until the Effective Date, without the need for any further action on the part of the Partnership or King County.

3. Modification of Road Network.

3.1 Termination of Portion of Road Network.

3.1.1 That portion of the Road Network delineated on Exhibit E and legally described on Exhibit E-1

("Relinquishment Area"), and any and all associated right, title, claim or interest and all related cost sharing, maintenance, improvement or any other responsibilities arising under the Road Network Documents are terminated and released as to the owner(s) of the Partnership Parcel, without any further liability, obligation or costs whatsoever. King County shall retain its easement rights to the Relinquishment Area of ingress, egress and utilities, as necessary for the use of the County Parcel as a public park and wetland interpretive center, provided King County shall have the sole obligation to maintain, repair and improve the roadway in the Relinquishment Area.

3.1.2 With the exception of King County's easement rights in the Relinquishment Area and the Common Road as provided in this Section, King County hereby relinquishes any and all easement rights of ingress, egress or utilities to the balance of the Road Network, and is hereby released from any responsibility or obligation for the cost of maintaining, repairing or improving the same.

3.2 Common Road. The balance of the Road Network in which King County and the Partnership have a common right of ingress, egress and utilities is delineated on Exhibit F and is legally described on Exhibit F-1 (the "Common Road"). King County shall have the right to use the Common Road for ingress, egress and utilities as necessary for the use of the County Parcel as a public park and wetland interpretive center.

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4. Common Road Improvements and Maintenance.

4.1 General. The cost of installation, maintenance, repair or replacement of any and all road improvements and utilities to be installed or placed in or about the Common Road shall be allocated among the owners of the Partnership Parcel and the County Parcel and shall be paid for in the manner provided for herein.

4.2 Common Road.

4.2.1 Initial Improvements. Subject to the provisions of paragraph 4.5 below, the owner of the Partnership Parcel is hereby authorized, but not obligated, to construct any and all road and related improvements and to install any and all utilities to the Common Road as deemed necessary by it or as required pursuant to any development permit or approval for the planned development of the Partnership Parcel including, without limitation, excavation and grading, surface preparation, paving, curb, gutter, lighting, landscaping and sidewalk installation, and the installation or placement of storm drainage, sanitary sewers, telephone lines, electric lines, cable television and radio, water lines, irrigation systems, and any and all utilities and related facilities (collectively, "Road Installation Work").

The owner of the Partnership Parcel may complete the Road Installation Work without obtaining the prior consent of King County, and each party shall be responsible for their respective proportionate share of the cost of the Road Installation Work as provided below; provided that, if the owner of the Partnership Parcel performs Road Installation Work that materially exceeds in quantity or quality the applicable King County road standards or the applicable standards for any such improvements, facilities or utilities as established or required by King County and/or any governmental, quasi-governmental, or other purveyors of such utilities, then King County shall not be obligated to pay the increase in costs attributable to such excess without its prior written consent or unless such excess is required under permits or other development approvals for all or any portion of the Partnership Parcel issued by King County. The Partnership shall give King County not less than thirty (30) days prior written notice before commencing such Road Installation Work, which notice shall set forth the nature and scope of the planned Road Installation Work, the estimated total cost, the scheduling and completion date thereof, and the persons or entities who will perform such work.

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4.2.2 To the extent that the owner of the Partnership Parcel is ever required to construct, install or otherwise provide additional improvements, facilities, or utilities in, upon or relating to the Common Road, or to upgrade, oversize or expand the Road Improvement Work beyond what is necessary for the development of the Partnership Parcel, or in order to serve the County Parcel in connection with King County's (including the public's) use thereof, then King County shall be solely responsible for any and all costs attributable thereto and, at the election of the owner of the Partnership Parcel, shall either pay such costs directly or by reimbursement to such owner in the manner specified in paragraph 4.4 below. Prior to the commencement of any Road Installation Work, King County may, at its sole cost and expense, undertake any Road Improvement Work and installation of utilities as reasonably may be necessary for the use of the County Parcel as herein authorized, and the owner of the Partnership Parcel shall not have any responsibility therefor, or for any maintenance, repair and replacement costs thereafter incurred by King County in connection with such road improvements. King County shall give not less than thirty (30) days prior written notice of the nature and scope of any such work and the commencement and scheduled completion dates thereof, and shall schedule, coordinate and complete all such work in a manner consistent with the rights of the owner of the Partnership Parcel.

