Final Environmental Impact Statement

Headquarters Camp Solid Waste Disposal Facility

Cowlitz-Wahkiakum Health District

Volume 1

EIS Text

December 1992

1516 Hudson
P.O. Box 458
Longview, WA 98632

PROTECTING YOUR HEALTH & ENVIRONMENT
COWLITZ WAHKIAKUM HEALTH DIST.

Phone (206) 425-7400

December 29, 1992

Re: Final Environmental Impact Statement, Headquarters Camp Solid Waste Disposal Facility

Dear Reader:

This document is Volume 1 of the Final Environmental Impact Statement (EIS) on the proposed Headquarters Camp Solid Waste Disposal Facility. The Final EIS consists of three volumes: Volume 1 - EIS Text, Volume 2 - Appendices, and Volume 3 - Comments and Responses. All volumes of the Final EIS are available for review at the Health District office in Longview, and at the Longview, Kelso, Castle Rock, Kalama, and Woodland public libraries. Any or all volumes may also be purchased from the Health District at a cost of $10.00 for Volume 1; $24.00 for Volume 2; and $24.00 for Volume 3.

The Weyerhaeuser Company proposes to construct and operate an industrial solid waste landfill on a site known as the "Headquarters Site", which is located approximately 7 miles east of I-5 and 1.8 miles south-southeast of Silver Lake in Cowlitz County. The proposed landfill would accept only forest products manufacturing waste and construction and demolition waste. No hazardous or dangerous waste and no household or commercial solid waste, as defined by federal or state regulations, would be accepted. The proposed landfill would be designed and operated in accordance with the Washington State Minimum Functional Standards for Solid Waste Handling (MFS), WAC 172-304. However, a variance would be required from the MFS locational standard that prohibits the location of a landfill active area in a wetland.

Consistent with the SEPA Rules [WAC 197-11-440(5)(d)], the EIS evaluates the impacts of the no-action alternative, the proposal, and other reasonable alternatives for achieving the objectives of the proposal on the Headquarters Site. Although alternative sites are not evaluated in this EIS, they will be evaluated in detail by the Corps of Engineers as part of the Section 404 permit process. For non-water dependent uses that require filling of "special aquatic sites", such as wetlands, federal regulations place the burden on the applicant to rebut the presumption that there are practicable alternatives available that do not involve special aquatic sites [40CFR 230.10(a)(3)].

The Proposal evaluated in this EIS would have a solid waste disposal capacity of approximately 45.8 million cubic yards and a "footprint" (area within which landfilling occurs) of 330 acres. Two alternative site plans are also evaluated: Alternative Site Plan A, which has a waste disposal capacity of 45 million cubic yards and a footprint of 312 acres; and Alternative Site Plan B, which has a waste disposal capacity of 32 million cubic yards and a footprint of 236 acres. An additional 50 acres of support facilities are also included in the Proposal and alternative site plans. Alternative Site Plan A is Weyerhaeuser's preferred alternative, because it reduces wetland filling and improves the alignment of a proposed diversion channel, without significantly reducing solid waste disposal capacity.

A total of 78 comment letters were received on the Draft EIS. In addition, numerous citizens provided oral testimony at two public hearings held on August 25 and 26, 1992. Volume 3 of this Final EIS provides responses to all written and oral comments relevant to the purpose and scope of the EIS. In addition, changes have been made in the text of the EIS to provide clarifications and corrections in response to comments.

As requested in comments on the Draft EIS, the proposed project has been modified to reflect import of Weyerhaeuser industrial solid waste from outside Cowlitz and Wahkiakum counties. Further explanation of this change is provided in Section I.B.4, Consistency with Solid Waste Management Plan and RCW 70.95. Weyerhaeuser estimates that the volume of imported waste would be approximately 150,000 cubic yards per year, or about 15 percent of the total waste volume of 1,000,000 cubic yards per year. Only minor changes were needed in the impact analyses in the Draft EIS (Section II.B.1, Noise, and Section II.B.6, Transportation) to evaluate the impacts of acceptance of this additional waste volume.

Other key issues raised in comment letters on the Draft EIS, and the section of the EIS in which they are addressed, include:

- Likelihood of a spill from a leachate tank car -- Section II.B.6, Transportation.
- Response to a spill of solid waste or leachate -- Section I.B.1.f(4), Spill Response
- Waste screening and inspection -- Section I.B.1.f(3), Waste Inspection and Acceptance Program.
- Potential impacts on Silver Lake water quality -- Section II.A.3, Surface Water.
- Potential for liner leaks -- further information supporting the EIS analysis has been added to Appendix B, Liner Leak Scenario.
- Natural resources mitigation -- the *Proposed Natural Resources Mitigation Plan* in Appendix A has been revised extensively in response to recommendations of a Technical Advisory Committee consisting of federal and state resource agencies.
- Coho spawning in Sucker Creek -- Section II.A.5, Plants and Animals, and Appendix K, Fish Community Analysis

If you need additional copies of the Final EIS, or have any questions or comments, please call the lead agency contact person, Richard Jones, at (206) 577-0289.

Sincerely,

David E. Riggs
Director of Environmental Health
SEPA Responsible Official

Final Environmental Impact Statement

Headquarters Camp
Solid Waste Disposal Facility

Volume 1
EIS Text

Cowlitz-Wahkiakum Health District
1516 Hudson, P.O. Box 458
Longview, Washington 98632

December 1992

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Fact Sheet

A. Nature and Location of the Proposal

The proposed action in this EIS is construction and operation of a solid waste landfill on a site owned by the proponent and known as the "Headquarters Site." The site is located in a managed forest area in Sections 23, 24, and 26, Township 9 North, Range 1 West, Willamette Meridian, approximately 7 miles east of I-5 and 1.8 miles south-southeast of Silver Lake in Cowlitz County.

The proposed landfill would have a capacity of approximately 45.8 million cubic yards of in-place solid waste, and a site life of approximately 30 to 50 years, depending on annual waste volumes. The landfill would be developed incrementally over the life of the project, and would eventually comprise a 330-acre footprint (area within which solid waste is disposed) plus approximately 50 acres of support facilities.

The landfill would accept only forest products manufacturing waste and construction and demolition waste. No dangerous or hazardous waste and no household or commercial solid waste, as defined by federal or state regulations, would be accepted. Weyerhaeuser's highest priority is to provide for disposal of Weyerhaeuser industrial solid waste generated within Cowlitz and Wahkiakum counties. The company's next priority is to accommodate Weyerhaeuser waste generated outside the two-county area. Its lowest priority is to accommodate waste of the same type and character generated by companies other than Weyerhaeuser within the two-county area.

Waste to be disposed at the landfill would be received at an existing solid waste recycling and transfer facility (SWRTF) at Weyerhaeuser's Longview mill, located in Section 5, Township 7 North, Range 2 West, Willamette Meridian. At the SWRTF, incoming waste would be sorted to remove recyclable materials, and non-recycled waste would be loaded onto rail cars for transport to the Headquarters Site on the existing Columbia & Cowlitz/Woods rail line. Leachate (water that has been in contact with solid waste) would be hauled by rail from the landfill site to the Longview mill wastewater treatment plant for treatment and discharge to the Columbia River.

In addition to the Proposal, this EIS evaluates the No-Action Alternative and two alternative site plans at the Headquarters Site. Alternative Site Plan A would have a footprint of 312 acres and a waste disposal capacity of 45 million cubic yards, while Alternative Site Plan B would have a footprint of 236 acres, with a waste disposal capacity of 32 million cubic yards. Alternative Site Plan A is currently Weyerhaeuser's preferred alternative, because it reduces wetland filling and improves the alignment of a proposed diversion channel, without significantly reducing solid waste disposal capacity.

B. Proponent

The Weyerhaeuser Company
Tacoma, Washington 98477

C. Proposed Date for Implementation

The proposed landfill is planned to begin operation in 1993.

D. Lead Agency

Cowlitz-Wahkiakum Health District
1516 Hudson, P.O. Box 458
Longview, Washington 98632

E. Responsible Official

David Riggs, Director of Environmental Health
Cowlitz-Wahkiakum Health District
1516 Hudson, P.O. Box 458
Longview, Washington 98632

F. Contact Person

Richard Jones
Cowlitz-Wahkiakum Health District
1516 Hudson, P.O. Box 458
Longview, Washington 98632
(206) 577-0289

G. Licenses Required

Variance from Minimal Functional Standards for Solid Waste Handling (WAC 173-304) for wetlands filling	Washington State Department of Ecology
Solid Waste Handling Facility Permit for Landfill	Washington State Department of Ecology
Solid Waste Handling Facility Permit for Recycling/Transfer Facility	Cowlitz-Wahkiakum Health District
Building/Grading Permit	Cowlitz County Department of Community Development
Sewage and Water System Approvals	Cowlitz-Wahkiakum Health District
Hydraulic Project Approval	Washington State Department of Wildlife
Forest Practices Permit	Washington State Department of Natural Resources

Notice of construction/application for approval	Southwest Washington Air Pollution Control Agency
NPDES Permit	Washington State Department of Ecology
Approval of 1992 Cowlitz County Comprehensive Solid Waste Management Plan as written (needed for waste import)	Cowlitz County and incorporated cities; and Washington State Department of Ecology
Section 404 Permit	U.S. Army Corps of Engineers
Section 401 Water Quality Certification	Washington State Department of Ecology

H. Authors and Principal Contributors

Principal Authors

Draft EIS	URS Consultants
Final EIS	Jean Garber

Technical Studies

Geology, Hydrogeology and Landfill Design	EMCON Northwest (formerly Sweet-Edwards/EMCON)
Noise	Michael R. Yantis Associates
Wetlands, Plants and Animals, Surface Water, Land Use, Recreation, Cultural Resources	Beak Consultants, Inc.
Air Quality	Omni Environmental Services, Inc.
Transportation	Kittelson & Associates, Inc.
Aesthetics	Robert Shinbo Associates

I. Date of Issue of Draft EIS/Date Comments were Due

The Draft EIS was issued on July 27, 1992. Written comments on the Draft EIS were due by September 11, 1992.

J. Date of Issue of Final EIS

December 29, 1992.

K. Public Hearings

Two public hearings were held to receive comments on the Draft EIS. The time and location of the hearings were as follows:

Tuesday, August 25, 1992, 7:00 p.m.
General Meeting Room
Cowlitz County Administration Building
207 North Fourth Avenue
Kelso, Washington

Wednesday, August 26, 1992, 7:00 p.m.
Silver Lake Grange
State Highway 504 at Paine Road Intersection
Silver Lake, Washington

L. Nature and Date of Final Action

The final action for this project will be a decision on the issuance of a solid waste handling facility permit by the Washington State Department of Ecology. The earliest date that such a decision would be made is in January 1993.

M. Subsequent Environmental Review

No subsequent environmental review under SEPA is expected for the Proposal and alternative site plans evaluated in this EIS.

N. Location of Background Data

The primary background information for this EIS is included in a document entitled *Environmental Technical Report for the Proposed Weyerhaeuser S.W. Washington Solid Waste Facility* prepared by Beak Consultants Incorporated and dated June 1991. This document, referred to in the EIS as *the Environmental Technical Report* (Beak, 1991a), is supported by two volumes of technical appendices. Appendices used as background information for this EIS include:

Volume 1

Appendix B. Environmental Assessment of a Hypothetical Spill Event
Appendix C. Morgan and Raught Soil Profile
Appendix D. Air Quality and Climate
Appendix E. Surface Water Hydrology Technical Report
Appendix F. Geology and Hydrogeology Technical Report
Appendix G. Botanical Successional Modeling

Volume 2

Appendix H.	Wetland Determination and Delineation (This report is useful as background information, but wetland boundaries were redefined in a more recent survey and confirmed by the Corps of Engineers. Updated acreages, which are reduced compared to this original delineation, are reflected in this EIS.)
Appendix I.	Wildlife Technical Report
Appendix J.	Fisheries Technical Report
Appendix K.	Transportation Impact Analysis
Appendix L.	Noise Technical Report
Appendix M.	Aesthetics Technical Report
Appendix N.	Cultural Resources Technical Report

Supplemental information developed since the *Environmental Technical Report* was prepared is included in the appendices in Volume 2 of this EIS, which are listed in the Table of Contents.

All of these primary background documents are incorporated by reference in this EIS and are available for review at the office of the lead agency (see Section D above), and at the Longview, Kelso, Castle Rock, Kalama, and Woodland public libraries. The solid waste permit application and supporting documents, which provided information used in the description of the Proposal, are also available for review at the office of the lead agency.

O. Cost to the Public for Final EIS

Approximately 80 copies of the Final EIS have been distributed to agencies, libraries, interest groups, and the public. Additional copies are available for purchase at the office of the lead agency (see D above). The cost of each volume is as follows:

Volume 1:	EIS Text	$10.00
Volume 2:	Appendices	$24.00
Volume 3:	Comments and Responses	$24.00

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Volume I. EIS Text

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Volume 2. Appendices

Volume 3. Comments and Responses

Acronyms

ADT	average daily traffic
ASIL	Acceptable Source Impact Level
AWQC	ambient water quality criteria
CCC	Cowlitz County Code
CFR	Code of Federal Regulations
CQA	construction quality assurance
DEIS	Draft Environmental Impact Statement
DEQ	(Oregon) Department of Environmental Quality
Ecology	Washington State Department of Ecology
EDNA	Environmental Designation for Noise Abatement
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FDM	Fugitive Dust Model
FICUN	Federal Interagency Committee on Urban Noise
FML	flexible membrane liner
FPA	Forest Practices Application
FR	Forestry-Recreation
FRA	Federal Railroad Administration
HAP	hazardous air pollutant
HGCS	hydraulic gradient control system
LCRS	leachate collection and removal system
LOS	Level of service
MCL	maximum contaminant level
MFS	Minimum Functional Standards for Solid Waste Handling
MMSW	mixed municipal solid waste
MSL	mean sea level
MSW	municipal solid waste
NO_x	nitrous oxides
NPDES	National Pollutant Discharge Elimination System
NTU	nephelometric turbidity unit
PCHB	Pollution Control Hearings Board
PM_{10}	particulate matter 10 microns and less
RCW	Revised Code of Washington
SCS	Soil Conservation Service
SEPA	State Environmental Policy Act
SO_2	sulfur dioxide
SUAI	significant unavoidable adverse impacts
SWAPCA	Southwest Washington Air Pollution Control Authority
SWRTF	solid waste recycling and transfer facility
TCLP	toxicity characteristic leaching procedure
TSP	total suspended particulates
TSS	total suspended solids
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

Acronyms
(continued)

VOC	volatile organic compound
WAC	Washington State Administrative Code
WDF	Washington Department of Fisheries
WDW	Washington Department of Wildlife
WSDOT	Washington State Department of Transportation
WUTC	Washington Utilities and Transportation Commission
WWTP	wastewater treatment plant

Units of Measure Abbreviations

ac	acre
°C	degrees Celsius
cfs	cubic feet per second
cm/s	centimeters per second
dB	decibel
dBA	decibel adjusted to the A-scale
°F	degrees Fahrenheit
ft/day	feet per day
g/m^3	grams per cubic meter
g/s	grams per second
gal	gallon
gpd	gallons per day
L_{dn}	day-night noise level
L_{eq}	equivalent sound level
MCY	million cubic yards
$\mu g/m^3$	micrograms per cubic meter
μm	micrometer
mg/l	milligrams per liter
ml	milliliter
mm	millimeter
mph	miles per hour
ppm	parts per million

Summary

Headquarters Camp
Solid Waste Disposal Facility

A. Introduction

1. Purpose and Need

The Weyerhaeuser Company proposes to construct and operate an industrial solid waste landfill on a site in Cowlitz County, Washington known as the "Headquarters Site" (Figure S-1). The landfill would be part of an integrated solid waste management system, supplementing Weyerhaeuser's ongoing waste reduction, recycling, and volume minimization programs.

The proposed landfill would accept only forest products manufacturing waste and construction and demolition waste. No dangerous or hazardous waste and no household or commercial solid waste, as defined by federal or state regulations, would be accepted. Weyerhaeuser's highest priority is to provide for disposal of Weyerhaeuser industrial solid waste generated within Cowlitz and Wahkiakum counties. The company's next priority is to accommodate Weyerhaeuser waste generated outside the two-county area. Its lowest priority is to accommodate waste of the same type and character generated by companies other than Weyerhaeuser within the two-county area.

Weyerhaeuser believes that ownership and operation of its own landfill would help it achieve three basic objectives: 1) to minimize environmental risks and liability associated with disposal of its solid waste by third-party contractors, 2) to assure adequate long-term disposal capacity, consistent with Weyerhaeuser's planned 30- to 40-year commitments of company resources in regional facilities, and 3) to stabilize and reduce disposal costs, which are a sizeable component of production costs, and have increased substantially in recent years.

2. Site Selection

Having determined that a Weyerhaeuser-owned landfill was needed to meet the above objectives, the company initiated a process to select a landfill site. The Cowlitz-Wahkiakum Health District did not participate in site selection, and has taken no position on the relative benefits and disadvantages of alternative sites identified by Weyerhaeuser, or the potential availability of other suitable sites. As discussed in more detail in Section B of this Summary, the Health District has decided to limit the alternatives evaluated in this EIS to the No-Action Alternative, the proposed landfill on the Headquarters Site, and other means of accomplishing the Proposal's objectives on the same site. This is consistent with the SEPA Rules and a 1991 decision by the Washington State Pollution Control Hearings Board.

Although alternative sites are not evaluated in this EIS, they will be evaluated in detail by the Corps of Engineers during the Section 404 permit process. For non-water dependent uses that require filling of "special aquatic sites", such as wetlands, federal regulations place the burden on the applicant to rebut the presumption that there are practicable alternatives available that do not involve special aquatic sites [40 CFR 230.10(a)(3)]. The *Alternatives Analysis* submitted to the Corps of Engineers in support of the Section 404 permit is included as Appendix C in Volume 2 of this EIS.

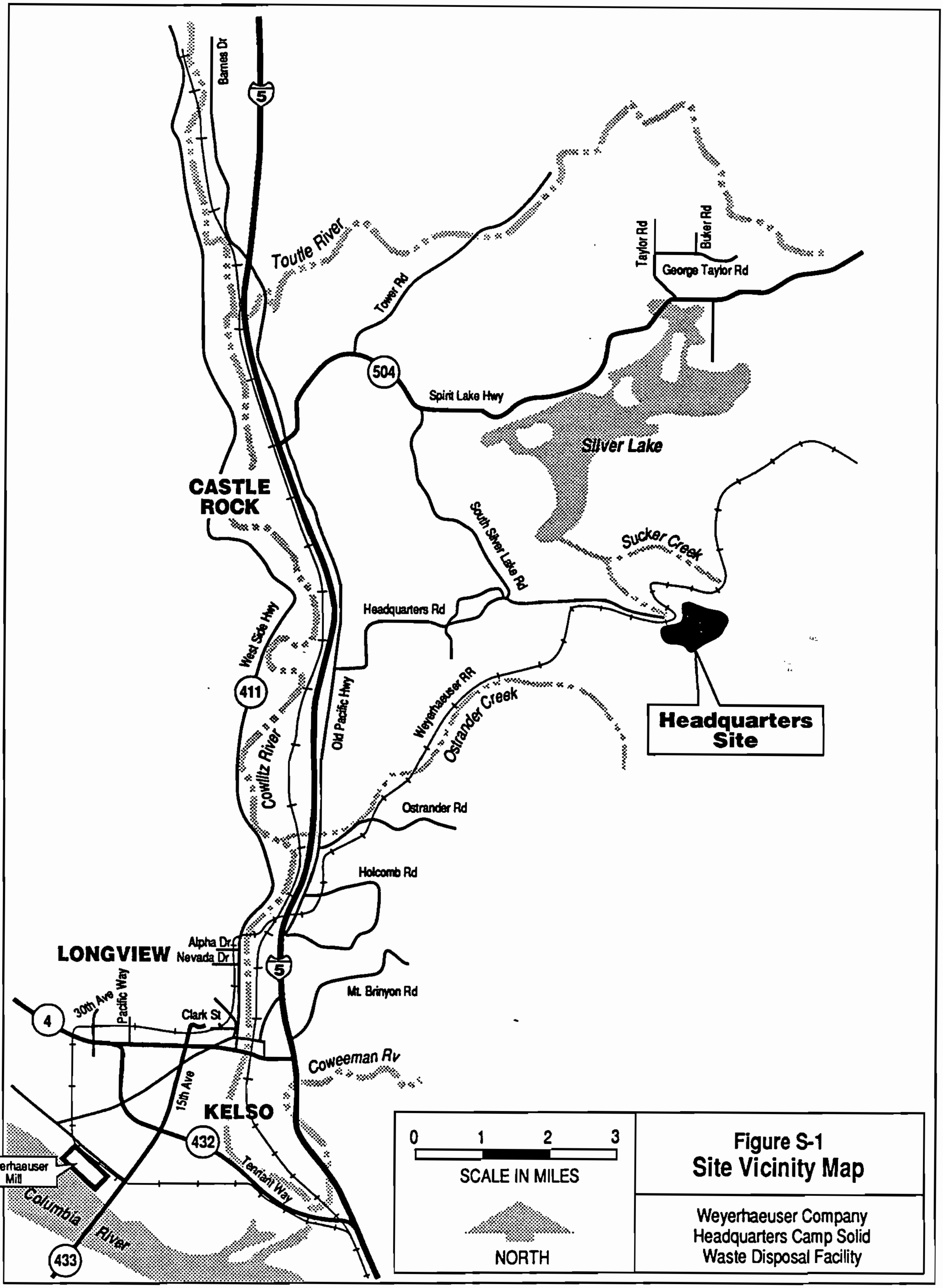


Figure S-1
Site Vicinity Map

Weyerhaeuser Company
Headquarters Camp Solid
Waste Disposal Facility

3. Waste Characteristics

Weyerhaeuser currently has a number of programs in effect to minimize the waste generated at the Longview mill complex through waste reduction and recycling. In addition, the company uses incineration to the maximum extent possible to reduce the volume of waste requiring landfill disposal. These programs, primarily incineration, resulted in a reduction in waste quantities going to landfill from about 750,000 cubic yards per year in 1981 to about 220,000 cubic yards per year in 1991.