4.3 Maintenance. Any and all costs of maintaining, repairing or replacing the Common Road, including but not limited to grading, regraveling, and repaving, shall be borne proportionately by the parties to this Agreement as provided

below. The owner of the Partnership Parcel shall determine any and all maintenance, repairs and replacements that are necessary to maintain the Common Road and all associated improvements and facilities in good, open and passable condition, and shall notify King County of such maintenance, repair or replacement work and the estimated schedule, completion day and cost thereof at least thirty (30) days before any such work is undertaken; provided that, if the owner of the Partnership Parcel determines, in its reasonable discretion, that an emergency exists or that the condition of the Common Road is impassable, then such owner shall be entitled to proceed immediately, without notice to King County, to effect all maintenance and repairs necessitated thereby, and shall notify King County of the nature and scope of the work performed as soon as reasonably possible under all of the circumstances. In the event of a transfer of portion(s) of the Partnership Parcel, the owners of the Partnership Parcel shall establish a Managing Owner to administer the notice provisions pursuant to this Section.

4.4 Allocation of Costs. Except as otherwise expressly provided in paragraph 4.3 above, any and all costs for the maintenance, repair or replacement of the Common Road, including, without limitation, hard construction costs, contractor's profit and overhead, design fees, and engineering, architectural, legal and other professional or consulting fees (see "Shared Costs"), shall be borne by the owners of the Total Property in the same ratio that the acreage of each owner's parcel bears to the combined acreage of the Total Property.

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4.4.1 For the purpose of calculating such ratios as of the date of this Agreement, the agreed acreage of the County Parcel is 320.62 acres, the agreed acreage of the Partnership Parcel is 208.67 acres, and the agreed acreage of the Total Property is 529.29 acres. In the event the owner of the Partnership Parcel transfers a portion of the Partnership Parcel to third party(s), the ratio shall be adjusted to reflect the acreage that each owner's parcel bears to the combined acreage of the Total Property.

4.4.2 The owner of the Partnership Parcel, or the Managing Owner, as the case may be, shall be entitled to submit invoices for Shared Costs to King County at any such time after receiving a bill therefor, but not more frequently than monthly. King County shall pay or reimburse the owner(s) of the Partnership Parcel for its respective portion of any Shared Costs within fifteen (15) days after receipt of an invoice showing a total amount for such costs and the allocation thereof among the parcels in accordance with the ratio set forth above.

4.5 Development Approvals. The rights of any party to construct, install and maintain road improvements or utilities in

the Common Road, and King County's right to maintain and repair the Relinquishment Area, shall be subject to that party's first securing any and all development, building or other permits or approvals as may be required under applicable law from King County or any other governmental entity having jurisdiction. Nothing herein shall be deemed to (1) constitute a pre-approval by King County of any development or construction activity or to limit the lawful discretion or authority of King County or such other governmental entities in the review of any application for such a permit or approval, or (2) affect or reduce King County's obligation to pay or reimburse its Shared Costs.

5. Indemnification. Each party hereto, its successors and assigns (the "Indemnifying Party") agrees to indemnify, release and hold harmless the other parties hereto, their successors and assigns (the "Indemnified Parties"), from any and all liabilities, obligations, losses, damages, claims, judgments, suits or expenses of any kind of nature whatsoever, including, but not limited to, reasonable attorneys' fees, arising out of or in any way connected with any exercise by the Indemnifying Party or its rights hereunder, including but not limited to work performed on the Common Road or the Relinquishment Area by the Indemnifying Party, its employees, agents, independent contractors or any other persons or entities acting by, under, or through the Indemnifying Party, and for any liability whatsoever resulting from any actual or alleged injury to any person or for any actual or alleged loss or damage to any property caused by or resulting from the performance of such work or such use, except to the extent attributable to the fault or negligence of the Indemnified Party or any person or entity acting by, under or through such Indemnified Party.