Weyerhaeuser estimates that the total volume of its industrial solid waste that would require landfill disposal is 900,000 cubic yards per year. Approximately 750,000 cubic yards per year would be generated by Weyerhaeuser operations within Cowlitz and Wahkiakum counties, while an estimated 150,000 cubic yards per year would be generated by the company's operations outside the two-county area. An additional 150,000 cubic yards per year would be expected from non-Weyerhaeuser generators within the two-county area. So as not to imply exactness in estimating long-term waste volumes, the total waste volume to be disposed at the proposed landfill was rounded to 1,000,000 cubic yards per year for purposes of the analyses in this EIS.

Due to uncertainties cited by Weyerhaeuser in estimating its manufacturing waste over the long-term, it is recommended that a condition be attached to the solid waste permit requiring an evaluation of the need for additional SEPA review if the total waste volume increases significantly beyond the 1,000,000 cubic yard per year figure used in the EIS analyses (for example, an increase of more than 10 percent).

The types of waste to be disposed at the proposed landfill would include wood chips and fines (fine wood particles), log sort yard debris (bark, wood chips, rocks and soil), boiler ash, pulp mill lime waste, wastewater treatment solids, pulp chip washer fines, paper recycling reject fiber (short fiber, clay binder, and ink from newsprint recycling), polyethylene waste from milk carton stock extrusion, construction and demolition waste, and other miscellaneous industrial solid waste.

4. Consistency with Cowlitz-Wahkiakum Comprehensive Solid Waste Management Plan

The 1984 Cowlitz-Wahkiakum Regional Solid Waste Management Plan (Regional Plan), as amended in 1988, recommends that the solution for disposal of nonhazardous industrial solid waste and wood waste be left to private industry. The Regional Plan specifies that waste reduction and recycling are preferred, but that siting of a new industrial waste landfill is also likely to be required.

In April 1991, the Washington State Pollution Control Hearings Board (PCHB) determined that Weyerhaeuser's proposed landfill is consistent with the Regional Plan as long as it accepts waste only from Cowlitz and Wahkiakum Counties. Waste import from outside the two-county area was determined to be inconsistent with the Regional Plan as written, since the Plan does not address the waste import issue. Therefore, waste import was not considered in the Draft EIS.

A Comprehensive Solid Waste Management Plan for Cowlitz County alone is currently being prepared, and a Preliminary Draft Plan has been issued for public and agency review. The Preliminary Draft Plan recommends that waste import to private solid waste disposal facilities be allowed. Also, based on a recent U.S. Supreme Court decision, the Cowlitz County prosecuting attorney has advised the County that private waste facilities should not be subject to restrictions based solely on the point of origin of the wastes. In light of these recent developments, the EIS has been revised to evaluate the import of industrial solid waste from Weyerhaeuser operations outside Cowlitz and Wahkiakum counties. Imported waste would be subject to the same waste screening procedures as non-imported solid waste (see Section B.1.f, Plan of Operation).

B. Description of Alternatives Evaluated in this EIS

When a proposal is for a private project on a specific site, and no rezone is required, SEPA requires that the lead agency evaluate only the no-action alternative and alternative means of accomplishing the proposal's objective on the same site. Also, in its 1991 ruling, the PCHB indicated that the selection of sites for the needed industrial waste landfill should be left to private industry. Therefore, the alternatives evaluated in this EIS are limited to the Proposal, two alternative site plans at the Headquarters Site (Alternative Site Plans A and B), and the No-Action Alternative.

The Proposal, which is the subject of Weyerhaeuser's preliminary solid waste permit application, would have the largest footprint and greatest impact of any of the alternatives (Figure S-2). Alternative Site Plan A, which is the subject of Weyerhaeuser's more recent Part I solid waste permit application, is now preferred by Weyerhaeuser, because it reduces the amount of wetland filling required and improves the alignment of a proposed diversion channel, without significantly reducing solid waste disposal capacity.

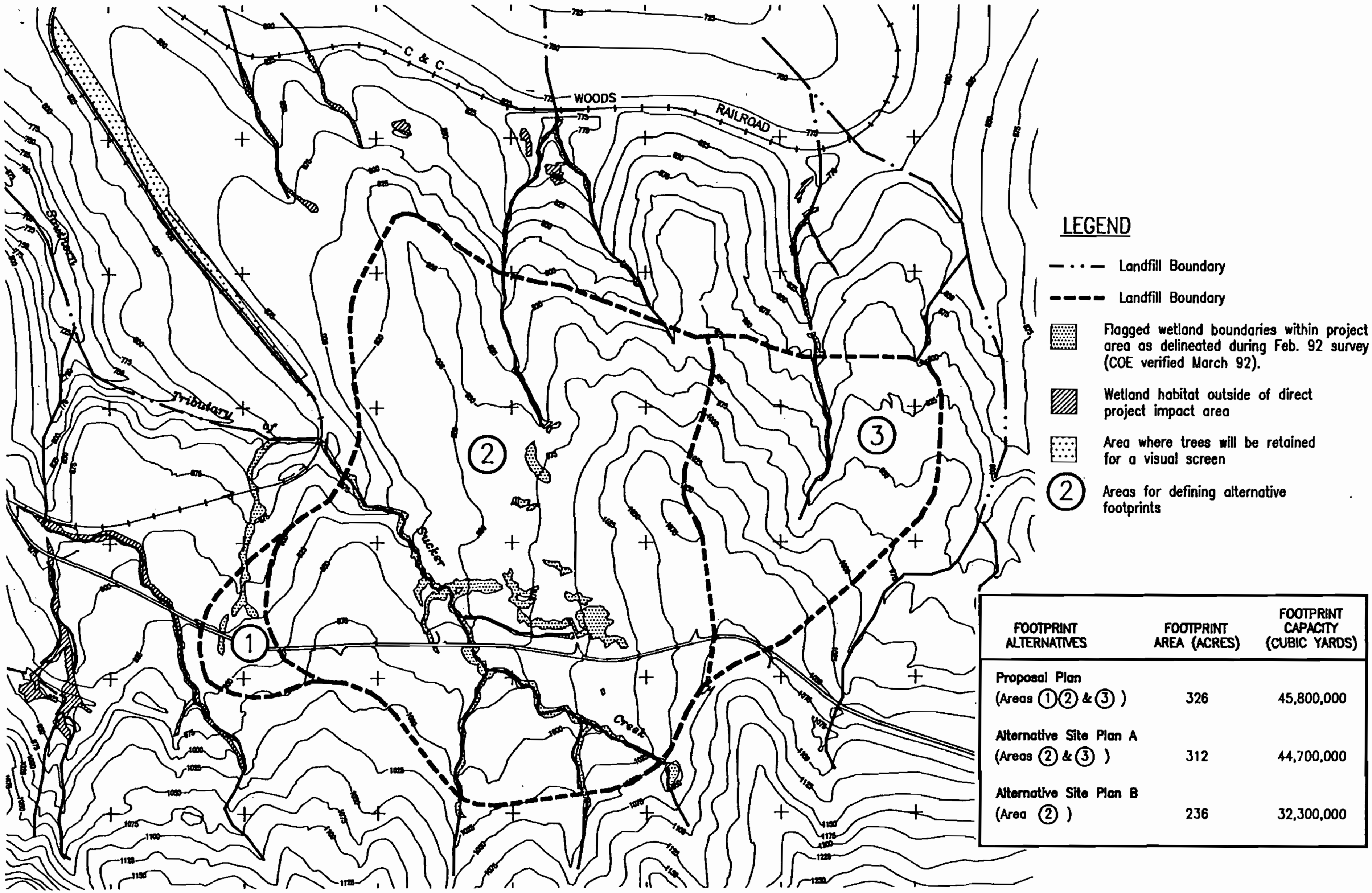
1. The Proposal

a. Project Overview

Weyerhaeuser proposes to construct and operate a solid waste landfill at the Headquarters Site, 7 miles east of I-5 and approximately 1.8 miles south-southeast of Silver Lake in Cowlitz County. The landfill would be designed and operated in accordance with the Washington State Minimum Functional Standards for Solid Waste Handling (MFS), WAC 173-304. However, a variance would be required from the MFS locational standard that prohibits the location of a landfill's active area in a wetland.

The proposed landfill would be developed incrementally over the life of the project (30 to 50 years) and eventually comprise an approximate 330-acre footprint (area within which landfilling occurs) plus an additional 50 acres of support facilities. The total site capacity is about 45.8 million cubic yards of in-place waste.

The overall project includes a solid waste recycling and transfer facility (SWRTF) to receive, sort, and load the waste onto rail cars at the Longview mill complex; an existing rail operation



FOOTPRINT ALTERNATIVES	FOOTPRINT AREA (ACRES)	FOOTPRINT CAPACITY (CUBIC YARDS)
Proposal Plan (Areas ①②&③)	326	45,800,000
Alternative Site Plan A (Areas ②&③)	312	44,700,000
Alternative Site Plan B (Area ②)	236	32,300,000

URS CONSULTANTS

NORTH

0 1000
SCALE IN FEET

Figure S-2
Alternative Footprints
Source: Sweet-Edwards/EMCON, 1991

Weyerhaeuser Company
Headquarters Camp Solid
Waste Disposal Facility

to ship the waste to the landfill and to ship leachate (water contaminated through contact with waste) back to the wastewater treatment plant at the mill; and the landfill operation itself. The landfill would operate up to 6 days per week, and up to 12 hours per day (7:00 a.m. to 7:00 p.m.). The SWRTF and rail system could operate any day, 24 hours a day, but would operate primarily in the daytime. Major features of the project are summarized below.

b. Solid Waste Recycling and Transfer Facility

All waste destined for the landfill would pass through the SWRTF at the Longview mill. Incoming waste would be received and inspected, recyclable materials removed where possible, and nonrecycled waste transferred to a dedicated rail transport system. The SWRTF would consist of an existing 6-acre open sort yard; a proposed tipping facility where waste could be dumped, sorted, and loaded into 40-cubic-yard covered containers; and an existing and an additional proposed 600-foot rail siding to load and store rail cars.

c. Waste Transportation and Unloading

Waste and leachate would be transported by train on the Columbia & Cowlitz/Woods Railroad, which passes by Headquarters Camp. This line was upgraded to meet Class II federal rail standards in 1991. New rail sidings are proposed for each end of the line, including the 600-foot siding at the SWRTF (see above), and a 2,000-foot siding at the landfill. Approximately 20 rail cars with covered containers of waste and 10 tank cars with leachate would travel the route each day. This would require one train, or two trains with each carrying half the daily load. Currently, one or two trains per day use the C&C/Woods line past Headquarters Camp, and historical use has been up to 6 trains per day.

Containers used to transport solid waste would be covered with a canvas tarp that fastens securely to a metal railing around the top of the container, and would have a rubber gasket on the rear door to reduce leakage. Although leachate from the proposed landfill would not be dangerous or hazardous waste as defined by federal or state regulations, Weyerhaeuser proposes to use so-called "105" tank cars designed to provide safe transportation of chlorine gas and other hazardous materials. In the event of a railway worker strike or temporary but sustained closure of the rail system, trucks would be used as a temporary emergency measure to haul solid waste and leachate.

d. Landfill and Associated Facilities

(1) Buffer Zone

All land within 1.25 miles of the landfill footprint is owned by Weyerhaeuser and would be retained as a buffer zone. This exceeds the MFS requirement of 250 feet. Most land in the buffer zone would continue to be managed for commercial timber production. Approximately 6.3 acres of existing tree stands northwest of the landfill footprint would be retained to screen views of landfill support facilities from the closest viewpoints on South Silver Lake Road (Figure S-2). Weyerhaeuser may selectively harvest trees in this area, and place stakes and guy wires to facilitate tree harvest in adjacent areas. However, the integrity of the visual screen would be maintained. Weyerhaeuser would be amenable to a condition on the solid waste permit or variance reflecting the proposed retention of trees for visual screening.

(2) Bottom Grading Plan

The bottom of the landfill would be graded to maintain a 5- to 10-foot separation between the highest anticipated groundwater levels and the landfill bottom liner. Bottom grades would be sloped to facilitate leachate collection. The bottom grading plan would require a combination of excavation and earthfill, which would produce a net excess of excavated soil. The excess soil would be approximately the amount needed for the base liner, intermediate soil needs, and final cover. Granular soils needed for drainage would be imported.

(3) Hydraulic Gradient Control

The MFS require that the bottom liner of a landfill be at least 10 feet above the highest expected groundwater level, or at least 5 feet above groundwater when a hydraulic gradient control system (HGCS) is installed. With the bottom grading plan discussed above, the bottom liner would be greater than 5 feet but less than 10 feet above the expected seasonal high groundwater level over most of the landfill footprint. Therefore, an HGCS consisting of a blanket drainage layer with embedded perforated pipes is proposed beneath the entire landfill.

The HGCS would not be expected to convey groundwater flows most of the time, since groundwater is usually well below the seasonal high levels. However, if groundwater unexpectedly rose to levels higher than assumed, the HGCS would act as an underdrain to prevent groundwater from impinging on the underside of the landfill liner.

(4) Leachate Management

Weyerhaeuser proposes to limit the active area of the landfill face to 5 acres to minimize rainfall infiltrating into the waste and producing leachate. Other elements of leachate management are summarized below.

(a) Bottom Liner. The bottom liner would be constructed above the HGCS to provide an impermeable layer to allow efficient leachate collection, prevent leachate from migrating downwards, and prevent landfill gas from migrating to subsurface soils. The liner would consist of a 60-mil polyethylene flexible membrane liner (FML), underlain by a 2-foot layer of recompacted soil approved by Ecology, with a permeability less than or equal to 1×10^{-6} cm/s (one millionth centimeter per second). A rigorous construction quality assurance program would be conducted during bottom liner installation.

(b) Leachate Collection and Removal System. The leachate collection and removal system (LCRS) consists of a 1-foot thick layer of imported clean sand or gravel with an embedded network of perforated polyethylene pipes constructed directly on the bottom liner over the entire base of the landfill. The LCRS would collect leachate, which would flow by gravity to one of three permanent collection sumps. To protect the LCRS and bottom liner from damage during landfill operations, the LCRS would be covered with a synthetic filter material and a 1-foot-thick protective soil cover layer. As an added measure of protection for the bottom liner, only waste material with pieces smaller than 1 foot in any dimension would be placed in the first 5-foot layer of waste.

(c) *Leachate Storage and Transfer*. Leachate collected in the LCRS would drain to collection sumps. The sumps would be lined with a double FML, with leak detection capabilities between the FMLs. Leachate drained or pumped from the sumps would be temporarily stored in a leachate holding pond, which would also be constructed with a double liner and leak detection system. The holding pond would have more than sufficient storage capacity to accommodate leachate during a 100-year storm. From the holding pond, leachate would be pumped directly into rail tank cars through polyethylene pipelines both above and below ground. Containment structures would be provided to collect potential spills at the leachate transfer area.

(d) *Final Cover System*. The purpose of the final cover system is to prevent infiltration of rainfall into the waste, and thus eventually stop leachate production. The final cover system would consist of (from top to bottom) 18 inches minimum of soil to support plant growth (may be thicker locally depending on the final vegetation plan), a 1-foot drainage layer to collect water draining through the soil layer and maintain cover stability, a textured polyethylene FML as a barrier to infiltration, a 6-inch sand layer as an FML subgrade and side slope seep collector, and 1 foot of compacted soil over the waste to provide support during cover construction.

(5) Surface Water Management

Surface water management includes controlling runon (water flowing onto the site from surrounding areas) and runoff (water flowing off the site). A major runon control feature would be the relocation of the upper portion of the Southern Tributary to Sucker Creek around the western perimeter of the landfill in a constructed diversion channel. The diversion channel would be constructed prior to construction of the initial landfill cell.

Runoff would be collected from all nonactive landfill areas and directed to three sedimentation/ detention basins at the north end of the landfill. Final design calculations indicate that the sedimentation/detention basins would detain peak flows from all storm events up to and including the 100-year event following landfill closure and during all interim development stages. Detained stormwater would be released at a rate no greater than the existing peak runoff rate from the site. All runoff within the active landfill area would be collected as leachate.

Potential sediment impacts to water quality would be controlled using best management practices recommended by the Washington Departments of Fisheries and Ecology. Erosion control would be accomplished primarily by limiting construction to the dry season (approximately June through September); keeping disturbed and exposed soil areas covered with interim plastic during winter months; using berms, ditches, and silt fences; paving heavily used permanent haul roads; and directing all runoff through the sedimentation/detention basins and biofiltration swales.

(6) Landfill Gas and Odor Control

Landfill gas created by decomposition of the waste would consist primarily of methane and carbon dioxide, both of which are colorless and odorless. Trace amounts of odorous gases such as mercaptans and hydrogen sulfide could also be present. The proposed waste stream would be expected to produce less gas than a municipal solid waste (MSW) landfill. Because gas generation is expected to be low, no gas control system is proposed at this time. However, horizontal trenches with gas extraction pipes would be installed in the last lift of waste before the final cover is placed. If and when sufficient gas is generated, as determined through coordination with the Southwest Washington Air Pollution Control Agency (SWAPCA), the gas would be withdrawn with a vacuum system and incinerated in a high-temperature enclosed flare.

(7) ***Final Grading Plan***

The final side slopes of the landfill would be 4:1, with benches every 50 vertical feet to control surface water runoff. The maximum fill elevation would be approximately 1,250 feet, compared to the current maximum site elevation of 1,080 feet. Maximum waste thickness would be about 250 feet. The landfill contours are designed to be naturally graded to form smooth swales and ridges to blend into the surrounding topography.

(8) ***Support facilities***

Approximately 50 acres of the site would be used for support facilities, including the waste transfer area, leachate holding pond, and stormwater control facilities. Additional area would be used for the diversion channel and wetlands buffer areas. Administrative and maintenance buildings would be located at the existing Headquarters Camp. A temporary fence would control access to the active area, and a permanent fence would control access to the leachate pond. Stockpile, borrow, and contractor staging areas would be within the landfill footprint. A 20-acre backup borrow area described in the Draft EIS is no longer proposed. Portable light fixtures would be used to light the active area of the landfill, and fixed lighting would be placed on the maintenance building and in the waste transfer area.

e. Landfill Construction and Sequencing

Constructing and operating the proposed landfill entails opening and closing individual waste disposal cells (approximately 15 to 30 acres each) in a planned sequence over the life of the project. This would result in a step-by-step conversion of land from forest production to landfill construction, operation, closure, and reclamation. Cell construction would only occur during the dry season at a frequency of approximately once every 2 years, and would generally proceed from west to east. At any given time, there would be areas on site at different stages of development, including an active landfilling area, new cell areas with no waste, landfilled areas with interim plastic cover, landfilled areas at final grade with final cover and revegetation, construction areas for new cells or for final cover installation, construction staging and equipment areas, stockpile and borrow areas, and temporary haul roads.

f. Plan of Operation

All landfill operations would be performed in accordance with a Plan of Operation approved by Ecology as part of the solid waste permit process. A few key aspects of the Plan of Operation not covered in previous sections are described below.

All areas of the constructed landfill without final cover would be covered with interim plastic except for the 5-acre active area and haul roads. Plastic sheets would be overlapped and weighted down with used tires or sandbags, and repositioned as needed. Shuttle dump trucks would deliver waste to the active face, where bulldozers would spread and compact it. Daily cover in the active landfill area is not deemed necessary because of its low organic content and soil-like consistency.

A number of measures would be used during landfill construction and operation to reduce fugitive dust emissions to the maximum extent feasible. These include paving haul roads, watering roads and exposed soil areas, covering exposed areas with temporary plastic, and hydroseeding. Existing on-site wells would be used as a water source.

Weyerhaeuser would implement a stringent waste inspection and acceptance program to prevent dangerous or hazardous waste and household or commercial solid waste, as defined by federal or state regulations, from being disposed at the proposed landfill. The program would hinge on a clear set of waste acceptance criteria related to 1) prequalification and training of waste generators, 2) waste characterization and designation, 3) waste inspection, 4) random waste stream audits, and 5) records keeping.

Spill prevention would be a major emphasis in landfill operations. Weyerhaeuser's response plan for spills of solid waste or leachate would include effective spill response equipment and trained personnel, with arrangements for contractor-provided backup; immediate notification of appropriate agencies and potentially affected parties; containment and removal of any pooled fluids or contaminated soils; a damage assessment; development and implementation of a recovery plan; and monitoring.

Standard fire prevention measures would be used in buildings and maintenance facilities. Most of the waste stream would not present a significant fire hazard, because it would be ash or have a high moisture content. Weyerhaeuser would maintain an on-site water tank as a source of fire-control water, and would ensure that landfill operations personnel have adequate training and equipment to control fires.

g. Proposed Natural Resources Mitigation Plan

The *Proposed Natural Resources Mitigation Plan* in Appendix A has been revised extensively since the Draft EIS to reflect recommendations of a Technical Advisory Committee consisting of representatives of federal and state resource agencies. Mitigation measures are developed in more detail for Alternative Site Plan A, because it is now Weyerhaeuser's preferred alternative. However, the same general concepts apply to the Proposal and Alternative Site Plan B. Mitigation will continue to be refined through agency coordination.

The proposed wetland mitigation includes wetland creation and enhancement in the lower reach of the diversion channel, wetland restoration and creation in the upper diversion channel, and wetland creation in association with the proposed off-channel ponds in the lower Southern Tributary drainage. In addition, forested wetland and riparian habitat in the upper Sucker Creek watershed would be preserved. The goal is to replace the hydrologic and habitat functions of wetlands that would be lost with created, enhanced, and preserved wetlands of equal or greater value.

Off-channel ponds would be created along the Southern Tributary near its confluence with Sucker Creek. Creation of the ponds would mitigate for the loss of fish habitat in the Southern Tributary within the landfill footprint. The ponds would consist of relatively deeper open water areas and shallower wetland areas, and would improve habitat for both fish (including coho salmon and cutthroat trout) and wildlife.