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6. Future Termination. At any time, but in no event on not less than sixty (60) days prior written notice to the owner(s) of record of the Partnership Parcel, King County may terminate all of its rights and interests in and to the Common Road and the Relinquishment Area and all of its obligations in connection therewith arising pursuant to the Road Easement Documents or this Agreement, including but not limited to, its obligation to pay for improvement, construction, installation, maintenance, repair or replacement costs, effective as of the date of such termination; provided that, such termination of obligation shall be conditioned upon the prior payment of King County's share of all Shared Costs as have been incurred or have accrued as of the effective date of such termination. In addition, King County shall complete any and all Road Improvement Work that is initiated prior to the effective date of such termination, unless the owner(s) of the Partnership Parcel otherwise agrees in writing. The parties, their successors and assigns, will execute any and all documents necessary to evidence of record such termination of rights and obligations pursuant to this Section.

7. No Dedication. Following the conveyance of the Additional Parcel to King County, the easement rights of King County in and to the Common Road and the Relinquishment Area shall be for the sole and exclusive purpose of allowing access and utility service to the County Parcel by King County, its employees, officers, agents, independent contractors, the public and invitees, in connection with the use of the County Parcel as a park and wetland interpretive center and for no other purpose except as expressly provided in this Agreement. Nothing contained herein or in the Road Network Documents shall be deemed a gift or dedication of any portion of the Partnership Parcel to King County or to the general public or for the general public, or for any public uses whatsoever other than as specifically granted herein.

8. Relocation. In the event the Common Road as presently located, or any of the easement rights granted herein, interfere with any future development, improvement or use of all or any portion of the Partnership Parcel by the Partnership, the Common Road may be relocated as reasonably necessary and the easement revised accordingly, all at the sole cost and expense of the owner(s) of the Partnership Parcel. The Common Road may not be relocated by King County without the prior written consent of the owner(s) of the Partnership Parcel and, in the event of any such approved relocation, King County shall pay all costs and expenses in connection therewith, including without limitation all costs of construction, reconstruction, installation, maintenance, repair and replacement of the affected portions of the Common Road to the same level of improvement and utility service as existed prior to such relocation.

9. License for Use. King County hereby grants to the owner of the Partnership Parcel a license to use the Relinquishment Area for the purpose of entering the Partnership Parcel to market, show, display or conduct studies, inspections or tests in the course of selling the Partnership Parcel. This license shall terminate upon the earlier of July 1, 2020 or the sale or conveyance of all of the Partnership Parcel by the Partnership.

10. Gates. King County shall install and maintain the two (2) gates, delineated as Gate 1 and Gate 2 on Exhibit G, at King County's sole cost and expense. Upon King County constructing facilities to accommodate the public accessing the County Parcel, King County shall have the right to remove Gate 1.

11. Attorneys' Fees; Lien for Non-Payment. Failure of any owner to contribute Shared Costs or to complete any improvements, maintenance, repair or replacement as specified herein, shall, to the extent allowed by law, entitle any owner(s) to pay such portion of the Shared Costs, or to complete such work after

thirty (30) days prior written notice of such default, and to file a lien upon the land owned by the non-performing owner for such cost. Such liens shall be enforced and foreclosed in the manner prescribed for labor and material liens within the State of Washington. In addition to such cost, there shall be assessed reasonable attorneys' fees if the services of an attorney are required, together with taxable costs and interest from the date that the obligation becomes delinquent at the rate of twelve percent (12%) per annum until paid, together with any actual damages incurred by reason of such failure on the part of the non-performing owner. Such attorneys' fees, interest and other costs shall be due whether or not suit is actually instituted in order in all circumstances to shift the burden for failure to comply with this Agreement to the non-performing owner. If the property of any owner is not subject to lien, then that owner shall, at its sole cost, post a bond or other security acceptable to the other owner(s) sufficient to secure payment of the cost incurred by the performing owner(s) hereunder.