The diversion channel would provide habitat for aquatic species other than fish, as well as terrestrial species. Vegetation would be planted along the diversion channel to provide bank stabilization and control runoff into the channel. The channel would be designed to conserve summer base flows and utilize storm flows to create wetlands.

When individual landfill cells reach final grade, they would receive final cover and be revegetated. A diverse grass/forb seed mix would be used to improve forage value for wildlife. To improve habitat structure and diversity, shallow rooted shrub cover would be planted on about 15 percent of the landfill's surface and patches of trees would be planted in areas engineered to accommodate deeper rooted plants and maintain liner integrity.

A monitoring plan for determining the success of mitigation measures would also be developed in coordination with resource agencies. The plan would include monitoring the hydrology and vegetation of wetland mitigation areas, monitoring planted and seeded areas to determine the success of revegetation efforts, monitoring the diversion channel to determine wildlife use and accessibility, and monitoring fish populations within the off-channel ponds and the Southern Tributary to determine the success of fisheries mitigation efforts. The leachate pond would also be monitored to determine the effectiveness of the proposed fencing in minimizing potential impacts to wildlife associated with this facility.

In addition to a monitoring plan, the final *Mitigation Plan* would include criteria for determining the success of mitigation measures, and contingency plans that would be implemented if these criteria are not met.

h. Landfill Monitoring Programs

(1) Groundwater Monitoring

A minimum of three downgradient monitoring wells and one background well would be used. Groundwater would be sampled and tested on a quarterly basis for a set of parameters determined by Ecology. Monitoring would continue for the life of the facility and during the 30-year post-closure care period. If leachate contamination were detected, a corrective action plan would be implemented. Potential corrective actions include waste removal and liner repair if the waste is not too deep, groundwater collection and treatment, accelerated closure over the leaking area to stop further leachate generation, or other appropriate corrective action approved by Ecology.

(2) Surface Water/HGCS Monitoring

The surface water monitoring plan would include monitoring of surface waters in sedimentation/ detention basins, in streams downstream of the facility, and at background locations. Monitoring would consist of routine water quality sampling, flow measurement, sediment sampling, and visual observations of water quality. Water quality sampling would be conducted in locations and at frequencies outlined in the solid waste handling facility and NPDES permits. If leachate contamination were detected, the source would be determined and corrective action taken. Potential sources include leaks in the bottom liner or leachate transmission lines, lateral movement of leachate, or problems with berms, ditches, or detention ponds.

In addition to the groundwater and surface water monitoring programs typically required, discharge from the HGCS would be monitored to provide early detection of a potential liner leak. The EIS recommends frequent monitoring of the HGCS discharge for this purpose. If a leak were detected, the HGCS discharge would be diverted to the leachate pond until corrective action is taken.

(3) Landfill Gas and Odor Monitoring

A landfill gas monitoring program would be established to address the potential buildup of methane, carbon dioxide, mercaptans, hydrogen sulfide, and other gases. The HGCS pipe outlets exiting from under the landfill liner would be checked for methane concentrations on at least a quarterly basis. If problem levels of gas were found, corrective action could include installing an active gas collection system, increasing the vacuum in the extraction system, or adding more gas extraction wells.

The perimeter of the site would be routinely monitored for odors during low wind conditions. If problematic landfill odors were detected, corrective action could include addition of more intermediate cover, repairs of a break in the landfill final cover, or the measures discussed above for landfill gas.

i. Post-Closure Maintenance

Post-closure maintenance and monitoring of the landfill would continue at least 30 years past the final closure of the facility. Activities would include leachate and landfill gas management, ground and surface water monitoring, and final cover and vegetation maintenance. Post closure maintenance would continue past the 30-year minimum if there is a need for it, such as a continued need for leachate or gas collection.

2. Alternative Site Plan A

Under Alternative Site Plan A, the west lobe of the landfill would be retracted 600 feet, reducing the landfill footprint by 18 acres (Figure S-2). The footprint size would therefore be approximately 312 acres, with a waste disposal capacity of 45 million cubic yards. Loss of wetlands (about 11.9 acres) would be reduced by approximately 1.1 acre compared to the Proposal. The length of the runon diversion channel would be approximately 6,700 feet, or about

300 feet shorter than for the Proposal. Within the area spared under this alternative, several acres of wetland could be created along the diversion channel and existing wetlands. The conceptual design of the diversion channel would generally remain the same as for the Proposal, with only the alignment changing. Other elements of the project would be the same as described above for the Proposal.

As noted previously, Alternative Site Plan A is currently Weyerhaeuser's preferred alternative, because it reduces wetland filling and improves the alignment of the Southern Tributary diversion channel, without substantially reducing solid waste disposal capacity.

3. Alternative Site Plan B

Under Alternative Site Plan B, the west lobe of the landfill would be retracted 600 feet and the east lobe would be retracted nearly 1,800 feet, eliminating the eastern leachate drainage basin and reducing the landfill footprint by 94 acres (Figure S-2). The footprint size would therefore be approximately 236 acres, with a waste disposal capacity of 32 million cubic yards. Loss of wetlands (about 11.2 acres) would be reduced by about 1.8 acres compared to the Proposal, and 0.7 acre compared to Alternative Site Plan A. Other features of Alternative Site Plan B, including the design of the runon diversion channel and associated wetlands mitigation, would be the same as for Alternative Site Plan A.

4. No-Action Alternative

Under the No-Action Alternative, the solid waste permit for the proposed landfill would not be issued. If this occurs, Weyerhaeuser has indicated its preferred option would be to dispose of its industrial solid waste at the Cowlitz County Sanitary Landfill, unless the county takes action to prohibit or limit the quantities of such waste at that facility. (The Preliminary Draft of the 1992 Cowlitz County Comprehensive Solid Waste Management Plan recommends that the County discourage the use of its landfill as a disposal facility for forest products waste.) Other potential options that could be considered by Weyerhaeuser under the No-Action Alternative include development of its own landfill at an in-county or out-of-county site other than the Headquarters Site, and long-haul transportation of solid waste to an out-of-county third-party landfill. Weyerhaeuser has determined that none of the options available under the No-Action Alternative would meet or approximate the objectives set forth in Section A.1 of this Summary (see *Alternatives Analysis* in Appendix C of this EIS).

C. Environmental Impacts, Mitigation Measures, and Significant Unavoidable Adverse Impacts

Table S-1 summarizes the adverse environmental impacts of alternatives, mitigation measures, and significant unavoidable adverse impacts. Due to the length of this table, it is included at the end of this Summary.

The following significant unavoidable adverse impacts are identified in this EIS:

- Site topography would be significantly altered under the Proposal and alternative site plans. Topographic changes would occur over 330 acres under the Proposal, 312 acres under Alternative Site Plan A, and 236 acres under Alternative Site Plan B. The landfill contours would be naturally graded to form smooth swales and ridges to blend into the surrounding topography.

The following impacts are identified in this EIS as potential significant unavoidable adverse impacts, because they depend on future events that cannot be predicted with certainty.

- If a derailed leachate tank car ruptured and spilled its entire contents into Sucker or Ostrander Creek at low flow, it would significantly impair water quality and kill all fish and most other aquatic organisms downstream to Silver Lake or the Cowlitz River, respectively. Given the proposed use of "105" rail tank cars operating at low speeds (10 to 12 mph), the EIS concludes that the probability of occurrence of such an event is so low that the potential for significant adverse impacts on water quality or aquatic resources could be considered remote and speculative (see further discussion in Sections D.2, Surface Water Quality, and D.7, Rail Operations, of this Summary).

- The Proposal and alternative site plans would result in the loss of all aquatic habitat within the landfill footprint, including about 2,590 feet of Type 3 stream and 3,350 of Type 4 stream (see Glossary). This loss is intended to be mitigated through the proposed aquatic resources mitigation plan. If this mitigation is successful, the loss of aquatic habitat would not constitute a significant unavoidable adverse impact.

- Approximately 13 acres of wetlands within the landfill footprint would be lost under the Proposal, 11.9 acres under Alternative Site Plan A (Weyerhaeuser's preferred alternative), and 11.2 acres under Alternative Site Plan B. This loss is intended to be mitigated through the proposed wetland mitigation plan. If this mitigation is successful, the loss of wetlands would not constitute a significant unavoidable adverse impact.

- Under the No-Action Alternative, Weyerhaeuser has indicated it would dispose of its industrial solid waste at the Cowlitz County Landfill, unless the county took action to prohibit or limit the disposal of such waste at that facility. Depending on the waste volume disposed, this could significantly reduce the site life of that facility for MSW disposal, requiring the county to develop other options for solid waste disposal sooner than expected.

D. Major Conclusions, Areas of Controversy, and Issues to Be Resolved

This section discusses the key concerns raised during scoping and in comments on the Draft EIS. For each issue, the section describes the major conclusions of this EIS and any areas of controversy or issues to be resolved, including choices to be made among alternatives and effectiveness of mitigation measures. The key concerns discussed in this section are 1) potential impacts on groundwater quality, 2) potential impacts on surface water quality, including leachate contamination and sediment and nutrient loading, 3) impacts on aquatic resources (including fisheries), 4) impacts on wetlands, 5) impacts on air quality and odor, 6) impacts on off-site views (aesthetics), and 7) impacts of rail operations, including noise and delays at intersections, and the likelihood of leachate spills from a derailed tank car. The subject of alternative sites, which was also a key issue raised during scoping and in comments on the Draft EIS, is discussed in Sections A.2 and B of this Summary.

1. Groundwater Quality

During normal operation of the landfill, the potential for leachate contamination of groundwater would be minimized by site characteristics (low-permeability soils and slow groundwater flow), as well as the mitigation measures incorporated in project design (most importantly, a composite bottom liner and LCRS). With the proposed construction quality assurance procedures and protective covering of the LCRS and bottom liner, the probability of a significant leak in the liner is low. In the event that a liner leak did occur, there would be increased potential for contamination of groundwater. To evaluate this potential, "reasonable maximum" and "extreme worst-case" leakage rates from a failed liner were calculated.

The reasonable maximum leakage rate (0.3 gallons per acre per day) represents the maximum discharge of leachate that would be expected from a liner subject to the proposed rigorous construction quality control, and reflects standard liner leak evaluation methods recommended by EPA. The extreme worst-case leakage rate (18 gallons per acre per day) substantially overestimates the leachate discharge that would be expected from a potential liner leak. Although useful for analysis purposes, its probability of occurrence is considered remote and speculative.

Assuming that the concentration of contaminants in the leachate are the highest observed in field or laboratory leachate data from the Mt. Solo Landfill, and that the leachate goes directly to the groundwater, there would be no violation of state or federal groundwater criteria even after 5 years at the extreme worst-case leakage rate. The quarterly groundwater monitoring program would allow a leak to be detected and corrective action taken early enough that the actual impact would be much less than that predicted under this scenario. Therefore, the EIS concludes that no significant unavoidable adverse impact on groundwater quality would be expected under the Proposal or alternative site plans.

2. Surface Water Quality

a. Long-Term Sediment and Nutrient Loading

During landfill construction and operation, erosion control measures would be implemented (interim plastic cover, hydroseeding, silt fences, grass-lined ditches, etc.), and surface water runoff would be directed through three sedimentation/detention basins and biofiltration swales. Proper design, frequent monitoring, and ongoing maintenance of these measures and facilities would be necessary to effectively control soil erosion and sedimentation.

The proposed sedimentation/detention basins would contain sediments resulting from existing on-site erosion, as well as sediments resulting from increased erosion due to landfill construction. Assuming erosion and sedimentation control efficiency is successfully maintained, the cumulative quantity of sediment discharged from the site over the life of the landfill is expected to be less than would be discharged during the same period under existing conditions. This would also be true for nutrient (phosphorus) loading, since phosphorus would be bound to sediment particles. Therefore, the EIS concludes that the Proposal and alternative site plans would have no significant long-term or cumulative impacts on water quality due to sediment or nutrient loading.

b. Potential Leachate Contamination of Surface Water

During landfill operation, all runoff from the active area of the landfill would be collected and directed to the leachate pond, minimizing the potential for leachate contamination of surface water. However, leachate contamination of surface water could result from accidental spills, such as may occur in a leachate tank car derailment; or from a leak in the bottom liner of the landfill.

The evaluation of accidental leachate spills in this EIS assumes that a 20,000-gallon leachate tank car derails, ruptures a 6-inch valve, and spills its entire contents into Sucker Creek (which flows into Silver Lake) or Ostrander Creek (which flows into the Cowlitz River) at low flow. If such an event occurred, the resulting high ammonia and low dissolved oxygen levels in the creeks would significantly impair water quality. (There would be no significant adverse impacts on water quality at higher creek flows such as occur during the rainy season.)

The EIS concludes that the spill scenario described above is a potential significant unavoidable adverse impact (see Section C of this Summary). However, based on consultations with rail safety experts and other considerations discussed in Section D.7, Rail Operations, the probability of occurrence of a train derailment that results in the rupture of a "105" tank car, releasing the entire contents into a creek at low flow, is so low that the potential for significant adverse impacts to creek water quality could be considered remote and speculative. Low stream flows occur only during periods of low rainfall when there is also reduced leachate production. With reduced leachate production, there is increased capacity to store leachate in the leachate holding pond on site, reducing the need to transport leachate to the Longview mill.

Following a spill into Sucker or Ostrander creeks at low flow, water quality would return to prespill conditions within several days. Upon reaching Silver Lake or the Cowlitz River, the spilled leachate would be diluted almost immediately to below applicable standards.

A leachate spill directly into the Cowlitz River was also evaluated. Given the volume of water moving through the river compared to the volume of leachate, the spilled leachate would be expected to mix completely with river water. Calculations indicate that the resulting concentrations of leachate constituents would be below all applicable standards. Therefore, no significant adverse impacts on aquatic biota or water quality would be expected. With regard to the probability of occurrence of a tank car derailment and spill into the Cowlitz River at low flow, the conclusion would be the same as that described above for Sucker and Ostrander Creeks.

Following a leachate spill, the spill response plan described in Section B.1.f of this Summary would be implemented immediately. For any spill of leachate into the Cowlitz River, the Longview and Kelso water plants would receive priority notification.

In the event that a leak occurred in the bottom liner, leachate could contaminate surface water via the discharge from the HGCS. At the extreme worst-case liner leakage rate discussed under Groundwater above, and during lowest base flow conditions, ammonia and dissolved oxygen levels in the Southern Tributary could violate applicable standards. However, the extreme worst case liner leak scenario is considered remote and speculative. At higher base flow conditions or at the reasonable maximum leakage rate, a liner leak would not significantly affect water quality or cause violations of standards. Further downstream, at the confluence of the Southern Tributary and Sucker Creek, liner leak impacts to water quality would be insignificant, even at the lowest base flow conditions or extreme worst-case leakage rate.

Based on this analysis, the EIS concludes that no significant unavoidable adverse impacts on surface water resources would be expected from a liner leak. The EIS recommends frequent monitoring of the HGCS when it is flowing to allow early detection of potential leaks (see Section B.1.h of this Summary).

3. Aquatic Resources

a. Effect of Leachate Spill or Liner Leak

Under the scenario described in Section D.2, Surface Water Quality, for a leachate tank car spill into Sucker or Ostrander creek, the resulting high ammonia and low dissolved oxygen levels would likely kill all fish and most other aquatic organisms downstream to Silver Lake or the Cowlitz River, respectively. The EIS concludes that this is a potential significant unavoidable adverse impact (see Section C of this Summary). However, the probability of occurrence of the spill scenario is so low that the potential for significant adverse impacts on aquatic resources could be considered remote and speculative.

Upon reaching either Silver Lake or the Cowlitz River, the leachate would be diluted rapidly to concentrations below those that would harm aquatic resources. An evaluation of a tank car spill directly into the Cowlitz River also concluded that the resulting concentrations of leachate constituents would be below levels of concern for aquatic resources (see Section D.2, Surface Water Quality).

Under the extreme worst-case liner leakage into the HGCS (see Section D.2, Surface Water Quality), elevated ammonia levels and reduced dissolved oxygen could cause chronic effects to fish in the Southern Tributary. As noted previously, the extreme worst case liner leak scenario is considered remote and speculative. Downstream of the confluence of this stream with Sucker Creek, dilution would reduce ammonia levels and oxygen-demanding substances well below chronic toxicity levels. Also, the recommended frequent monitoring of the HGCS discharge (see Section B.1.h of this Summary) would prevent chronic effects. The reasonable maximum liner leakage was determined to be harmless to aquatic resources. Based on this analysis, the EIS concludes that no significant unavoidable adverse impacts on aquatic resources would be expected due to a liner leak.

b. Loss of Aquatic Habitat

Construction of the Proposal or alternative site plans would result in the loss of all aquatic habitat on the site. This loss would occur during initial site preparation activities, when the upper portion of the Southern Tributary would be rerouted around the western perimeter of the landfill in a constructed diversion channel. Approximately 2,590 feet of Type 3 stream and 3,350 feet of Type 4 stream (see Glossary) would se affected. The Type 3 stream contains cutthroat trout and sculpin, while the Type 4 stream contains sculpin and aquatic macroinvertebrates, but supports few, if any, cutthroat trout.

As described in Section B.1.g of this Summary, the proposed off-channel ponds and diversion channel would be designed to replace lost aquatic habitat and enhance coho salmon production. Details of the proposed design are presented in the revised *Mitigation Plan* in Appendix A of this EIS. The off-channel ponds would be created to mitigate for the loss of fish habitat in the Southern Tributary. Similar ponds at other locations have been found to be beneficial to both cutthroat trout and coho salmon. The primary function of the diversion channel would be to divert water around the landfill, with a secondary function of providing habitat for aquatic organisms other than fish. Aquatic resources mitigation would be similar for the Proposal and alternative site plans.

Based on the results of the proposed monitoring plan, aquatic resources mitigation would be modified as needed to ensure success (see Section B.1.g of this Summary). The conclusion of the EIS with regard to significant unavoidable adverse impacts is discussed in Section C of this Summary.

4. Wetlands

The wetlands on the project site are generally confined to narrow strips of vegetation along the drainages that flow into Sucker Creek, with a few small isolated wetlands in the central portion of the site. The wetlands fall into two classes, emergent and scrub-shrub (see Glossary), and perform the following functions: 1) stream cover and shading, 2) streambank stabilization, 3) nutrient production, 4) wildlife habitat, 5) surface water retention and biofiltration, and 6) recharge of surface water and groundwater.

The Proposal and alternative site plans would result in the loss of all wetlands within their respective footprints. A total of approximately 13 acres of wetlands would be lost under the Proposal, 11.9 acres under Alternative Site Plan A (Weyerhaeuser's preferred alternative), and 11.2 acres under Alternative Site Plan B. Proposed mitigation for the loss of wetlands is summarized in Section B.1.g of this Summary and detailed in the revised *Mitigation Plan* in Appendix A.

Due to favorable hydrologic conditions and other factors, the probability of success of the proposed created wetlands is considered high. If forested wetland systems can be developed over time through the proposed mitigation, such systems would provide higher wildlife habitat value than the existing wetland systems found on the landfill site. There would be more opportunities for wetland creation and enhancement associated with the diversion channel under the alternative site plans, because the topography adjacent to the channel is more favorable than under the Proposal.

Based on the results of the proposed monitoring plan, wetland mitigation would be modified as needed to ensure success (see Section B.1.g of this Summary). The conclusion of the EIS with regard to significant unavoidable adverse impacts is discussed in Section C of this Summary.

5. Air Quality and Odor

The Proposal and alternative site plans could impact air quality in two primary ways: 1) construction activities would produce dust that would contribute to ambient particulate concentrations in the area, and 2) landfill gas and flare emissions could introduce volatile organic compounds (VOC - toxic and explosive hydrocarbons) and criteria pollutants (SO_2 and NO_x) into the atmosphere. In addition, odor associated with the solid waste or landfill gas could potentially be a problem. Computer dispersion modeling was used to evaluate these issues.

This EIS concludes that during landfill construction, particulate concentrations at the western site boundary (and nearest residence) would be well below applicable standards with or without dust control measures. Similarly, VOC concentrations from uncontrolled landfill gas (no combustion in flares), or criteria pollutants from flares if an active gas control system is implemented, would be well below applicable standards.

Due to the explosive nature of methane, potential worst-case concentrations at the western property boundary were estimated, and found to be well below the lower explosive limit. Analysis of four odorous compounds that could be present in landfill gas indicates that odors would not be present at property boundaries or beyond, except under rare meteorological conditions when short-term odors may occur.

The Proposal and alternative site plans include measures to control particulate emissions, such as paving, sweeping, mulching, watering, and plastic cover of nonactive areas. If sufficient landfill gas is produced, a gas collection and combustion system would be installed. With these measures, no significant unavoidable adverse impacts on air quality or odor would be expected.

6. Aesthetics

The Proposal and alternative site plans would be most visible from a point on South Silver Lake Road about 1 mile west of the site, and two residences along Silver Lake Road, about 2.5 miles west of the site. A number of mitigation measures for aesthetic impacts are incorporated into the Proposal and alternative site plans, including retention of a portion of existing tree stands northwest of the landfill footprint (Figure S-2), phased revegetation and natural contouring of the landfill to blend in with surrounding topography, and use of earth tones on project structures. With these measures, and regrowth of trees in a recently clearcut area west of the site, no significant unavoidable aesthetics impacts would be expected from the closest viewpoints.

Views from the Mt. St. Helens Visitors Center would be relatively distant (about 3.5 miles) and obscure. Most windows and outdoor viewing areas at the center orient to toward the mountain to the east, rather than the site to the south. Users of Silver Lake would view the landfill through intervening vegetation at distances ranging from 2.5 to 3.5 miles. Because of the distance from these viewpoints, and the proposed revegetation and natural contouring of the landfill, there would be no significant adverse aesthetic impacts. Most users of the Visitors Center and Silver Lake would probably be unaware of the landfill after completion.

For up to 6 months a year and up to 3 hours a day, the landfill active area would be lighted with portable, directional light fixtures on 20- to 30-foot standards. Lights would be shielded on one side, and wherever possible would be directed so as not to be visible from viewpoints to the north and west. Therefore, there would be no significant off-site impacts.

7. Rail Operations

a. Noise and Intersection Delays

The C&C/Woods rail line is regulated and subject to periodic monitoring by the Federal Railroad Administration (FRA). Therefore, noise from rail operations is subject to FRA noise regulations and other federal guidelines, and exempt from state and local noise regulations. The noise level of a passing train measured along Headquarters Road appears to be in compliance with FRA noise emissions standards. (Noise from whistles or bells sounded for safety purposes are exempt from these standards.) Ongoing FRA inspections of the rail line will help ensure continued compliance.

During the time the one or two additional landfill-related trains are passing, noise increases at residences within 200 feet of the rail line would be very noticeable, particularly when train whistles are sounding. However, the estimated increase of 3 dBA in average daily noise levels (L_{dn}) would not constitute a significant adverse impact under applicable federal standards or guidelines.

Assuming two trains per day, landfill-related trains would be expected to cause average delays of 3 to 4 minutes when crossing at-grade intersections with roads. Delays would occur four times between 6:00 a.m. and 6:30 p.m. If the trains operated during the evening peak hour of automobile traffic, they would result in an average delay at the crossing of State Route 4 of 10 to 15 seconds per automobile (assuming random arrival of automobiles). This level of average vehicle delay equates to LOS B (a good level of service) if measured as a signalized intersection, and is not considered a significant impact.

b. Rail Safety

Numerous improvements have been made in the C&C/Woods rail line in recent years, and the line is now fully in compliance with FRA rail safety standards for Class 2 tracks. At least 30 days before movement of solid waste or leachate begins, FRA would perform a full track and operations inspection, and require that any needed upgrades be implemented before such movement occurs. Several improvements would be implemented as part of the proposed landfill, including the use of new or refurbished rail cars meeting common carrier standards to transport solid waste, and use of "105" tank cars to transport leachate.

The historical incidence of derailments on the C&C/Woods line cannot be used to predict the likelihood of a leachate spill, because most derailments do not result in sufficient damage to tank cars to cause a release of the contents. According to rail safety experts consulted for purposes of this Final EIS, the probability of a rupture of a "105" tank car at speeds of 10 to 12 mph is "remote" (FRA, 1992) and "would require a combination of improbable events" (Washington Utilities and Transportation Commission, 1992). Based on nationwide data on the release of hazardous materials in rail accidents on Class 2 tracks, a derailment resulting in a significant spill of leachate would be expected to occur less than once in 200 years.

The rail safety experts referred to above indicated that the potential for spills from more than one leachate tank car in a single incident is "extremely remote." Therefore, a scenario involving leachate spills from multiple tank cars is considered remote and speculative, and is not evaluated in this EIS.

Table S-1 Comparative Environmental Impacts of Alternatives, Mitigation Measures, and Significant Unavoidable Adverse Impacts (SUAI)

Element	The Proposal	Alternative Site Plan A	Alternative Site Plan B	No-Action Alternative
Earth	**Impacts:** Excavation over 253 acres and fill over 77 acres of 330-acre landfill footprint. Maximum excavation depth of 30 ft and fill depth of 50 ft. Final elevations up to 250 ft higher than existing elevations. No significant erosion impacts because of erosion and sedimentation controls included in project.	**Impacts:** Landfill footprint would be reduced by 18 acres compared to Proposal, reducing excavation and fill. Other impacts similar to Proposal.	**Impacts:** Landfill footprint would be reduced by 94 acres compared to Proposal, reducing excavation and fill. Other impacts similar to Proposal.	**Impacts:** Some soil erosion would occur due to timber management practices.
	Mitigation: Includes sedimentation/detention basins and plastic covering of exposed areas to control erosion. No mitigation possible for topographic changes on site.	**Mitigation:** Same as Proposal.	**Mitigation:** Same as Proposal.	**Mitigation:** None required.
	SUAI: Alteration in site topography.	**SUAI:** Same as Proposal.	**SUAI:** same as Proposal.	**SUAI:** None.
Groundwater	**Impacts:** No significant impacts during normal operation due to mitigation in project, including bottom liner, LCRS, and monitoring. Extreme worst-case bottom liner failure scenario shows no violation of water quality standards (see Section D.1 of Summary).	**Impacts:** Same as Proposal.	**Impacts:** Same as Proposal.	**Impacts:** None.
	Mitigation: No mitigation required other than design measures and monitoring.	**Mitigation:** Same as Proposal.	**Mitigation:** Same as Proposal.	**Mitigation:** None required.
	SUAI: None expected.	**SUAI:** Same as Proposal.	**SUAI:** Same as Proposal.	**SUAI:** None.
Surface Water	**Impacts:** No significant impacts during normal operation due to proposed surface water management plan and monitoring of surface water and HGCS. If derailed leachate tank car spilled into Sucker or Ostrander Creek at low flow, would significantly impair water quality. Probability of occurrence of such a spill so low that potential for significant adverse impacts on water quality could be considered remote and speculative.	**Impacts:** Slightly less increase in runoff volume compared to Proposal. Other impacts similar to Proposal.	**Impacts:** Slightly less increase in runoff volume compared to Proposal. Other impacts similar to Proposal.	**Impacts:** Sediment and nutrient loading could be somewhat greater than with landfill, because eroded soil not contained in sedimentation basins.

Table S-1. Comparative Environmental Impacts of Alternatives, Mitigation Measures, and Significant Unavoidable Adverse Impacts (continued)

Element	The Proposal	Alternative Site Plan A	Alternative Site Plan B	No-Action Alternative
Surface Water (continued)	Extreme worst-case liner leak into HGCS would violate water quality standards in Southern Tributary, but considered remote and speculative. Reasonable maximum liner leak would have no significant impact (see Section D.2 of Summary).			
	Mitigation: No mitigation proposed other than design measures and monitoring. Frequent monitoring of HGCS recommended. If leak detected, HGCS discharge collected and treated.	**Mitigation:** Same as Proposal.	**Mitigation:** Same as Proposal.	**Mitigation:** None required.
	SUAI: If derailed leachate tank car spilled into Sucker or Ostrander Creek at low flow, would significantly impair water quality (see comments on probability of occurrence under Impacts above, and Section D.2 of Summary).	**SUAI:** Same as Proposal.	**SUAI:** Same as Proposal.	**SUAI:** None.
Air	**Impacts:** Increase in dust during construction in immediate project area, but no violations of ambient standards for particulates. If sufficient landfill gas produced, would be collected and combusted. Flare emissions would be below standards. No problem levels of methane or odor at property boundary (see Section D.5 of Summary).	**Impacts:** Same as Proposal.	**Impacts:** Same as Proposal.	**Impacts:** Some dust produced during timber management activities, but no violations of standards.
	Mitigation: Other than gas control system if needed, mitigation would include application of water or dust-suppressing chemicals, as necessary.	**Mitigation:** Same as Proposal.	**Mitigation:** Same as Proposal.	**Mitigation:** None required.
	SUAI: None expected.	**SUAI:** Same as Proposal.	**SUAI:** Same as Proposal.	**SUAI:** None.

Table S-1. Comparative Environmental Impacts of Alternatives, Mitigation Measures, and Significant Unavoidable Adverse Impacts (continued)

Element	The Proposal	Alternative Site Plan A	Alternative Site Plan B	No-Action Alternative
Plants, Animals, and Fisheries	**Impacts:** 330 acres converted from managed forest to reclaimed shrub/grassland, reducing abundance and diversity of wildlife on site. Numerous measures in project to enhance value of site as wildlife habitat. Aquatic habitat within project boundary lost when creek rerouted. Off-channel ponds and diversion channel designed to enhance coho production and replace lost aquatic habitat. Significant impacts on aquatic resources if derailed leachate tank car spilled into Sucker or Ostrander Creek at low flow. Probability of occurrence of such a spill so low that potential for significant adverse impacts on aquatic resources could be considered remote and speculative. Extreme worst-case liner leak could cause chronic effects to aquatic resources, but considered remote and speculative. Reasonable maximum liner leak determined harmless (see Section D.3 of Summary).	**Impacts:** Change in vegetation and wildlife habitat would occur over 18 acres less than Proposal. Other impacts same as Proposal.	**Impacts:** Change in vegetation and wildlife habitat would occur over 94 acres less than Proposal. Other impacts same as Proposal.	**Impacts:** Timber management activities would determine vegetation composition of site. Wildlife abundance and diversity dynamic. Aquatic habitat similar to existing conditions. Upstream extension of coho distribution to railroad crossing possible, as it would be under Proposal and alternative site plans.
	Mitigation: Habitat replacement and enhancement built into project. Would be monitored and modified as needed to ensure success. Leachate pond monitored for impacts on wildlife. Additional measures taken to prevent wildlife access, if needed. Also, see mitigation measures under Surface Water above.	**Mitigation:** Same as Proposal.	**Mitigation:** Same as Proposal.	**Mitigation:** None required.

Table S-1. Comparative Environmental Impacts of Alternatives, Mitigation Measures, and Significant Unavoidable Adverse Impacts (continued)

Element	The Proposal	Alternative Site Plan A	Alternative Site Plan B	No-Action Alternative
Plants, Animals, and Fisheries (continued)	**SUAI:** No SUAI on plants and wildlife due to abundance of managed forest land in area, similarity of impacts to those of commercial logging, proposed mitigation, and absence of sensitive, threatened, or endangered species. If habitat replacement successful, loss of on-site aquatic resources would not be SUAI. Significant impacts on aquatic resources if derailed leachate tank car spilled into Sucker or Ostrander Creek at low flow (see comment on probability of occurrence under Impacts above, and Section D.3 of Summary).	**SUAI:** Same as Proposal.	**SUAI:** Same as Proposal.	**SUAI:** None.
Wetlands	**Impacts:** Loss of 13 ac. of wetlands within landfill footprint. Project includes mitigation plan to replace wetland functions (see Section D of Summary). If forested wetlands developed over time through proposed mitigation, would provide higher wildlife habitat value than existing wetland.	**Impacts:** Loss of wetlands would be 11.9 acres, 1.1 ac. less than Proposal. More opportunities for wetland creation along diversion channel than Proposal due to more favorable topography.	**Impacts:** Loss of wetlands would be 11.2 acres, 1.8 acres less than Proposal. Opportunities for wetland creation same as Alternative Site Plan A.	**Impacts:** None.
	Mitigation: Wetland mitigation plan built into project. Would be monitored and modified as needed to ensure success.	**Mitigation:** Same as Proposal.	**Mitigation:** Same as Proposal.	**Mitigation:** None required.
	SUAI: If wetland mitigation successful, loss of wetlands within landfill footprint would not be SUAI.	**SUAI:** Same as Proposal, except smaller area of wetlands affected.	**SUAI:** Same as Proposal, except smaller area of wetlands affected.	**SUAI:** None.
Noise	**Impacts:** No significant increase in off-site noise levels due to construction and operation. Noise from passing trains very noticeable to nearby residents, but not considered significant under federal standards and guidelines (see Section D.7 of Summary).	**Impacts:** Same as Proposal.	**Impacts:** Same as Proposal.	**Impacts:** Some noise associated with timber management, including occasional rail noise. No standards violated.

Table S-1. Comparative Environmental Impacts of Alternatives, Mitigation Measures, and Significant Unavoidable Adverse Impacts (continued)

Element	The Proposal	Alternative Site Plan A	Alternative Site Plan B	No-Action Alternative
Noise (continued)	**Mitigation:** Keep number of train trips to minimum needed, and schedule during daytime hours to extent possible.	**Mitigation:** Same as Proposal.	**Mitigation:** Same as Proposal.	**Mitigation:** None required.
	SUAI: None expected.	**SUAI:** Same as Proposal.	**SUAI:** Same as Proposal.	**SUAI:** None.
Human Health Risk	**Impacts:** Even under extreme worst-case liner leak scenario, or if leachate tank car spilled into creek or Cowlitz River, contaminants in groundwater and surface water would be below levels that could affect human health. No groundwater or surface water used as drinking water. Monitoring would prevent any long-term cumulative effects on Silver Lake water or fish resources. Potential flare emissions and odorous compounds also below levels that could affect human health. Dioxins and furans not expected in leachate at levels that would significantly affect human health or environment, because they have low water solubility, bind tightly to soils and small particles, and do not leach easily.	**Impacts:** Same as Proposal.	**Impacts:** Same as Proposal.	**Impacts:** None.
	Mitigation: Mitigation built into project, (see Groundwater, Surface Water, and Air).	**Mitigation:** Same as Proposal.	**Mitigation:** Same as Proposal.	**Mitigation:** None required.
	SUAI: None expected.	**SUAI:** Same as Proposal.	**SUAI:** Same as Proposal.	**SUAI:** None.
Land Use	**Impacts:** Removal of approximately 380 acres of highly productive forest land from timber production. Represents less than 0.1 percent of 440,000-acre St. Helens Tree Farm of which it is a part. Landfill appears consistent with intent of County Comprehensive Plan.	**Impacts:** Same as Proposal, except 362 acres affected.	**Impacts:** Same as Proposal, except 286 acres affected.	**Impacts:** None.

Table S-1. Comparative Environmental Impacts of Alternatives, Mitigation Measures, and Significant Unavoidable Adverse Impacts (continued)

Element	The Proposal	Alternative Site Plan A	Alternative Site Plan B	No-Action Alternative
Land Use (continued)	**Mitigation:** No mitigation is available for change in land use.	**Mitigation:** Same as Proposal.	**Mitigation:** Same as Proposal.	**Mitigation:** None required.
	SUAI: None.	**SUAI:** Same as Proposal.	**SUAI:** Same as Proposal.	**SUAI:** None.
Aesthetics	**Impacts:** Closest views of landfill would be from point on South Silver Lake Road approx. 1 mi. west of site, and two residences on that road approx. 2.5 mi. west of site. Views from Mt. St. Helens Visitors Center (3.5 mi) and Silver Lake (2.5-3.5 mi) distant and obscured by vegetation (see Section D.6 of Summary). Active area lighted up to 3 hours per day up to 6 months per year.	**Impacts:** Impacts similar to Proposal.	**Impacts:** Impacts similar to Proposal.	**Impacts:** None.
	Mitigation: Retention of portion of trees northwest of landfill footprint, regrowth of trees in recent clearcut west of site, phased revegetation and natural contouring of landfill, earth tones on buildings, lighting for active area directed to south and east whenever possible.	**Mitigation:** Same as Proposal.	**Mitigation:** Same as Proposal.	**Mitigation:** None required.
	SUAI: None expected, due to distance to viewpoints and mitigation.	**SUAI:** Same as Proposal.	**SUAI:** Same as Proposal.	**SUAI:** None.
Transportation	**Impacts:** One or two additional round-trip trains per day (historical use of line up to 6 trains per day). Some delays to vehicles from additional trains crossing at-grade intersections with local arterials (see Section D.5 of Summary). If trucks used as temporary backup to haul waste from mill to landfill, would add up to 20 one-way truck/trailer trips per day during peak hours. Would not change current peak-hour LOS at key intersections.	**Impacts:** Same as Proposal.	**Impacts:** Same as Proposal.	**Impacts:** Number of trains using line could remain at one or two per day or increase to historical levels. Weyerhaeuser waste would be transported elsewhere by rail or truck.

Table S-1. Comparative Environmental Impacts of Alternatives, Mitigation Measures, and Significant Unavoidable Adverse Impacts (continued)

Element	The Proposal	Alternative Site Plan A	Alternative Site Plan B	No-Action Alternative
Transportation (continued)	**Mitigation:** No mitigation proposed.	**Mitigation:** Same as Proposal.	**Mitigation:** Same as Proposal.	**Mitigation:** None required.
	SUAI: None expected.	**SUAI:** Same as Proposal.	**SUAI:** Same as Proposal.	**SUAI:** None.
Historic and Cultural Preservation	**Impacts:** Potential exists for previously unknown resources to be encountered during construction.	**Impacts:** Same as Proposal.	**Impacts:** Same as Proposal.	**Impacts:** None.
	Mitigation: Conduct 100% cultural resource survey of the site prior to beginning construction. If cultural resources are discovered, construction would be delayed for Section 106 review process.	**Mitigation:** Same as Proposal.	**Mitigation:** Same as Proposal	**Mitigation:** None required.
	SUAI: None expected.	**SUAI:** Same as Proposal.	**SUAI:** Same as Proposal.	**SUAI:** None.
Public Services and Utilities	**Impacts:** Beneficial impact on the County solid waste system by providing 45.8 million cubic yards of industrial waste disposal capacity, preventing the potential adverse impacts discussed under No-Action Alternative if County Landfill is used.	**Impacts:** Same as Proposal, except would provide slightly less disposal capacity (45 million cubic yards).	**Impacts:** Same as Proposal, except would provide substantially less disposal capacity (36 million cubic yards).	**Impacts:** Weyerhaeuser waste would reduce site life of facility and contribute to environmental impacts wherever disposed. Reduction in site life could be significant if disposed at County Landfill.
	Mitigation: No mitigation is proposed.	**Mitigation:** Same as Proposal.	**Mitigation:** Same as Proposal.	**Mitigation:** None.
	SUAI: None expected.	**SUAI:** Same as Proposal.	**SUAI:** Same as Proposal.	**SUAI:** If Weyerhaeuser uses County Landfill, could be significant reduction in site life.

Section I
Alternatives, Including the Proposal

Headquarters Camp
Solid Waste Disposal Facility

A. Introduction

1. Purpose and Need

The Weyerhaeuser Company proposes to construct and operate an industrial solid waste landfill on a site in Cowlitz County, Washington known as the "Headquarters Site" (Figure I-1). The proposed landfill would be part of an integrated solid waste management system, supplementing Weyerhaeuser's ongoing waste reduction, recycling, and volume minimization programs. Even with such programs, there is still a substantial amount of waste requiring landfill disposal (see further detail on waste characteristics in Section I.A.3).

The proposed landfill would accept only forest products manufacturing waste and construction and demolition waste. No dangerous or hazardous waste and no household or commercial solid waste, as defined by federal or state regulations, would be accepted. Weyerhaeuser's highest priority is to provide for disposal of Weyerhaeuser industrial solid waste generated within Cowlitz and Wahkiakum counties. The company's next priority is to accommodate Weyerhaeuser waste generated outside the two-county area. Its lowest priority is to accommodate waste of the same type and character generated by companies other than Weyerhaeuser within the two-county area. Acceptance of non-Weyerhaeuser waste is intended as a service to Cowlitz County, to preserve the capacity of the County Landfill for municipal solid waste. Weyerhaeuser would accept such waste only to the extent that an acceptable waste screening and certification process could be implemented with the generator.

Weyerhaeuser believes that ownership and operation of its own landfill would help it achieve three basic objectives (Appendix C of this EIS):

1. ***Minimization of environmental risks associated with landfill disposal.*** Weyerhaeuser has historically relied on third-party contractors to dispose of its solid waste at existing private and municipal landfills. This has caused the company to be responsible for environmental impacts over which it has little or no control. The risk of such liability has increased under recent regulatory standards, which can make solid waste generators perpetually responsible for environmental problems at disposal facilities. Weyerhaeuser believes that it has the technical and financial capability to construct and operate a landfill to the highest environmental standards, thus reducing the risk associated with disposal through third parties.

2. ***Assurance of adequate long-term disposal capacity.*** Weyerhaeuser has made and plans to make large investments in its Longview mill and other facilities in the region, representing 30- to 40-year commitments of company resources. Weyerhaeuser believes it is essential that there be capacity over this same term for the solid waste that these facilities are expected to generate. Due to uncertainties in market demand, Weyerhaeuser also requires the flexibility to vary production, and thus waste generation.

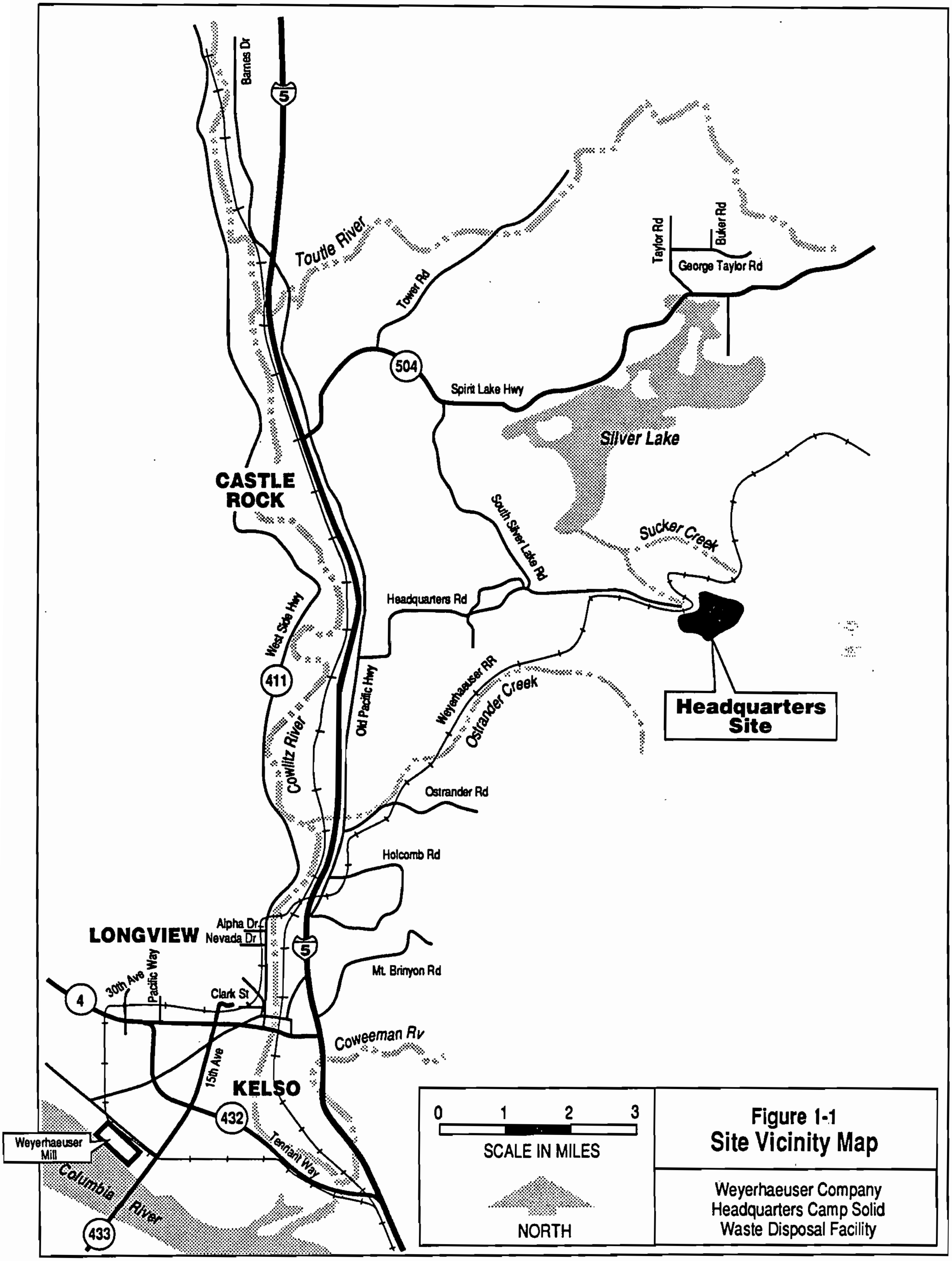


Figure 1-1
Site Vicinity Map

Weyerhaeuser Company
Headquarters Camp Solid
Waste Disposal Facility

3. ***Reduction and stabilization of solid waste disposal costs.*** Extensive modernization of the Longview mill is needed both to keep the plant competitive and to enable it to meet increasingly stringent regulatory requirements. Weyerhaeuser's ability to reduce and stabilize production costs will be a key consideration in its decision on whether to invest in the needed modernization. Solid waste disposal costs are a sizeable component of production costs and have increased dramatically in recent years. Weyerhaeuser believes that ownership and operation of its own landfill would stabilize and reduce disposal costs.