12. Notice. All notices or other communications required or given hereunder shall be in writing and shall be effective upon personal or hand delivery, overnight courier delivery, facsimile transmittal, or two (2) days after deposit in U.S. certified mail, postage prepaid, return receipt requested, in any case to the following address/facsimile number or to such other address/facsimile number for any party as may be provided in the manner required for notices hereunder:

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If to the Partnership:

Moss Lake Associates
c/o Colin W. Radford
Radford & Co. Realtors
10423 Main Street, Suite 4
Bellevue, Washington 98004-5984
Fax No. (206) 455-1258

If to King County (after the Effective Date):

King County, Office of Open Space
1621 Smith Tower
506 Second Avenue
Seattle, Washington 98104
Attn: James Greenfield
Fax No. (206) 296-0516

Any owner may notify the other owner(s) of the transfer of such owner's interest and the address of the transferee of such owner's interest, all in accordance with the provisions of this Section 12.

13. Road Easement Documents Amended. The Road Network Documents shall be deemed amended as of the Effective Date in accordance with and to the full extent necessary to be consistent with and to effectuate the terms and conditions of this Agreement. Except as so amended, all terms and conditions of the Road Network Documents shall remain in full force and effect. To the extent of any inconsistency between the terms of any of the Road Network Documents and this Agreement, the terms of this Agreement shall control. This Agreement shall not amend any agreements between the Partnership and John F. Druschba and Cindy Druschba recorded under King County Recording Nos. 8808170981 and 9008140507.

14. Covenants Running with the Land. All terms, conditions, agreements, and covenants herein contained and the rights and restrictions herein created shall be appurtenant, shall touch and concern the Total Property, shall run with the land, and shall be binding upon and inure to the benefit of the parties hereto and their respective heirs, successors, assigns and transferees, including without limitation all subsequent owners, condominium owners, homeowners associations, tenants, subtenants, and all persons or entities claiming by, through, or under them.

EXECUTED the day and year first above written.

MOSS LAKE ASSOCIATES, a Washington general partnership

By _____
Colin W. Radford
a Managing Partner

By _____
Eilif Kunnle,
a Managing Partner

KING COUNTY

By _____
Its _____

9507190763

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9507190763

EXECUTED the day and year first above written.

MOSS LAKE ASSOCIATES, a Washington general partnership

By _____
Colin W. Radford
a Managing Partner

By _____
Eilif Kuhnle,
a Managing Partner

KING COUNTY

By James A. Pitchford
Its Open Space Administrator

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

On this 23 day of JUNE, 1995, before me, the undersigned, a Notary Public in and for the State of Washington, duly commissioned and sworn, personally appeared Colin W. Radford and ~~Eilif Kuhnle,~~ to me known to be the Managing Partners of MOSS LAKE ASSOCIATES, a Washington general partnership, the partnership that executed the foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said partnership, for the uses and purposes therein mentioned, and on oath stated that they were authorized to execute the said instrument.

WITNESS MY HAND AN OFFICIAL SEAL hereto affixed the day and year first above written.

SANDRA L. DUFFIN NOTARY PUBLIC COMMISSION EXPIRES 5-01-99 STATE OF WASHINGTON

NOTARY PUBLIC in and for the State of Washington, residing at Duvall
My commission expires 5-1-99

9507190763

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

On this 10 day of JULY, 1995, before me, the undersigned, a Notary Public in and for the State of Washington, duly commissioned and sworn, personally appeared ~~Colin W. Radford~~ and Eilif Kuhnle, to me known to be the Managing Partners of MOSS LAKE ASSOCIATES, a Washington general partnership, the partnership that executed the foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said partnership, for the uses and purposes therein mentioned, and on oath stated that they were authorized to execute the said instrument.

WITNESS MY HAND AN OFFICIAL SEAL hereto affixed the day and year first above written.

SANDRA L. DUFFIN NOTARY PUBLIC COMMISSION EXPIRES 5-01-99 STATE OF WASHINGTON

NOTARY PUBLIC in and for the State of Washington, residing at Duvall
My commission expires 5-1-99
SANDRA L. DUFFIN

FILED BY:
FIRST AMERICAN TITLE
1111 19'95

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

I certify that I know or have satisfactory evidence that Jim Gleason Fund is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he was authorized to execute the instrument and acknowledged it as the Administrator of this office of Open Space of King County, a governmental subdivision, to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

Dated: July 15, 1991

(Signature)

Robert FH Knickerbocker
(Name legibly printed or stamped)

(Seal or stamp)

Notary Public in and for the State of Washington, residing at Kirkland
My appointment expires 9/1/91.