2. Site Selection Process

Having determined that a Weyerhaeuser-owned landfill is needed to meet the above objectives, the company initiated a process to identify and evaluate potential landfill sites and select a preferred site. The Cowlitz-Wahkiakum Health District did not participate in site selection, and has taken no position on the relative benefits and disadvantages of alternative sites identified by Weyerhaeuser, or the potential availability of other suitable sites. As discussed in more detail in Section I.B, Description of Alternatives Evaluated in this EIS, the Health District has decided to limit the alternatives evaluated in this EIS to the No-Action Alternative, the proposed landfill on the Headquarters Site, and other means of accomplishing the Proposal's objectives on the same site. This is consistent with the SEPA Rules and a 1991 decision by the Washington State Pollution Control Hearings Board.

Weyerhaeuser's site selection process is described in the *Alternatives Analysis* submitted to the Corps of Engineers as part of the Section 404 permit application. The *Alternatives Analysis* is included in Appendix C of this EIS, not for purposes of SEPA compliance, but to provide additional information to assist agencies in making the balancing judgments necessary to support permit decisions. Relevant information in the *Alternatives Analysis* was obtained from a report entitled *Solid Waste Disposal Facility Site Selection Study* and its addendum (Sweet-Edwards/ EMCON, 1990 and 1991a), which are available for review at the offices of the Cowlitz-Wahkiakum Health District.

Although alternative sites are not evaluated in this EIS, they will be evaluated in detail by the Corps of Engineers during the Section 404 permit process. For non-water dependent uses that require filling of "special aquatic sites", such as wetlands, federal regulations place the burden on the applicant to rebut the presumption that there are practicable alternatives available that do not involve special aquatic sites [40 CFR 230.10(a)(3)].

3. Waste Characteristics

a. Waste Reduction, Recycling, and Volume Minimization

Weyerhaeuser currently has in place a number of programs to minimize the waste generated at the Longview mill complex through waste reduction and recycling efforts. In addition, the company uses incineration to the maximum extent possible to reduce the volume of waste requiring landfill disposal. These programs have resulted in a reduction in waste quantities requiring landfill disposal from about 750,000 cubic yards per year in 1981 to about 220,000 cubic yards per year in 1991. This 70 percent reduction, which was primarily the result of incineration, was achieved in a period when mill production increased by approximately 40 percent. The programs remain in place and additional opportunities are being actively pursued.

A partial list of past and present waste reduction efforts is shown below.

(1) Waste Reduction

(a) Pulping processes at the Longview mill have been selected and optimized to reduce the amount of waste produced and to increase the pulp yield.

(b) Chlorine dioxide substitution and other recent process improvements have significantly reduced chlorinated organic compounds in the solid waste.

(c) A proposed modernization of the pulp mill/bleach plant will increase the bleached pulp capacity and reduce the amount of bleaching chemical required per ton of product. The modern plant will also use less water. More material will be retained in the Kraft Recovery process.

(d) Mechanical pulping is used at the NORPAC facility on the Longview mill site. In addition to the mechanical pulping, the facility uses significant amounts of recycled paper.

(e) All of the paper machines at Longview recycle water and filter fibrous material from the remaining paper machine effluent and return the fibrous material to the paper-making process. These reductions in water use and in the fiber lost directly reduce the quantity of solids produced in wastewater treatment.

(f) All paper machines produce a small amount of paper that is unfit for use by the customers. This material is recycled through a device called a hydropulper, which converts the waste paper back into pulp. The pulp is then used to make paper.

(2) Recycling

(a) Weyerhaeuser, through its NORPAC subsidiary, uses approximately 600 tons per day of old newsprint for processing into new newsprint. Most of the old newsprint is usable, but approximately 15 percent is waste.

(b) Market pulp from post-consumer recycling is used in the production of fine paper. Currently this represents up to 10 percent of the pulp for fine paper and is projected to increase during the 1990s.

(c) Approximately 350 tons per day of corrugated paper products are produced at Longview using 65 percent recycled material. The sources for the recycled material are digester pulping rejects from Longview and other mills that would otherwise be landfilled, and "clippings" from box manufacturing.

(d) The Longview mill is pilot testing a program to recycle milk cartons through an extrusion operation that removes the polyethylene coating. Most polyethylene waste from the extrusion operation is salvaged and recycled. The reject polyethylene coating is incinerated for energy recovery.

(e) Log sort yard debris is mechanically screened to separate rocks and soil from wood debris. Rock is returned to the sort yard. Soil and wood fines are sold for landscape and nursery products.

(f) At the solid waste recycling and transfer facility, additional recyclable waste would be separated and used.

(g) Waste paper at the Longview mill complex is collected and recycled into new paper products.

(h) Ash from the mill boilers and lime waste are being investigated for use as a soil amendment for agricultural uses.

*(3) **Volume Minimization***

(a) Organic waste is burned for energy recovery and chemicals are regenerated and reused.

(b) The reject fiber waste from newspaper recycling is incinerated for energy recovery.

(c) Clean wood from log sort yard debris is burned for energy recovery.

(d) Options to reduce the overall volume of wood waste and wastewater treatment solids from the pulping process are being investigated. Trial burns for some of these materials have been successful to recover energy, reduce the overall volume and organic content, and perhaps make a usable land application product. A pilot program of waste composting and marketing the compost material is also underway.

b. Disposal Requirements

The discussion in this section is based on information developed by Weyerhaeuser on landfill capacity requirements (see Appendix M of this Final EIS).

Weyerhaeuser estimates that the total volume of its industrial solid waste that would require landfill disposal is 900,000 cubic yards per year. Approximately 750,000 cubic yards per year would be generated by Weyerhaeuser operations within Cowlitz and Wahkiakum counties, while an estimated 150,000 cubic yards per year would be generated by the company's operations outside the two-county area.

These estimates assume that waste disposal would continue at the current rate, but that incineration would no longer be used to reduce waste volumes. Weyerhaeuser believes there is a real possibility that current incineration activities may not be able to continue throughout the 30-year forecast period, due to increasingly stringent regulatory limitations on air emissions, as well as practical considerations related to operation of the existing boilers. As noted previously, the reduction of Weyerhaeuser's waste stream from 750,000 cubic yards per year in 1981 to 220,000 cubic yards per year in 1991 was primarily the result of incineration. Incineration is not considered waste reduction or recycling under state law (RCW 70.95). It has the same priority as a solid waste management option as landfill disposal (see Section I.A.4, Consistency with Comprehensive Solid Waste Management Plan and RCW 70.95).

In addition to the uncertainty related to incineration, Weyerhaeuser cites numerous other uncertainties that make it difficult to estimate the amount of its waste requiring disposal over the long term. Uncertainties that may result in increases in waste volumes include facility expansions and additions; requirements for additional wastewater treatment, which might result in additional biological solids or other solid waste; changes in air or water quality regulations that may require landfill disposal of greater amounts of wastewater treatment plant solids; and the possibility that certain recycling options may become economically, environmentally, or politically less acceptable.

Some facility expansion projects are already at a serious stage of development. Most importantly, the kraft mill at Longview must be modernized to become more competitive and to comply with future environmental regulations. In the process, the mill is being designed to increase its capacity by about 35 percent. Another Longview expansion possibility is the addition of a second newsprint de-inking facility at NORPAC, which in itself would increase solid waste volumes by 140,000 cubic yards per year. A major recycling facility for fine (office grade) paper is also being evaluated for either Longview or another location in Washington. The facility would add an incremental 100,000 to 200,000 cubic yards per year of solid waste requiring landfill disposal, depending on final process design and recycling capacity.

There are also uncertainties that could decrease the volume of waste requiring landfill disposal to an unknown extent. These include process improvements; new waste reduction and recycling technologies; and paving log yards so that log yard debris is cleaner and more amenable for use as a fuel, thus reducing the volume of residual debris that must be disposed.

All of these uncertainties make it impossible to know what actual waste volume will require landfill disposal over the next three decades. Weyerhaeuser believes it is as likely that the annual waste volumes discussed above are under-estimated as over-estimated. The estimates imply that all future waste increases (including those from projects currently being given serious consideration) will be offset by corresponding additional successes in waste reduction or recycling efforts, which are largely unidentified at this time.

As discussed in Section I.A, Introduction, Weyerhaeuser would also accept selected industrial wastes of the same type and character from non-Weyerhaeuser generators within Cowlitz and Wahkiakum counties. Weyerhaeuser estimates that up to 150,000 cubic yards per year of such waste would be disposed at the proposed landfill. When added to Weyerhaeuser's annual disposal requirements of 900,000 cubic yards, the total industrial waste to be disposed annually at the proposed landfill is estimated to be 1,050,000 cubic yards per year.

So as not to imply exactness in estimating long-term waste volumes, this figure was rounded to 1,000,000 cubic yards per year for Weyerhaeuser's landfill capacity calculations, and for purposes of the analyses in this EIS. Due to the uncertainties cited by Weyerhaeuser in estimating its manufacturing waste over the long-term, it is recommended that a condition be attached to the solid waste permit requiring an evaluation of the need for additional SEPA review if the total waste volume increases significantly beyond the 1,000,000 cubic yard per year estimate used in the EIS analyses (for example, an increase of more than 10 percent). The Cowlitz-Wahkiakum Health District would monitor incoming waste volumes through the annual report required by the MFS [WAC 173-304-405(4)].

c. Waste Composition

Weyerhaeuser's industrial solid waste stream to be landfilled is made up of wastes from its industrial processes and log sorting facility at the Longview mill. Table I-1 shows the solid waste stream composition. The major categories to be handled include log sort yard debris (wood, bark, rock, and soil), pulp mill waste (wastewater treatment solids, boiler ash, lime wastes), saw mill waste, de-inking solids from newsprint recycling, demolition and construction wastes, and other miscellaneous solid wastes. Non-Weyerhaeuser industrial waste disposed at the proposed landfill is expected to consist of similar types of waste, but may differ in percent composition.

Section I.B.1.f, Plan of Operation, discusses procedures for testing and inspecting waste to be disposed at the proposed landfill to ensure that no dangerous or hazardous waste and no household or commercial solid waste, as defined by federal or state regulations, would be accepted.

4. Consistency with Comprehensive Solid Waste Management Plan and RCW 70.95

The Cowlitz-Wahkiakum Regional Solid Waste Management Plan (Regional Plan) (Cowlitz-Wahkiakum Governmental Conference 1985, as amended in 1988) recognizes the concern about disposal capacity for nonhazardous industrial waste, and recommends that the solution to this problem be left to private industry. Responsibility for proper disposal of wood waste is also left to private industry under the Regional Plan. The Plan specifies that waste reduction and recycling should be considered the preferred alternative, but that siting of a new industrial waste landfill is also likely to be required.

In April 1991, the Washington State Pollution Control Hearings Board (PCHB) determined that Weyerhaeuser's proposed landfill is consistent with the Regional Plan as long as it accepts waste only from Cowlitz and Wahkiakum counties (Washington Environmental Hearings Office, 1991). Waste import from outside the two-county area was determined to be not in conformance with the Regional Plan as written, since the Plan does not address the waste import issue. Therefore, waste import was not considered in Draft EIS.

Table I-1 Estimated Annual Industrial Solid Waste Flow to the Proposed Weyerhaeuser Landfill

Source/Type of Industrial Solid Waste	Description	Volume (Cubic Yards)	Percent of Waste Stream
Weyerhaeuser Waste from within Two-County Area [a]			
Wood chips and fines	Dirty wood chips, bark, sawdust	15,000	1.5
Log sort yard debris	Bark, wood chips, rocks, soil	75,000	7.5
Boiler ash	Inorganic ash, carbon from solid fuel boilers	100,000	10.0
Pulp mill lime waste	Calcium carbonate, carbon from recovery operations	15,000	1.5
Wastewater treatment solids	Dewatered fibrous and biological solids	350,000	30.0
Pulp chip washer fines	Fine wood particles	18,000	1.8
Paper recycling reject fiber (de-inking sludges)	Short fiber, clay binder, ink from newsprint recycling	120,000	12.0
Box dump waste	Various industrial solid wastes	3,000	0.3
Polyethylene waste	Waste plastic from milk carton stock extrusion	8,000	0.8
Miscellaneous waste	Miscellaneous mill solid waste	38,000	3.8
Construction/demolition waste	Nonrecyclable debris from building and pavement demolition or construction	8,000	0.8 [b]
	Subtotal	750,000	70%
Weyerhaeuser Waste from Outside Two-County Area			
Same types as above		150,000	15
Non-Weyerhaeuser Waste from within Two-County Area			
Same types as above		150,000	15
Total Solid Waste Volume		1,000,000 [c]	100%

Source: Weyerhaeuser Company, 1991b. See Appendix M of EIS.

[a] Cowlitz and Wahkiakum counties.

[b] Would vary greatly depending on construction and demolition activity in given year. May be up to 5-10 percent of waste stream in years of high activity, but expected to average less than 1 percent over life of landfill.

[c] Total waste volume was rounded to 1,000,000 cubic yards per year for purposes of capacity calculations and EIS analyses (see Section I.A.3.b, Disposal Requirements).

A Comprehensive Solid Waste Management Plan for Cowlitz County alone is currently being prepared, and a Preliminary Draft Plan has been issued for public and agency review (Cowlitz County and SCS Engineers, 1992). The Preliminary Draft Plan recommends that waste import to private solid waste disposal facilities be allowed. Based on a recent U.S. Supreme Court decision on the waste import issue, the Cowlitz County prosecuting attorney has advised the County Solid Waste Superintendent that "in drafting our solid waste management plan, we must be careful to not subject private waste facilities to restrictions based solely on the point of origin of the wastes." (Koss, 1992. See Appendix P of the EIS.)

In light of these recent developments, the EIS has been revised to evaluate the import of industrial solid waste from Weyerhaeuser operations outside Cowlitz and Wahkiakum counties. Imported waste would be subject to the same waste screening procedures as non-imported solid waste (see Section I.B.1.f, Plan of Operation).

The Preliminary Draft Plan reflects changes in the state's solid waste management code (RCW 70.95) mandated by the so-called "Waste Not Washington Act" of 1989 (Engrossed Substitute House Bill 1671). This act and code revisions establish the following solid waste management priorities: 1) waste reduction; 2) recycling, with source separation of recyclable materials as the preferred method; 3) energy recovery, incineration, or landfilling of separated waste; and 4) energy recovery, incineration, or landfilling of mixed waste.

As described in Section I.A.3, Waste Reduction, Recycling, and Volume Minimization, Weyerhaeuser currently has a number of programs in effect to reduce the amount or toxicity of waste generated, to reuse waste material, and to transform or remanufacture waste material into usable or marketable materials. Incineration is also used to reduce the volume of certain waste prior to landfill disposal. Waste reduction, recycling, and volume minimization are in the best interest of the company from both an economic and environmental risk standpoint, and Weyerhaeuser has indicated that it will continue to seek technologies to further reduce the amount of waste requiring landfill disposal. Therefore, the Proposal appears to be consistent with the solid waste management priorities established in RCW 70.95.

5. Timing of Possible Approval

The SEPA Rules require that an EIS evaluate the benefits and disadvantages of reserving for some future time implementation of the Proposal, as compared with possible approval at this time [WAC 197011-440(5)].

A delay in implementing the proposed landfill as compared with possible approval at this time would have some short-term environmental benefits in that it would delay the environmental impacts associated with construction and operation of the proposed landfill. The disadvantage of such a delay is that there would be a longer period of time during which Weyerhaeuser would have to use alternative disposal facilities.

Currently, most nonrecycled solid waste from the Longview mill is disposed at the Mt. Solo Landfill, with a small amount long-hauled by rail to the Roosevelt Regional Landfill in Klickitat County, Washington. The Mt. Solo Landfill is operating under a variance that allows it to continue operation only through September 1, 1993. Even with timely approval of the proposed Headquarters Site landfill, there could be some interim period between the Mt. Solo Landfill closure and the start of the proposed landfill operations. Delaying approval of the Proposal would extend this time period.

During any period of delay, Weyerhaeuser would probably transport all or part of its waste to the Cowlitz County Sanitary Landfill, unless the County takes action to prohibit or limit the quantities of industrial waste or construction and demolition waste at that facility. Acceptance of Weyerhaeuser waste at the County Landfill would reduce its planned capacity for mixed municipal solid waste. The greater the delay in implementation of the Proposal, the greater the reduction in the site life.

Alternatively, if there is a delay in implementing the Proposal, Weyerhaeuser could contract for temporary long-haul of all or part of its solid waste to an out-of-county disposal facility. This would reduce or eliminate the potential impact on the site life of the Cowlitz County Landfill.

B. Description of Alternatives Evaluated in this EIS

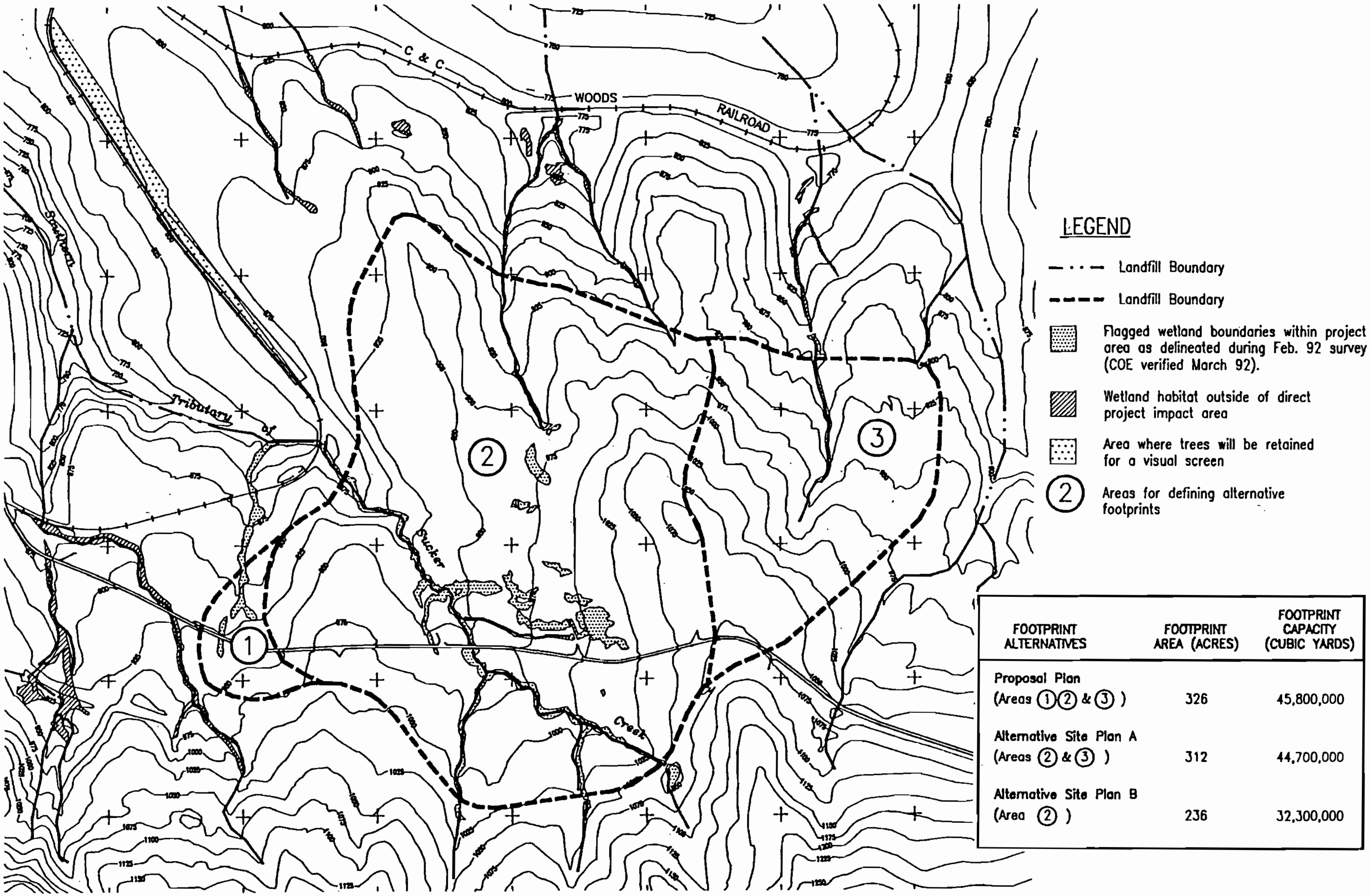
When a proposal is for a private project on a specific site, and no rezone is required, the lead agency is required to evaluate only the no-action alternative and alternative means of accomplishing the Proposal's objective on the same site. However, the Lead Agency may evaluate alternative sites if locations for the proposed use are not considered in existing planning or zoning documents [WAC 197-11-440 (5)(d)].