9507190763

FILED BY:
FIRST AMERICAN TITLE

1111 19'95

(10)

KING COUNTY CONSERVATION FUTURES BOND PROGRAM
MOSS LAKE PROJECT
PARCEL #1-6

GRANT DEED OF CONSERVATION EASEMENT

THIS GRANT DEED OF CONSERVATION EASEMENT is made by and between MOSS LAKE ASSOCIATES, a Washington general partnership, having an address at 10423 Main Street, Bellevue, WA 98004 ("Grantor"), and King County, a political subdivision of the State of Washington, by and through THE KING COUNTY OFFICE OF OPEN SPACE, having its principal offices at the Smith Tower, 506 Second Avenue, Seattle, Washington 98104 ("Grantee").

BACKGROUND

1. Grantor is the fee owner of that certain real property in King County, Washington, legally described on Attachment 1 attached hereto and incorporated herein by this reference ("Grantor's Parcel"). Grantor has agreed to grant to Grantee a conservation easement across a portion of the Grantor's Parcel described in Attachment 2 attached hereto and incorporated herin by this reference (the "Easement Property").

2. The Property possesses natural, scientific, educational, scenic, cultural and open space values (collectively, "Conservation Values") of great importance to the people of King County and the people of the State of Washington.

3. Grantor recognizes that the Easement Property has substantial conservation value and desires to cooperate with the Grantee in preserving and protecting these values.

4. Grantor wishes to convey to King County an easement upon the Easement Property providing for the preservation of native vegetation for all purposes that benefit the public health, safety, and welfare, including control of surface water and erosion, maintenance of slope stability, visual and aural buffering and protection of plant and animal habitat.

5. The Grantee has determined that acquisition of such an easement will benefit the public through the preservation and protection of the Easement Property's conservation values and the Grantee is willing to purchase the Easement and accept this instrument of conveyance.

6. The grant and conveyance of such an easement by the Grantor to the Grantee will preserve and protect the conservation values of the Easement Property in perpetuity in accordance with the specific terms and conditions hereinafter set forth.

7. Grantee already holds a road easement, as created under King County Recording No. 8808170980 dated April 5, 1988. Nothing herein shall affect the rights created therein, which include, without limitation, the right to construct a roadway within that portion of the existing 60 foot easement held by Grantee, lying within the northerly 30 feet of the Easement Property.

CONVEYANCE

Grantor, for and in consideration of Twelve Thousand Five Hundred

and No/100 Dollars ($12,500.00) lawful money of the United States of America, paid to the Grantor by the Grantee, the receipt whereof is hereby acknowledged, and the Grantor being therewith fully satisfied, does convey and warrant unto the Grantee forever a beneficial interest in the Easement Property as follows:

1. Grant of Easement. Grantor hereby conveys and warrants to Grantee a conservation easement in perpetuity over the Easement Property on the terms and conditions set forth herein (the "Easement"). Grantor expressly intends that this Easement runs with the land and that this Easement shall be binding upon Grantor's successors and assigns.

2. Easement Purpose. It is the purpose of this Easement to assure that the Easement Property will be retained forever in its natural and open space condition and to prevent any use of the Easement Property that may impair or interfere with the conservation values of the Easement Property.

3. Rights of Grantee. To accomplish the purpose of this Easement the following rights are conveyed to Grantee by this Easement:

a. To preserve and protect the conservation values of the Easement Property;

b. To enter upon the Easement Property at reasonable times to monitor Grantor's compliance with and otherwise enforce the terms of this Easement; provided that such entry shall be upon prior reasonable notice to Grantor, and Grantee shall not unreasonably interfere with Grantor's use and quiet enjoyment of the Easement Property;

c. To prevent any activity on or use of the Easement Property that is inconsistent with the purpose of this Easement and to require the restoration by the Grantor, its successors or assigns of any such areas or features of the Easement Property that may be damaged by any inconsistent activity or use by Grantor or any permittee, licensee, successor, or assign of Grantor, in accordance with paragraph 6 herein.