The relevant planning document in this case is the 1984 Cowlitz-Wahkiakum Regional Solid Waste Management Plan, as amended in 1988. As noted under Section I.A.4., Consistency with Comprehensive Solid Waste Management Plan and RCW 70.95, the Regional Plan recommends that the solution for disposal of nonhazardous industrial waste and wood waste be left to private industry. In finding the Proposal consistent with the Plan, the PCHB stated:

> The Plan acknowledges that a new industrial waste landfill site will likely be needed. The Plan, however, makes no effort to locate this future site. Rather, when local government and Ecology adopted the Plan, they delegated the solution to private industry. That choice was clear and unambiguous.... (Washington State Environmental Hearings Office, 1991).

It is implicit in this ruling that the selection of sites for the needed industrial waste landfill should be left to private industry. Therefore, the alternatives evaluated in this EIS are limited to the Proposal, two alternative site plans at the Headquarters Site (Alternative Site Plans A and B), and the No-Action Alternative.

The difference between the Proposal and the two alternative site plans is primarily the size of the landfill footprint and the area of impacted wetlands (Figure I-2). The Proposal footprint is consistent with the footprint presented in Weyerhaeuser's preliminary solid waste handling facility permit application (Sweet-Edwards/EMCON, 1990c) and is the largest of the three alternatives. The Proposal was also the basis for impact assessments in the *Environmental*



FOOTPRINT ALTERNATIVES	FOOTPRINT AREA (ACRES)	FOOTPRINT CAPACITY (CUBIC YARDS)
Proposal Plan (Areas ①②&③)	326	45,800,000
Alternative Site Plan A (Areas ②&③)	312	44,700,000
Alternative Site Plan B (Area ②)	236	32,300,000

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Figure I-2
Alternative Footprints
Source: Sweet-Edwards/EMCON, 1991

Weyerhaeuser Company
Headquarters Camp Solid
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Technical Report (Beak, 1991a) and would result in the greatest impacts of the three alternatives. Alternative Site Plan A is presently preferred by Weyerhaeuser because it reduces wetland filling and improves the proposed diversion channel alignment without significantly reducing solid waste disposal capacity. Alternative Site Plan A is the subject of Weyerhaeuser's more recent Part I solid waste handling facility permit application (Sweet-Edwards/EMCON, 1991d).

1. The Proposal

Information in this section is based largely on the preliminary and Part I solid waste permit applications (Sweet-Edwards/EMCON, Inc., 1990c and 1991d).

a. Project Overview

Weyerhaeuser proposes to construct and operate a solid waste landfill at the Headquarters Site, which is located approximately 7 miles east of I-5 and 1.8 miles south-southeast of Silver Lake in Cowlitz County (Figure I-1).

The landfill would be designed and operated in accordance with the requirements of the Washington State Minimum Functional Standards for Solid Waste Handling (MFS), WAC 173-304. However, a variance would be required from the MFS locational standard that prohibits the location of a landfill's active area in a wetland [WAC 173-304-130(2)(e)]. Procedures for applying for and granting variances are set forth in WAC 173-304-700.

The proposed landfill would be developed incrementally over the life of the project (30 to 50 years) and eventually comprise an approximately 330-acre footprint (area within which landfilling occurs) plus an additional 50 acres of support facilities. The total site capacity is about 45.8 million cubic yards of in-place waste. Monitoring and mitigation programs would be performed for all aspects of the affected environment and landfill operations. A minimum 30-year post-closure monitoring and maintenance program would be conducted after the last cell closure.

The overall project includes a solid waste recycling and transfer facility (SWRTF) to receive, sort, and load the waste onto rail cars at the Longview mill complex; an existing rail operation to ship the waste to the landfill and to ship leachate (water that has been in contact with waste) back to the mill for treatment; and the landfill operation itself. The landfill would operate up to 6 days per week, and up to 12 hours per day (7:00 a.m. to 7:00 p.m.). The SWRTF and rail system could operate any day, 24 hours a day, but would operate primarily in the daytime. Major features of the project are described below.

b. Solid Waste Recycling and Transfer Facility

All waste destined for the landfill would pass through the SWRTF. Most of the facilities comprising the SWRTF already exist and are being used to transfer a portion of Weyerhaeuser's waste to rail cars for shipment to the Roosevelt Regional Landfill in Klickitat County. Existing facilities include a 6-acre sort yard with mechanical sorting equipment and a 600-foot rail siding. The proposed landfill operations would require construction of additional facilities to allow efficient management of a larger flow of materials. These would include a concrete tipping pad where incoming loads of waste could be dumped, sorted, and the residual loaded into 40-cubic-yard containers for rail transport; an additional 600-foot rail siding; and additional access roads and surface water management facilities. Also, it is possible that existing mechanical sorting equipment would be replaced with more modern processing equipment that incorporates additional approaches to separate mixed debris into its various components.

Most solid waste handled at the SWRTF (up to an estimated 750,000 cubic yards per year) would originate at the Longview mill, while a smaller amount (up to 300,000 cubic yards per year) would be expected from off-site sources. Waste that contains no significant recyclable material would be placed in covered solid waste containers at the sort yard. If sufficient recyclable materials are present, the waste would be moved to the sorting facility for processing.

Haulers of waste from off-site sources would be required to present signed certification of the contents of their loads upon arrival at the SWRTF. Loads of waste would be further inspected and evaluated against waste acceptance criteria at the generator site and at the SWRTF prior to rail loading. No dangerous or hazardous waste and no household or commercial solid waste, as defined by federal or state regulations, would be accepted. Further detail on the proposed waste inspection and acceptance program is provided in Section I.B.1.f, Plan of Operation.

Recyclables may include concrete aggregate, wood, or metal from construction and demolition debris; paper, or wood waste. The aggregate may be hauled off-site for reuse. Paper would be reprocessed on site or removed from the site by a paper recycler under contract to Weyerhaeuser. Wood waste would be used as hog fuel at the complex.

The SWRTF is located in the central portion of the Longview mill complex adjacent to a sawmill and just south of a number of existing rail sidings. The new construction needed to augment existing facilities would cause minor temporary impacts (primarily noise and dust emissions), which would be confined to the mill complex. Therefore, the impacts of constructing such facilities are not evaluated in Section II of this EIS. The nature and extent of the proposed construction is typical of that in progress at the mill complex at any given time.

The proposed waste sorting and transfer operations themselves would also not be expected to cause significant off-site impacts, and are not evaluated in Section II. However, operation of the SWRTF would result in additional truck and rail traffic to the Longview mill, as well as rail traffic from the Longview mill to the Headquarters Site (see Section I.B.1.c, Waste Transportation and Rail Loading/Unloading Facilities). The amount of truck and rail traffic and resulting impacts are evaluated in Section II.B.6, Transportation. Noise impacts associated with the increased traffic are evaluated in Section II.B.1, Noise.

c. Waste Transportation and Rail Loading/Unloading Facilities

All waste would be shipped by rail from the SWRTF to the landfill. The Columbia & Cowlitz (C&C)/Woods Railroad currently operates between the Longview mill and Headquarters Camp (refer to Figure I-1). The line continues to the Green Mountain Mill, a major lumber production facility located east of Headquarters Camp.

The C&C/Woods line was upgraded in 1991 to meet federal Class 2 rail standards. These improvements included new ballast (roadbed), new rails, new ties, improved drainage, and other modifications (see Section II.B.6, Transportation, for further detail). No additional improvements to the rail line are proposed for the project. A new rail siding is proposed at each end of the line. These improvements include the 600-foot siding at the Longview mill near the SWRTF to store drop boxes on rail cars before shipping, and a 2,000-foot rail siding at the landfill for temporary storage of waste-filled containers and tank cars.

At the landfill unloading facility, cranes or lifts would unload the waste containers from the rail cars onto shuttle trucks. The containers would be delivered to the active landfill cell, emptied at the face, and compacted. The shuttle trucks would then return the empty containers for reloading onto the flatcars.

All landfills generate some contaminated water from rain falling onto open areas of the landfill and percolating through the waste, as well as from dewatering of waste material. This water, called leachate, would be pumped into a double-lined holding pond and then into rail tank cars at the rail siding for transportation back to the Longview mill wastewater treatment facility.

The project would require up to two trains per day from the SWRTF to the landfill. Each train would carry full containers of waste on rail cars and empty tank cars up the hill to the landfill. Each train would return with empty waste containers on rail cars, as well as tank cars filled with leachate for shipment to the Weyerhaeuser wastewater treatment plant. Approximately 20 rail cars with containers of waste and 10 leachate tank cars, would travel the route each day of operations. The total number of cars would be accommodated either on one or two trains.

Containers used to transport solid waste would be covered with a canvas tarp that fastens securely to a metal railing around the top of the container, and would have a rubber gasket on the rear door to reduce the potential for leakage. The containers would be similar to those currently used for rail transport of Snohomish County mixed municipal waste and King County construction, demolition, and landclearing waste to the Roosevelt Regional Landfill in Klickitat County. Weyerhaeuser is also currently using this type of container to transport a portion of its industrial solid waste from the Longview mill to the Roosevelt Regional Landfill. Each rail car can accommodate three 40-cubic-yard containers of waste. For transport of solid waste, Weyerhaeuser would use new or refurbished rail cars that meet common carrier, main line requirements rather than the cars currently used to haul forest products on the Woods line.

Although leachate from the proposed landfill would not be dangerous or hazardous waste as defined by state or federal regulations, Weyerhaeuser proposes to use so-called "105" tank cars (cars meeting the performance requirements of 49 CFR 179.105) for rail transport of leachate. These tank cars are designed to provide safe transportation of chlorine gas and other hazardous materials, and are the best tank cars available in the general tank car fleet (FRA, 1992). The key advantages to "105" tank cars compared to standard tank cars are:

- "Head shields", which are steel jackets on the ends of the tank car, protect the tank car from the impacts of other tank cars in a derailment. FRA estimates that over 90 percent of the punctures in tank cars used to occur in the ends of the cars.

Head shields such as those specified for "105" tank cars have resolved this problem.

- "Shelf couplers", which consist of a metal "shelf" above and below the coupling, prevent the end of a tank car from being lifted and uncoupled in a derailment.

- Unlike standard tank cars, "105" cars have no bottom outlet valves. (Damage to bottom outlet valves has historically been a common contributor to spills from tank cars). The manway where the valves are located on a "105" tank car is surrounded by a 1/2-inch plate steel housing with a plate steel lid.

In the event of a railway workers' strike or temporary but sustained closure of the rail system, trucks would be used to haul solid waste and leachate. Trucks would be used only in the event of a rail shutdown in excess of 1 week and as a temporary emergency measure.

d. Landfill and Associated Facilities

(1) Buffer Zone and Visual Screening

The definition of buffer zone under the MFS [WAC 173-300-100(8)] is that part of the facility that lies between the active area and the property boundary. The MFS require a minimum distance of 250 feet from the active area to the property line of adjacent land zoned residential at the time of the adoption of the county's comprehensive solid waste management plan. In the case of the proposed landfill, the minimum distance from the active area boundary to the nearest non-Weyerhaeuser-owned property is 1.25 miles. Except for trees retained for visual screening of landfill support facilities (see discussion in following paragraph), the buffer zone would continue to be managed for commercial timber production.

Weyerhaeuser proposes to retain approximately 6.3 acres of trees northwest of the landfill footprint to screen views of landfill support facilities from the closest viewpoints along South Silver Lake Road (Figure I-2). Support facilities to be located in this area include the transfer facility, leachate storage pond, and stormwater detention facilities. The growth stages of the trees to be retained are primarily "pole" (21 to 40 year old Douglas fir with red alder and western hemlock) and "early sawtimber" (41 to 60 year old stands of Douglas fir, with western hemlock and grand fir). Pole trees average 40 feet in height, while early sawtimber trees average approximately 100 to 130 feet. Weyerhaeuser may selectively harvest trees in this area, and place stakes and guy wires to facilitate tree harvest in adjacent areas. However, the integrity of the visual screen would be maintained throughout the life of the project and post-closure period.

Weyerhaeuser is amenable to a condition on the solid waste permit or variance that would reflect the retention of trees for visual screening.

(2) Bottom Grading Plan

The landfill bottom grading plan is designed to generally parallel the groundwater contours, maintaining a 5- to 10-foot separation between the highest anticipated groundwater levels and the bottom of the liner. This subgrade plan would result in a combination of excavation and earthfill to obtain the design subgrades, with a net excess of about 2.8 million cubic yards of excavated soil. This is approximately the amount of soil needed for the base liner, final cover, and intermediate soil needs. Granular soils needed for drainage would be imported.

Excavation would occur over approximately 253 acres of the 330-acre landfill footprint, with a maximum excavation depth of about 35 feet and an average depth of about 8 feet. Earth filling would be required over approximately 77 acres, with an average fill depth of 9 feet. A maximum fill depth of 50 feet would occur in one of the perimeter berms at the north end of the site at the sump location. All fill would be placed in 8-inch lifts, moisture conditioned, compacted, and tested as part of a construction quality control/quality assurance program. The earthwork would be performed incrementally over the life of the landfill.

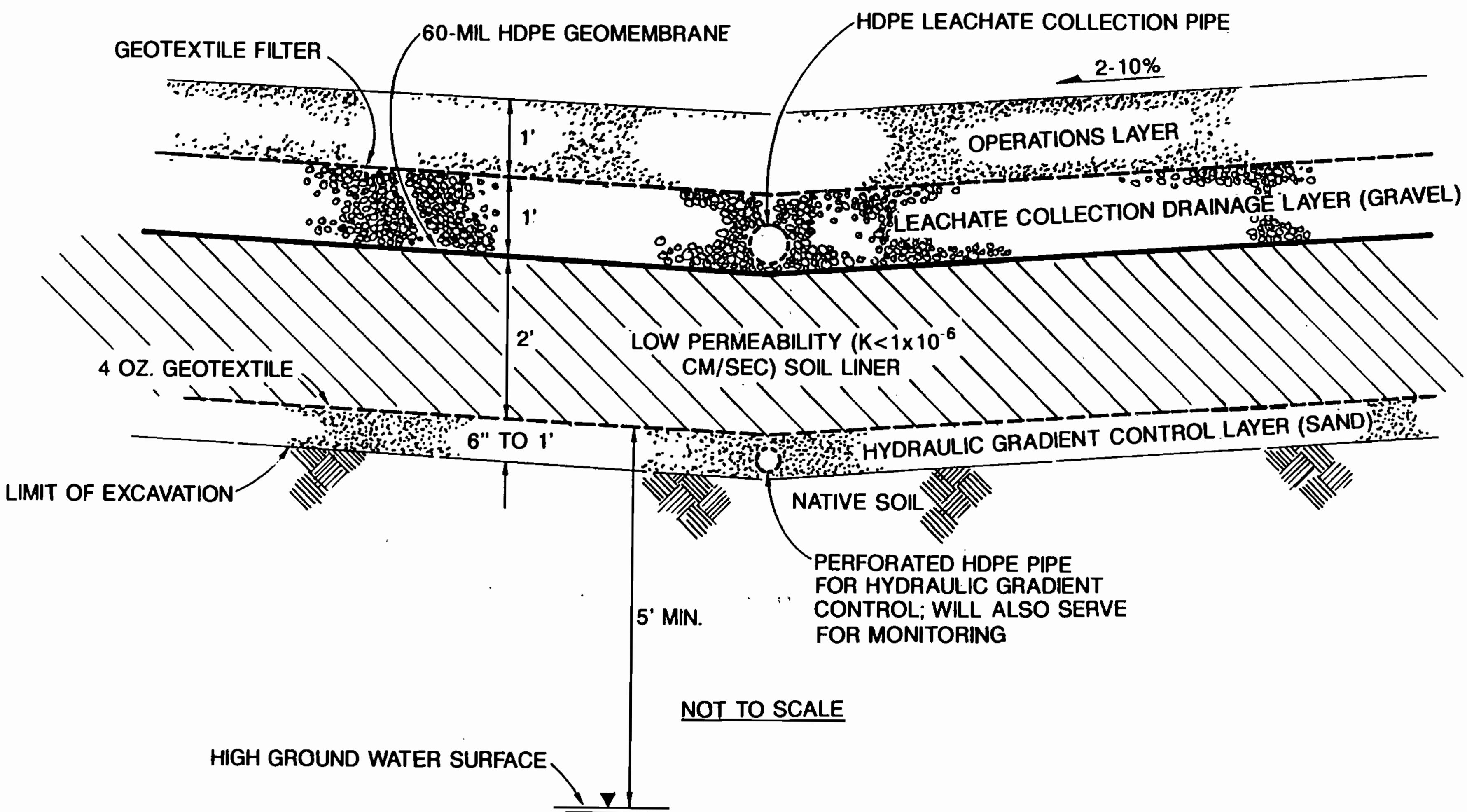
Bottom grades would be sloped between 3 and 12 percent to facilitate leachate collection. Subgrade side slopes at the perimeter of the landfill would be constructed using 3:1 slopes (3 horizontal: 1 vertical) and would generally be about 10 feet in height (maximum approximately 30 feet).

(3) Hydraulic Gradient Control System

The MFS [WAC 173-304-130(2)(b)(i)] require that the bottom liner of a landfill (see following section) be at least 10 feet above the highest expected groundwater level, or at least 5 feet above groundwater when a hydraulic gradient control system (HGCS) is installed. With the bottom grading plan discussed above, the bottom liner would be greater than 5 feet but less than 10 feet above the expected high groundwater over most of the landfill footprint. Therefore, an HGCS consisting of a blanket drainage layer with embedded perforated pipes is proposed beneath the entire landfill (Figure I-3). The pipe network is shown schematically in Figure I-4.

The proposed HGCS is not expected to convey significant groundwater flows, because most of it would be constructed above the highest expected groundwater level. If groundwater unexpectedly rose to levels higher than assumed, the HGCS would act as an underdrain to prevent groundwater from impinging on the underside of the landfill liner.

Some swale areas (small stream drainages) within the landfill footprint currently convey surface water that is derived in part from groundwater discharge. Although most of the flow in these swales would be diverted by the diversion channel along the upgradient side of the landfill, groundwater may continue to discharge naturally into these swale areas after the landfill is constructed. To allow these potential flows to continue to flow freely beneath the landfill, underdrains consisting of perforated pipes, gravel, and sand drainage blankets would be installed in these areas. The proposed design has integrated these underdrain features into the HGCS to create a continuous drainage network beneath the landfill. Figure I-5 illustrates how the HGCS would transition from a typical location directly beneath the liner to up to 5 feet below the liner in an existing swale location. The HGCS would be monitored (see discussion in Section I.B.1.h), and any segment of it could be rerouted for treatment if required.