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4. Prohibited Activities and Uses. Any activity on or use of the Easement Property inconsistent with the purpose of this Easement is prohibited and Grantor acknowledges and agrees that it will neither conduct, engage in or permit any such activity or use. Without limiting the generality of the foregoing, the following activities and uses are expressly prohibited:

a. Constructing or installing any building;

b. Constructing or installing any pipeline, well, septic system or drain field;

c. Constructing or installing any above or below ground utility pole, tower, line or facility;

d. Constructing any pond or other surface impoundment or disrupting, diverting or altering any surface water in a defined bed or channel;

e. Logging, pruning or cutting any timber, shrubs, grasses or other flora, except removal of invasive non-native plants, fallen trees, noxious weeds and alder saplings with a diameter of less than three inches is permitted as necessary to protect the public health and safety;

f. Conducting grazing or agricultural activities of any kind;

g. Conducting any exploration for or development or extraction of minerals and hydrocarbons;

h. Any alteration of the surface of the land, including, without limitation, the excavation or removal of soil, sand, gravel, rock, peat or sod;

i. Paving any surface of the Easement Property;

j. Installing or parking any structure such as a mobile home, camper or other form of live-in vehicle on the Easement Property;

k. Dumping or other disposal of wastes, refuse, and other debris; and

l. Conducting any activity or use of the Easement Property that involves more than fifty (50) people present on the Easement Property at any single moment in time.

5. Reserved Rights. Grantor reserves to itself, and to its successors and assigns, all rights and obligations accruing from its ownership of the Easement Property, other than those conveyed to Grantee in this grant of Easement.

6. Grantee's Remedies. If Grantee determines that Grantor is in violation of the terms of this Easement or that a violation is threatened, Grantee shall give written notice to Grantor of such violation and demand corrective action sufficient to cure the violation. Where the violation involves injury to the Easement Property resulting from any activity or use inconsistent with the purpose of this Easement, Grantee may also demand restoration of the Property so injured. If Grantor fails to begin curing such violation within thirty (30) days after receipt of notice thereof from Grantee, or fails to continue diligently to cure such violation until finally cured, Grantee may bring an action at law or in equity in a court of competent jurisdiction to: (1) enforce the terms of the Easement and enjoin the violation by temporary or permanent injunction; (2) recover damages, including damages for the loss of scenic, aesthetic, or environmental values; and (3) require the restoration of the Easement Property to the condition that existed prior to any such violation.

7. Acts Beyond Grantor's Control. Nothing contained in this Easement shall be construed to entitle Grantee to bring any action against the Grantor to abate, correct, or restore any condition on the Easement Property or to recover damages for any injury to or changes in the Easement Property resulting from causes beyond Grantor's control, including, without limitation, natural changes, fire, flood, storm, or earth movement, or from any prudent action taken by Grantor under emergency conditions to prevent, abate, or mitigate significant injury to the Easement Property resulting from such causes, or from acts of trespassers.

8. Access. No right of access by the general public is conveyed by this Easement. However, Grantee shall have access to all of the Easement Property as outlined in paragraph 3b.

9. Costs and Liabilities. Grantor retains all responsibilities and shall bear all costs and liabilities of any kind related to the ownership, operation, upkeep, and maintenance of the Easement Property, including the following:

a. Grantor shall keep Easement Property free of any liens arising out of any work performed for, materials furnished to, or obligations incurred by Grantor.

b. Grantor shall pay before delinquency all taxes, assessments, fees, and charges of whatever description levied on or assessed against the Easement Property by competent authority (collectively "taxes"), including any taxes imposed upon, or incurred as a result of, this Easement, and shall furnish Grantee with satisfactory evidence of payment upon request.

10. Subsequent Transfers. Grantor agrees to reference the terms of this Easement in any deed or other legal instrument by which it divests itself of any interest in all or a portion of the Easement Property, including, without limitation, a leasehold interest. Grantor further agrees to give written notice to Grantee of the transfer of any interest on the closing date of such transfer. The failure of Grantor to perform any act required by this paragraph shall not impair the validity of this Easement nor limit its enforceability in any way.

11. Recordation. Grantee shall record this instrument in timely fashion in the official records of King County, Washington, and any other appropriate jurisdictions and Grantee may re-record it at any time as may be required to preserve its rights in this Easement.

12. General Provisions

12.1 Governing Law. The interpretation and performance of this Easement shall be governed by the laws of the State of Washington.

12.2 Liberal Construction. Any general rule of construction to the contrary notwithstanding, this Easement shall be liberally construed in favor of the grant to effect the purpose of this Easement. If any provision in this instrument is found to be ambiguous, an interpretation consistent with the purpose of this Easement that would render the provision valid shall be favored over any interpretation that would render it invalid.

12.3 Severability. If any provision of this Easement, or the application thereof to any person or circumstance, is found to be invalid, the remainder of the provisions of this Easement, or the application of such provision to persons or circumstances other than those as to which it is found to be invalid, as the case may be, shall not be affected thereby.

12.4 Entire Agreement. This instrument sets forth the entire agreement of the parties with respect to the Easement and supersedes all prior discussions, negotiations, understands, or agreements relating to the Easement, all of which are merged herein.

12.5 No Forefeiture. Nothing contained herein will result in a forfeiture or reversion of Grantor's title in any respect.

12.6 Successors. The covenants, terms, conditions, and restrictions of this Easement shall be binding upon, and inure to the benefit of, the parties hereto and their respective successors and assigns and shall continue as a servitude running in perpetuity with the Easement Property.

TO HAVE AND TO HOLD unto Grantee, its successors and assigns forever.

IN WITNESS WHEREOF, the undersigned Grantor has executed this instrument this 23 day of JUNE, 1995.

MOSS LAKE ASSOCIATES

by Colin W. Radford, managing partner
Grantor

Eilif Kuhnle
Grantor EILIF KUHNLE

STATE OF WASHINGTON)
)SS
COUNTY OF KING)

On this 23 day of JUNE, A.D. 1995, before me, the undersigned, a Notary Public in and for the State of Washington, duly commissioned and sworn personally appeared COLIN W. RADFORD, to me known to be the individual described in and who executed the foregoing instrument, and acknowledged to me that he signed and sealed the said instrument as his free and voluntary act and deed for the uses and purposes therein mentioned.

WITNESS my hand and official seal hereto affixed the day and year in this certificate above written.

SANDRA L. DUFFIN NOTARY PUBLIC COMMISSION EXPIRES 5-01-99 STATE OF WASHINGTON

Notary Public in and for the State of Washington, residing at Duvall
City and State
My appointment expires 5-1-95

SANDRA L. DUFFIN

9507190762

STATE OF WASHINGTON)
)ss
COUNTY OF KING)

On this 10 day of JULY, A.D. 1995, before me, the undersigned, a Notary Public in and for the State of Washington, duly commissioned and sworn personally appeared FEILIF KUHNLE, to me known to be the individual described in and who executed the foregoing instrument, and acknowledged to me that she signed and sealed the said instrument as her free and voluntary act and deed for the uses and purposes therein mentioned.

WITNESS my hand and official seal hereto affixed the day and year in this certificate above written.

SANDRA L. DUFFIN NOTARY PUBLIC STATE OF WASHINGTON COMMISSION EXPIRES

Notary Public in and for the
State of Washington, residing
at Kirkland
City and State
My appointment expires 5-1-97

SANDRA L. DUFFIN

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Moss Lake Regional Park Master Plan
Estimate of Probable Construction Cost - Master Plan Phase
Phased Development With Gravelled Access Road