URS CONSULTANTS		**Figure I-3** **Proposed Hydraulic Gradient Control System Outside Existing Swale Areas** Source: Sweet-Edwards/EMCON, 1991	Weyerhaeuser Company Headquarters Camp Solid Waste Disposal Facility

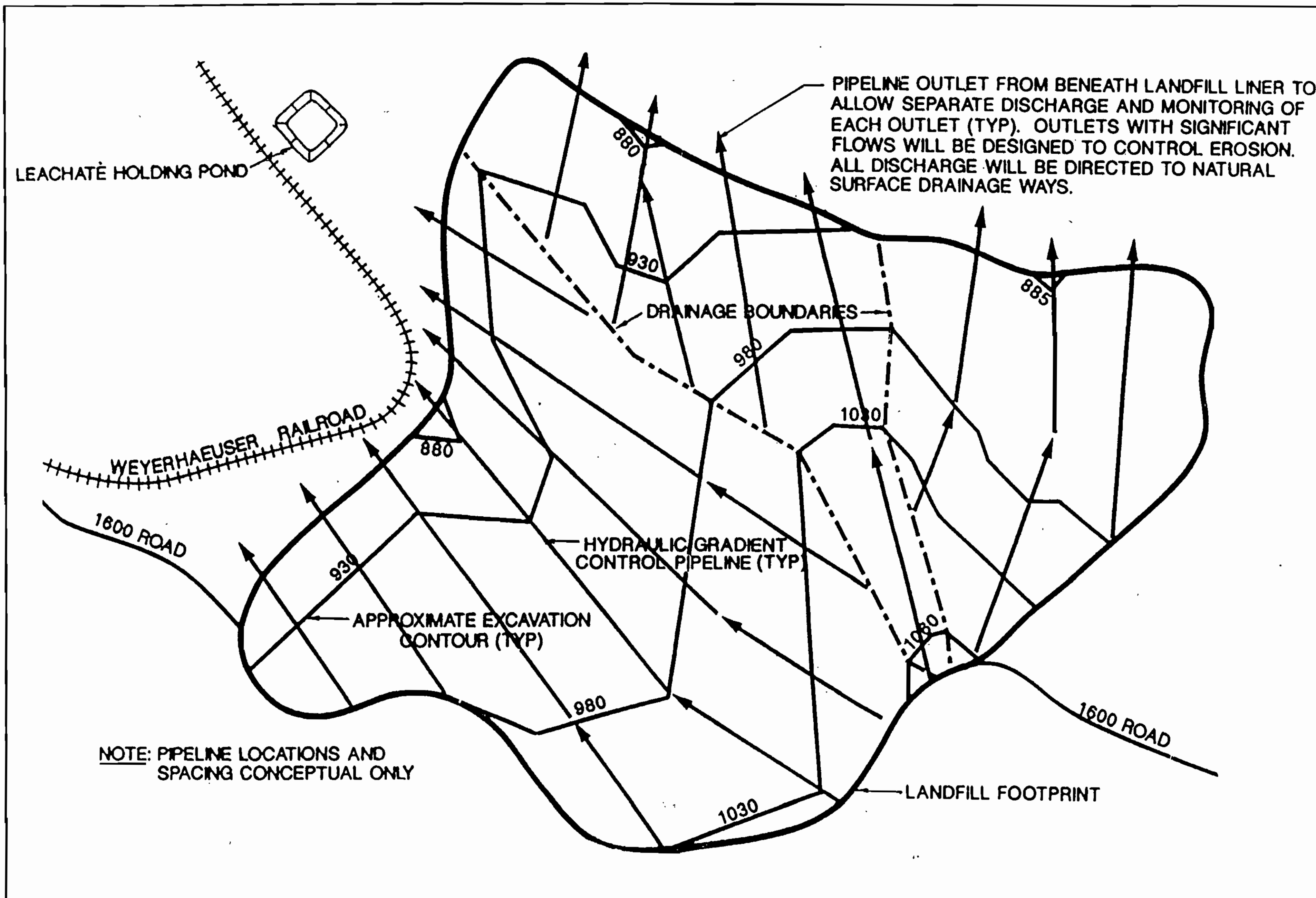


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Figure I-4
Schematic of Hydraulic Gradient Control Pipe Network Below Landfill Liner
Source: Beak Consultants, Inc., 1991

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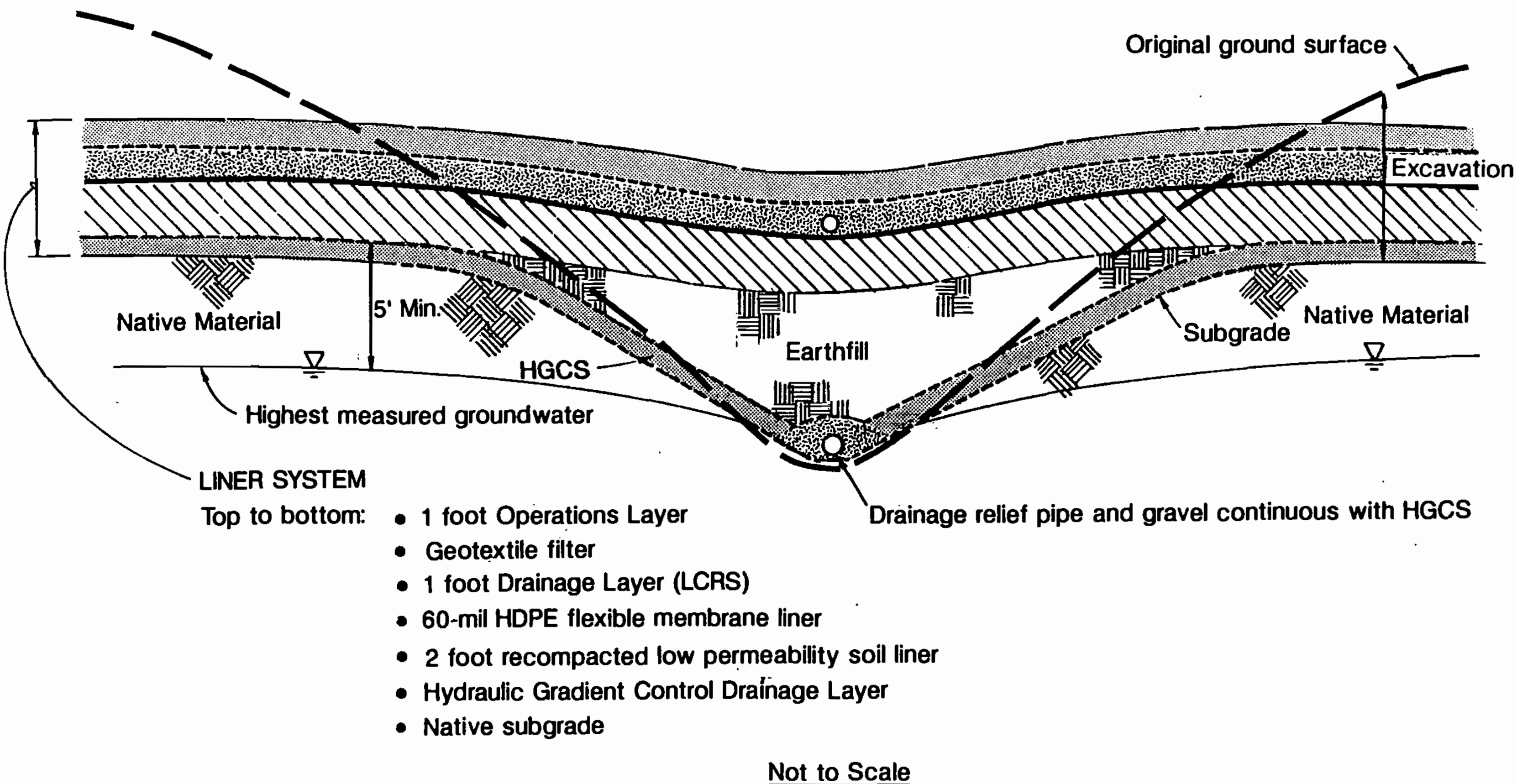

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Figure I-5
Schematic Cross Section Showing Hydraulic Gradient Control System (HGCS) Through a Swale Area

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(4) Leachate Management

As noted previously, any rainfall that might come into contact with the waste by falling on the active landfill face can become contaminated. This contaminated water, called leachate, must be collected, contained, and properly treated. This process is known as leachate management. Weyerhaeuser proposes to limit the active area of the landfill face to 5 acres to minimize leachate production.

Other elements of leachate management include a bottom liner to prevent leachate from migrating downward into the groundwater, a leachate collection and removal system (LCRS) installed above the bottom liner, a system to pump leachate to a temporary storage pond and then to tank cars for transport to the wastewater treatment plant at the Longview mill, and a final cover system designed to prevent infiltration of rainfall. Each of these components of leachate management is discussed below.

(a) Bottom Liner. The bottom liner would be constructed immediately above the HGCS (Figure I-4) to provide an impermeable layer to allow efficient leachate collection, prevent leachate from migrating downward, and prevent landfill gas from migrating to subsurface soils. The liner design, which meets MFS requirements for limited purpose landfills, would be a composite liner consisting of a 60-mil polyethylene flexible membrane liner (FML) underlain by a 2-foot layer of recompacted soil approved by Ecology with a permeability less than or equal to 1×10^{-6} cm/s (one millionth centimeter per second).

A rigorous construction quality assurance program would be conducted during FML installation, including selective destructive seam testing; 100 percent non-destructive testing of seams for leaks; and full-time monitoring during FML placement, seam welding, and placement of a protective soil cover over the liner (see discussion under (b) below).

The construction quality assurance program would also include monitoring the soil liner construction, including borrow material quality (grain size distribution and soil classification), moisture blending, compaction, permeability, thickness, and grades. Minimum testing frequencies would be established and a certification report would be prepared by a registered engineer documenting that the liner was constructed in accordance with the design intent.

(b) Leachate Collection and Removal System. The leachate collection and removal system (LCRS) consists of a 1-foot-thick blanket layer of granular drainage material (imported clean sand or gravel) with an embedded network of perforated polyethylene pipes constructed directly on the bottom liner over the entire base of the landfill. A schematic plan view of the LCRS pipe network is shown in Figure I-6. The LCRS would collect leachate at the bottom of the landfill, which would flow by gravity to one of three permanent collection sumps at the lowest part of the landfill. The drainage layer permeability and perforated pipe spacing would be designed to allow no more than a 1-foot buildup of leachate head over any point on the liner. Under actual operating conditions the leachate head buildup would generally be expected to average less than a few inches. MFS requirements for sanitary landfills allow up to a 2-foot head buildup of leachate over the liner.

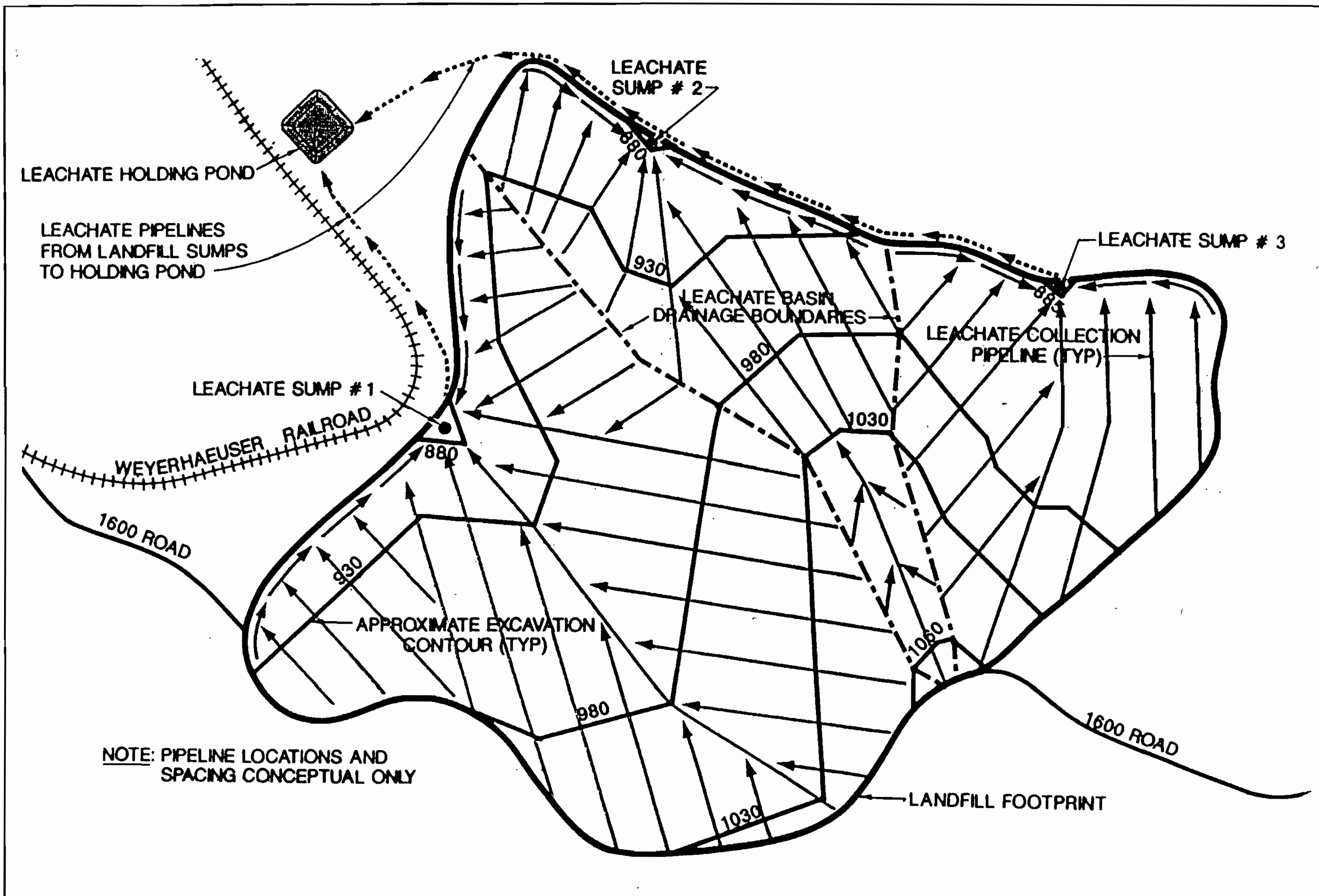

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Figure I-6
Schematic of Leachate Collection and Removal Pipe Network Above Landfill Liner
Source: Sweet-Edwards/EMCON, 1991

Weyerhaeuser Company Headquarters Camp Solid Waste Disposal Facility

To protect the LCRS and liner from damage during landfill operations, the LCRS would be covered with a geotextile filter and a 1-foot-thick protective soil layer. This soil layer would be installed as part of the construction contract requiring construction certification before landfill operations begin. It is possible that a waste such as boiler ash (equivalent in physical properties to sand) could be used for the protective soil layer during construction.

As an added measure of protection for the liner, the initial 5-foot-thick waste layer would be required to be a material with pieces smaller than 1 foot in any dimension. Almost all of the waste from the Longview mill meets this criterion. Waste material with pieces 1 foot or larger in any dimension, such as construction and demolition debris, would only be placed in areas that had received a minimum of 5 feet of the other types of waste.

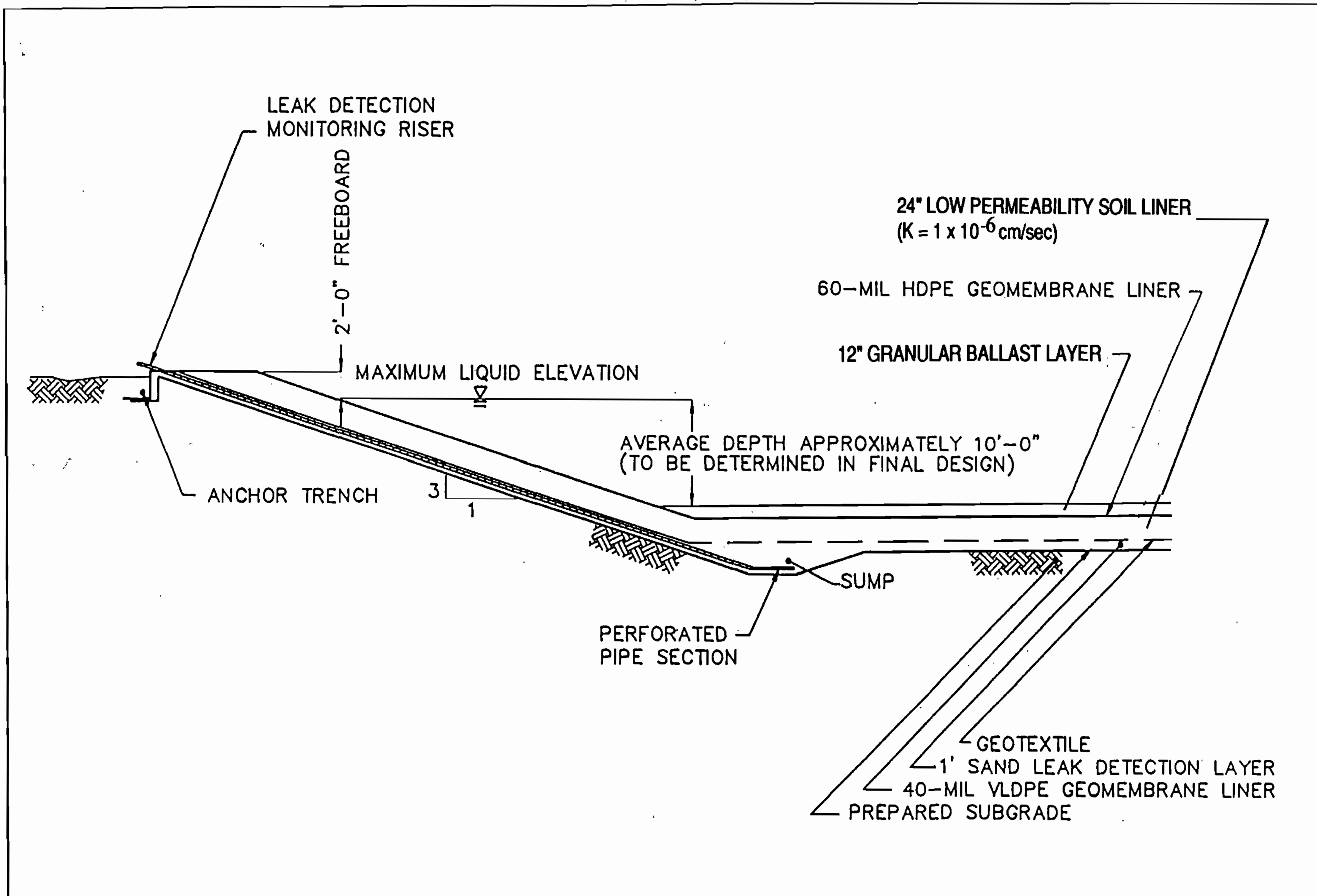
(c) *Leachate Storage and Transfer*. Leachate percolating through the waste would be collected in the LCRS, discussed above, and then would drain to collection sumps. The collection sumps would be constructed with a riser pipe and equipped with an automatic pump. Depending on the relative elevations of the final design, some of the sumps may drain by gravity to the leachate holding pond; others would require pumping. The sumps would be lined with a double flexible membrane liner (FML) with leak detection capabilities between the FMLs.

A leachate holding pond (approximately 5 million gallons in capacity) would receive leachate drained or pumped from the sumps and would store the leachate temporarily for transfer to rail tank cars. Pond capacity would be sufficient to hold at least 10 days' supply of maximum anticipated leachate flow and about 30 days' supply of normal peak winter flows. This is more than sufficient capacity to store leachate during a 100-year storm. The holding pond also would be constructed with a double liner and leak detection system (Figure I-7). Leachate would be pumped from the holding pond directly into rail tank cars through polyethylene pipes below ground and metal pipes above the ground.

Containment structures would be provided to collect potential spills at the leachate transfer area. These structures would consist of berms and shallow ditches along both sides of the rail lines, and a ground cover (such as a geomembrane or concrete) sloped toward ground drains. Any spilled leachate or stormwater runoff collected in the ground drains would be conveyed to a sump structure where it would be pumped back to the leachate holding pond.

Leachate from the landfill would be pumped from the leachate holding pond to 16,000- to 20,000-gallon rail tank cars, and hauled downhill on the train transporting the empty solid waste cars to the mill complex. The leachate then would be pumped from the tank cars to the existing Longview wastewater treatment plant (WWTP). The existing plant is a secondary WWTP with a permitted discharge to the Columbia River. Acceptance of leachate at the WWTP would not require any upgrades or improvements to the plant, or any changes in the NPDES permit. The WWTP is already permitted to accept leachate from the Mt. Solo Landfill, and the permit reflects the potential acceptance of leachate from the proposed landfill.

Average daily flows predicted for the leachate using an average annual rainfall of 65 inches is estimated to be approximately 67,000 gallons per day (gpd) (Appendix B), which would require four to five tank cars per day. The average peak daily flow would be approximately 153,000 gpd, which would occur in the winter of the second year of operations. These flows assume the



URS CONSULTANTS		Figure I-7 Typical Leachate Holding Pond Liner Section Source: Sweet-Edwards/EMCON, 1991	Weyerhaeuser Company Headquarters Camp Solid Waste Disposal Facility

liner system collects all leachate under normal operations. Ten tank cars per day would be required for removal of this peak rate.

Leachate sumps, the transfer system, and the leachate pond leak detection system would be inspected weekly or as deemed appropriate to check for proper drainage and pump operations, as well as leakage. Automatic backup generators would be installed to provide power to the leachate pumps in case of a power outage.

(d) *Final Cover System*. The purpose of the final cover system is to prevent precipitation infiltration into the waste and thus eventually stop leachate from being produced. The final cover system (Figure I-8) would consist of (from top to bottom) 18 inches (minimum) of soil to support plant growth (may be thicker locally depending on the final planting plan), a 1-foot drainage layer to collect water draining through the soil layer and maintain cover stability, a textured polyethylene FML as a barrier to infiltration, a 6-inch sand layer as an FML subgrade and side slope seep collector, and 1-foot of compacted soil to act as a foundation layer over the waste to provide support during cover construction.

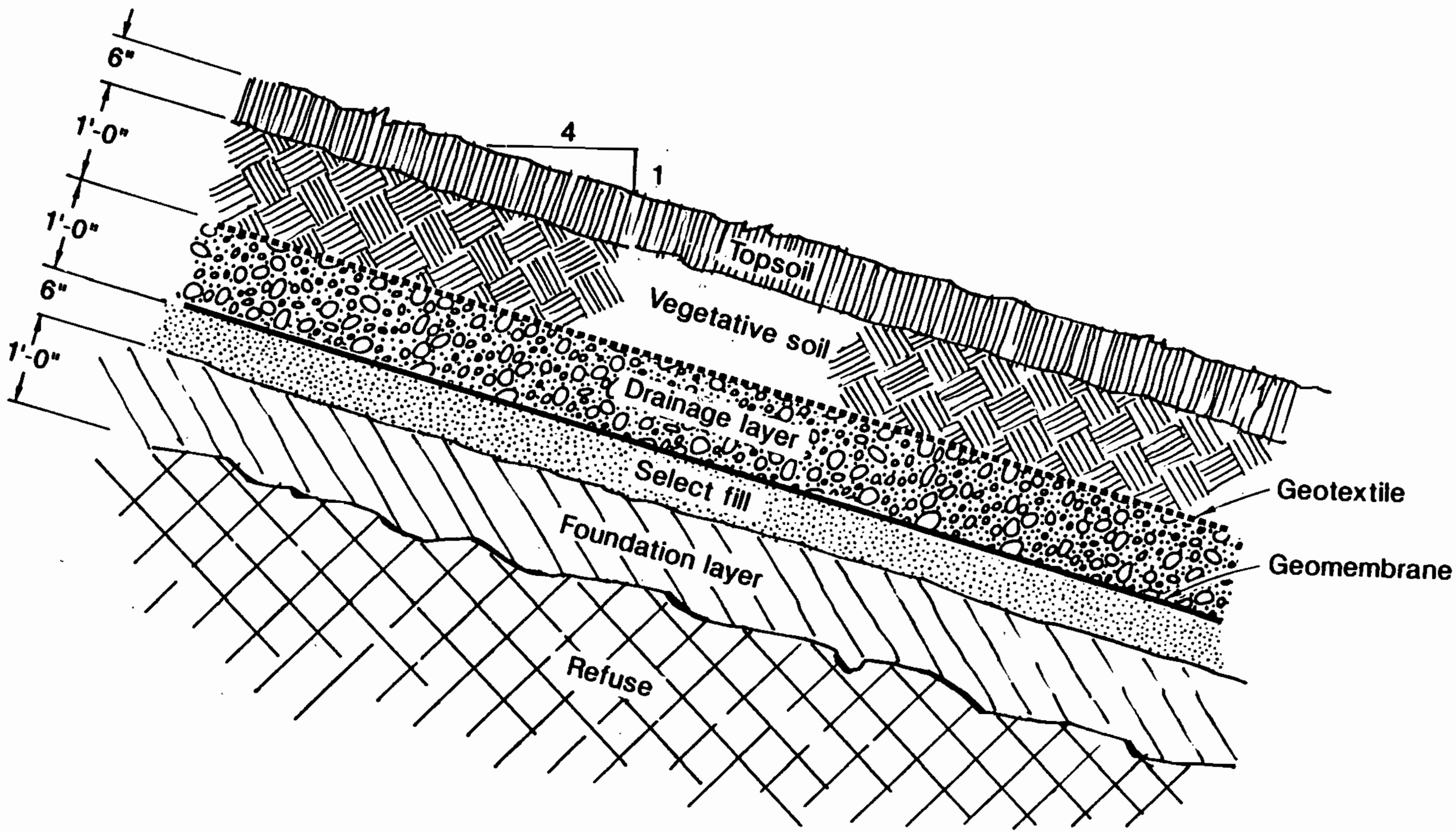
(5) Surface Water Management

Surface water management includes controlling runon (water flowing onto the site from surrounding areas) and runoff (water flowing off the site). Runon water, collected primarily from undisturbed land, would be diverted around the site and discharged without treatment into the existing drainage swales to the north of the site. A major runon control feature would be the relocation of the Southern Tributary to Sucker Creek in a constructed diversion channel. Runoff that may carry sediment would be controlled using best management practices to minimize erosion, remove sediment loads, and provide detention to limit peak discharge flow rates.