Item	Quantity	Unit	Unit Price	Amount	Phase 1 Subtotal	Quantity	Unit	Unit Price	Amou
1. Contractor Costs									
Mobilization (8.5%)			Allow	20,503.28				Allow	35,200.6
Survey Control (2%)			Allow	4,824.30				Allow	8,282.5
Subtotal				25,327.58	**$25,327.58**				43,483.1
2. Site Preparation									
Temp Wetland/Creek Control Fencing	3,000	LF	4.00	12,000.00		800	LF	4.00	3,200.0
Clearing and Grubbing									
Light Vegetation/Tree Limbing						2.00	AC	3,500.00	7,000.0
Heavy Vegetation	1.20	AC	5,500.00	6,600.00		0.90	AC	5,500.00	4,950.0
Trail Obliteration/Restoration								Allow	4,500.0
Misc. Disposal			Allow	3,750.00				Allow	3,500.0
Subtotal				22,350.00	**$22,350.00**				23,150.0
3. Earthwork									
Cut and Fill (on-site)	2,500	CY	5.00	12,500.00					
Import Ballast	1,500	CY	17.50	26,250.00					
Subgrade Road and Parking	7,900	SY	1.50	11,850.00					
Subgrade Primary Trail						8,600	SY	1.50	0.0
Grade & Compact Secondary Trails						6,500	SY	7.50	48,750.0
Stormwater Facilities (roadway and parking lot)			Allow	25,000.00					
Streambed Restoration			Allow	7,500.00					
Culverts	120	LF	25.00	3,000.00		80	LF	25.00	2,000.0
Subtotal				86,100.00	**$86,100.00**				50,750.0

Moss Lake Regional Park Master Plan
Estimate of Probable Construction Cost - Master Plan Phase
Phased Development With Gravelled Access Road

Item	Quantity	Unit	Unit Price	Amount	Phase 1 Subtotal	Quantity	Unit	Unit Price	Amou
4. Paving and Surfacing									
Crushed Surfacing Base Course (4" depth)	1,400	TN	15.00	21,000.00					
Crushed Surfacing Top Course (2" depth)	700	TN	25.00	17,500.00					
Asphalt Parking Lot Surfacing	207	TN	50.00	10,350.00					
Asphalt Access Roadway Surfacing	*(optional in Phase 2 construction)*					*609*	*TN*	*50.00*	*30,450.0*
Crushed Rock Primary Trail Surfacing						670	TN	32.50	21,775.
Boardwalks and Deck						700	LF	200.00	140,000.
Viewing Deck						625	SF	40.00	25,000.
Pavement Marking	500	LF	0.20	100.00					
Tactile Paving	150	SF	10.00	1,500.00					
Subtotal				50,450.00	**$50,450.00**				217,225.
5. Site Improvements									
Double Vault Privy			Allow	32,500.00					
Single Vault Privy								Allow	20,000.
Amphitheaters						2	EA	20,000.00	40,000.
Viewing Tower								Allow	35,000.
Footbridge (w/abutements)			Allow	6,500.00					
Rest Stop Sitting Logs (5 clusters of 5 logs)						5	EA	1,500.00	7,500.
Log Curbs	10	EA	300.00	3,000.00					
Miscellaneous Control Signs			Allow	1,000.00				Allow	2,000.
Overview Sign			Allow	3,000.00					
Interpretive Signs (4-6 signs)								Allow	7,000.
Handicap Accessible Sign	1	EA	150.00	150.00					
Entrance Gate						1	EA	3,000.00	3,000.
Service Gate	1	EA	3,000.00	3,000.00					
Subtotal				49,150.00	**$49,150.00**				114,500.
6. Landscape Restoration									
Parking Lot Tree Plantings			Allow	7,500.00					
Coniferous Enhancement Trees			Allow	5,000.00					
Shrub Understory Plantings	2,100	SF	2.00	4,200.00		4,250	SF	2.00	8,500.
Groundcover	1,670	SF	2.00	3,340.00					
Topsoil/Fine Grading (6")	400	CY	20.00	8,000.00					
Mulch (2")	10	CY	12.50	125.00					
Erosion Control Seeding	30,000	SF	0.10	3,000.00					
Seeding	20,000	SF	0.10	2,000.00					
Subtotal				33,165.00	**$33,165.00**				8,500.
			SUBTOTAL		**$266,542.58**				
			Sales Tax (8.20 % OF MACC)		**$21,856.49**				
			Building Permit Fee (2.00 % OF MACC)		**$5,330.85**				
			TOTAL CONSTRUCTION COST		**$293,729.92**				