(a) *Southern Tributary Diversion Channel*. Construction of the landfill would require rerouting the upper portion of the Southern Tributary at the project site. The Southern Tributary diversion channel would be constructed prior to construction of the initial landfill cell. The diversion channel would, in part, be designed to replace lost habitat and hydrologic functions of the creek.

Relocation would begin along the southern perimeter of the landfill footprint, where flow for the Southern Tributary would be intercepted. Flow would be directed west and north around the western perimeter of the landfill. The diverted channel would join the existing Southern Tributary at the northwest edge of the site just upstream of the rail crossing.

The diversion channel would be designed to carry a 100-year flood event and prevent erosion at flows less than or equal to the 25-year flood event. The flow within the channel and channel gradient would vary from the headwaters to the confluence with the Southern Tributary. In addition, channel design would change with changes in gradient and expected flows. Specific details about the design of the diversion channel as developed for Alternative Site Plan A are presented in the revised *Mitigation Plan* in Appendix A. The same concepts would apply to the Proposal.



Not to Scale

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Figure I-8
Final Cover Section

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(b) *Runon Control*. Runon control measures, in addition to the relocation of the Southern Tributary, would be required for surface water collected on undisturbed land between the diversion channel and the upgradient side of developed areas. These measures would include diversion ditches and berms to direct runon around developed areas to existing drainages on the north side of the site. Runon passing over disturbed ground that could potentially be sediment laden would be directed to the appropriate sedimentation/detention basin at the north end of the site. Runon controls would not be required along the eastern or northern sides of the site because the topography slopes away from the landfill in these areas.

(c) *Runoff Control*. Runoff from nonactive areas of the landfill, including temporary closed slopes, final closed slopes, construction areas, stockpiles, borrow areas, and support facilities, would be collected and directed to one of three sedimentation/detention basins north of the landfill footprint (Figure I-9). Runoff from final closed slopes would be collected in bench drains, carried down the slope in down drains, and routed in a perimeter runoff ditch. Runoff from temporary closed areas, stockpiles, borrow areas, and support facilities would be collected in ditches around the perimeters of these areas. Runoff from the active landfill area would be collected and directed to the leachate holding pond.

All runoff control facilities, including drains, ditches, and sedimentation/detention basins, would be designed to convey a 100-year peak flow event. In addition, the sedimentation/detention basins would be designed to detain, at a minimum, a 25-year peak flow event. Final design calculations indicate that the sedimentation/detention basins would actually detain peak flows from all storm events up to and including the 100-year event following landfill closure and during all interim development stages. Detained stormwater would be released at a rate no greater than the existing peak runoff rate from the site.

The proposed runoff control meets or exceeds MFS requirements, as well as stormwater management criteria and guidelines established by the Washington Department of Fisheries (WDF) Habitat Management Division (*Stormwater Management Interim Criteria and Guidelines for Protection of Stream Channels and Aquatic Life*, January 1990) and Ecology (*Stormwater Management Manual,* February 1992). These criteria and guidelines were established to maintain the integrity of downstream systems and prevent significant adverse impacts from hydrologic modification, sedimentation, or decreased water quality. A draft plan for stormwater management has been reviewed by Ecology and will be included in the final NPDES permit application.

(d) *Erosion and Sedimentation Controls*. Sediment impacts to water quality would be minimized by using management practices recommended by WDF and Ecology (see references to source documents in the previous discussion of runoff control). Erosion and sedimentation control would be accomplished by limiting construction to the dry season (approximately June through September); keeping disturbed and exposed soil areas covered with plastic during the winter months; using grass-lined swales to convey runoff where possible; strategically utilizing berms, ditches, harrowing, and silt fences; paving heavily used permanent haul roads; and directing all runoff through the sedimentation/detention basins described above, as well as biofiltration swales following the basins.

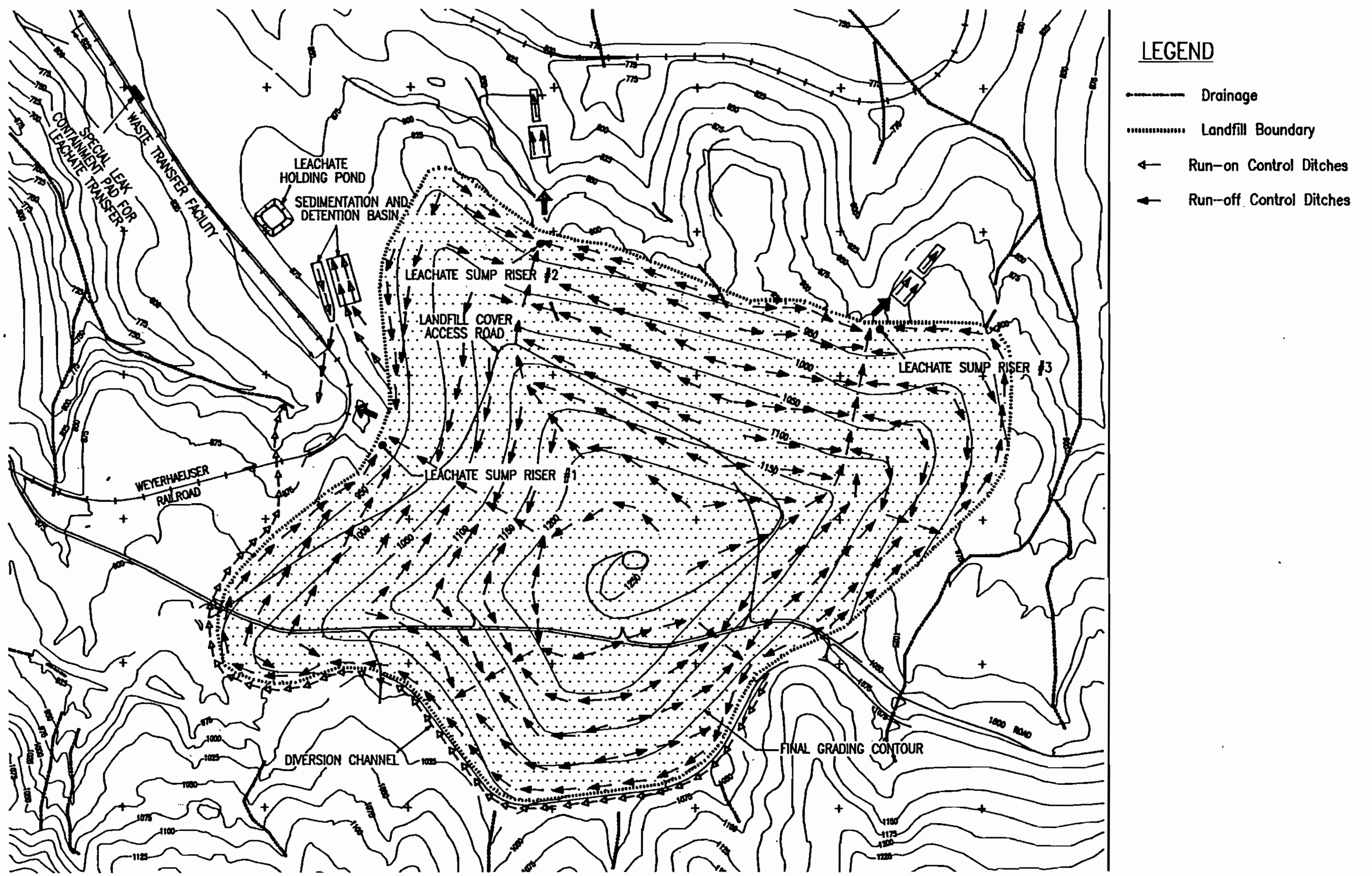

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Figure I-9
Final Grading and Drainage Plan
Source: Sweet-Edwards/EMCON, 1991

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The sedimentation basins would be designed to settle out a 15-micron particle size in a 25-year 24-hour storm, and would settle out even smaller particles in smaller events. In addition, a major logging road passing by the site, the 1600 Road (to be relocated around the south side of the landfill), would be paved within the limits of the site drainage to aid in minimizing the overall sediment loads. The effectiveness of the proposed erosion and sedimentation controls are evaluated in Section II.A.3, Surface Water.

(6) Landfill Gas and Odor Control

Landfill gas created by decomposition of the waste would consist primarily of methane and carbon dioxide, both of which are colorless and odorless. Trace amounts of odorous gases such as mercaptans could also be present. The amount and rate of gas generation depends on the type of waste. The waste stream proposed for the facility would be expected to produce less gas than a municipal solid waste (MSW) facility because of the relatively low organic content and the high carbon to nitrogen ratio of the proposed waste constituents. Gas generation for typical MSW sites in the Pacific Northwest typically peaks approximately 5 years after waste placement and continues for about 20 to 30 years.

Because landfill gas generation is expected to be low, no gas control system is proposed at this time. However, horizontal trenches with perforated vacuum-extraction pipes would be installed in the last lift of waste before the final cover is placed. If sufficient gas is generated (see further discussion of "sufficient" below), the extraction pipes would be connected to gas manifold pipes at the landfill surface, which in turn would connect to a motor blower located near the transfer facility or leachate pond. The motor blower would create a vacuum in the manifold and extraction pipes, causing gas to flow through the pipes to the blower, and from there to an adjacent high-temperature flare.

Based on estimated gas generation rates, it is expected that one motor blower and one flare would be needed, but more would be installed if necessary. The flare would be enclosed, so the flame would not be visible from the ground. Typically, flares are cylindrical steel structures that can be up to approximately 6 feet in diameter and 40 feet high.

Detailed design of the flare and other aspects of the gas and odor control system would be developed in coordination with the Southwest Washington Air Pollution Control Agency (SWAPCA) as part of the process of obtaining the required approval from that agency (see Section G of Fact Sheet). The determination of when there is "sufficient" gas to implement active gas control would also be made in coordination with SWAPCA. It is proposed that a gas system be installed if and when gas flows are high enough to support combustion, but additional or different criteria may be established by SWAPCA.

(7) Final Grading Plan

Figure I-9 shows the final grading plan for the landfill. The final side slopes would be 4:1, with benches every 50 vertical feet to control surface water runoff. The maximum fill elevation would be approximately 1,250 feet, compared to the current maximum site elevation of 1,080 feet. The maximum waste thickness would be about 250 feet. The lowest point of the landfill at the outer perimeter would be about elevation 900 feet. The top crown of the landfill would have a slope between 5 and 10 percent. The landfill contours are designed to be naturally graded to form smooth swales and ridges to blend into the surrounding topography.

(8) Soil Borrow Areas

Except for granular drainage material that would be imported, all soil needs are expected to be provided by material excavated from within the landfill footprint. In general, soil would be borrowed from cell areas in the order in which they would be constructed. Since some cells would require mostly fill, borrow areas in some cases may be located several cells in advance of the one under construction. Borrow soils would be classified into three general categories: soil liner material, general fill material, and topsoil. These material types would be separately stockpiled as they were excavated for later use.

Further design work has determined that the 20-acre backup borrow area described in the Draft EIS would no longer be needed, so it has been eliminated from the Proposal. However, since it is difficult to predict the exact nature of all the material that would be excavated within the landfill footprint, it is possible that additional imported soils may be required to meet the site soil needs. The source of rock for temporary road construction would be either existing Weyerhaeuser quarries used for maintaining logging roads and providing railroad ballast, or imported materials from the Longview area.

(9) Support Facilities

Approximately 50 acres of the Headquarters Site would be used for landfill support facilities, including the waste transfer area (two rail sidings with truck lanes in between), the leachate holding pond, and stormwater control facilities. Additional area would be used for the diversion channel and wetlands buffer areas. Other project support facilities that would be located at the existing Headquarters Camp would include an administrative building, maintenance building, utilities, water supply system, fire control, parking areas, and security fences. A temporary fence would control access to the active landfill area, and a permanent fence would control access to the leachate holding pond. Stockpile, borrow areas, and contractor staging areas would be within the landfill footprint and would not be permanent features.

For up to six months of the year, the active area of the landfill would require lighting in the early morning and at dusk to allow safe landfill operations. Lighting would consist of portable, directional light fixtures on 20- to 30-foot standards. Lights would be powered by a portable generator, and placed immediately adjacent to the cell to be filled. The light source in each fixture would be shielded on one side by a reflective shield, and would direct light sharply downward to the area where it is needed. Fixed lighting would be placed on the maintenance building and in the waste transfer area.

e. Landfill Construction and Sequencing

The landfill would be developed incrementally. At any given time, there would be areas on site at different stages of development, including an active landfilling area, new cell areas with no waste, landfilled areas with interim plastic cover, landfilled areas at final grade with final cover, construction areas for new cells or for final cover installation, construction staging and equipment areas, stockpiles and borrow areas, and temporary haul roads. These developmental areas are in addition to the permanent facilities such as the leachate holding pond, waste transfer facility, permanent haul roads, and permanent runon and runoff controls described in the other sections.

A conceptual layout of these various types of developmental areas is shown in Figure I-10. This figure illustrates the stage in landfill operations when landfilling is just beginning in Cell 2. The stages leading up to this point would be as follows:

1. Initial construction of the following landfill facilities and Cell 1 during the dry season (approximately June through September):

   - The runon diversion channel (including wetlands)
   - The off-channel ponds
   - The first of three stormwater detention/sedimentation ponds
   - A biofiltration swale with the sedimentation pond
   - Other runoff control measures
   - Leachate pond
   - Transfer facility
   - Grading (excavation and fill) for the Cell 1 subgrade
   - Runon control measures for Cell 1
   - Cell 1 liner construction (including hydraulic gradient control, leachate collection, and protective cover elements)
   - Placing excess soil in stockpiles
   - Covering all of Cell 1 with interim plastic except for 5 acres of active landfill area to minimize leachate production
   - Covering stockpiles with interim plastic
   - Hydroseeding exposed borrow areas

   All aspects of construction would receive full-time monitoring and inspection by a registered engineer, who would provide construction quality assurance and certify that construction was performed in accordance with the design intent.

2. Operations within Cell 1. Landfilling waste would begin in the fall of the first year. Landfilling would occur as described in Section I.B.1.f, Plan of Operation, until Cell 1 reached its interim capacity.

3. Construction of Cell 2. Cell 2 would be constructed in the dry season before Cell 1 reached capacity. The same processes of excavation, filling, stockpiling, and borrowing would occur to construct the required subgrade, runon control, liner, hydraulic gradient control, leachate collection, and protective cover systems. The new liner would be connected with the Cell 1 liner to provide a continuous system. Temporary plastic would be placed over the newly constructed cell, which would be phased into operations with Cell 1.

4. Final closure of portion of Cell 1. As Cell 1 is filled, a portion of the outer slope would come to final grade. When the area at final grade reached approximately 10 acres or

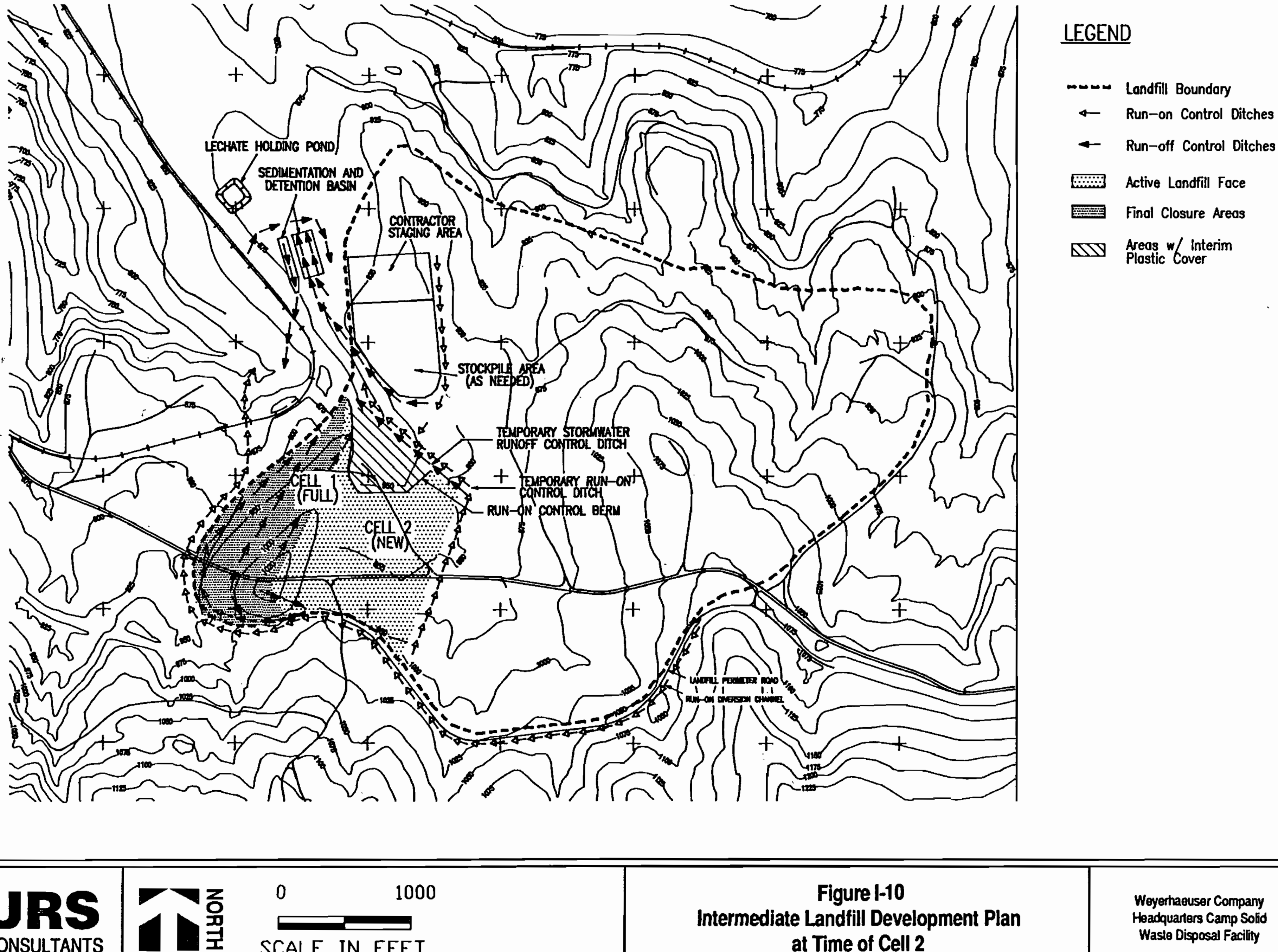

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Figure I-10
Intermediate Landfill Development Plan at Time of Cell 2

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greater, that area would be closed with a final cover (Figure I-8). The final cover would be constructed during the dry season and completed by fall, at which time the area would be covered with interim plastic. The interim plastic would be removed in the spring, reused in another part of the landfill, and the final cover area would be planted and seeded with appropriate vegetation. This sequencing of final cover construction would minimize the amount of soil that would be exposed during the rainy season and thus minimize sediment erosion. All aspects of final cover construction would be monitored by a registered engineer who would administer a construction quality assurance program and certify that construction was performed in accordance with the design intent.

Subsequent cell openings, operations, and final cover installation would continue throughout the life of the landfill. Cell construction would only occur during the dry season (approximately June through September) at a frequency of approximately once every 2 years. The second and third sedimentation/detention basins would be constructed 1 year before they are needed to control runoff. Cell sequencing would generally proceed from the west to the east side of the landfill. A proposed cell sequencing is presented in the preliminary solid waste permit application (Sweet-Edwards/EMCON, 1990c). Stockpile and construction staging areas would be relocated and stormwater controls for these facilities modified as required by the cell sequencing.

f. Plan of Operation

All operations related to the proposed landfill would be performed in accordance with a Plan of Operation approved by Ecology as part of the solid waste permit process. Weyerhaeuser will submit a detailed Plan of Operation along with other detailed plans to Ecology with Part 2 of the solid waste permit application. This Plan would be approved by Ecology prior to issuance of the permit, and all landfill operations would be conducted in accordance with the Plan. The Plan of Operation would be updated as needed throughout the life of the landfill as part of Health District review and approval of annual operating permits.

This section focuses on a few key aspects of the Plan of Operation: 1) operations related to landfilling of waste, 2) fugitive dust control, 3) waste inspection and acceptance, 4) spill response, and 5) fire response. Other aspects of landfill operation, such as leachate management, surface water management, and monitoring programs, are discussed elsewhere in Section I.

Information in this section is based on the preliminary solid waste permit application (Sweet Edwards/EMCON, 1990c), as well as a preliminary Draft Plan of Operation prepared by EMCON in 1991 and included in Appendix N of this EIS.

(1) Landfilling of Waste

All areas of the constructed landfill without final cover would be covered with interim plastic, except for the 5-acre area of active landfilling and haul roads. The active area would be limited to less than 5 acres to minimize the potential for leachate production. Plastic sheets approximately 1 acre in size would be used. The sheets would be overlapped and weighted down with used tires or sandbags and could be repositioned as needed. The interim plastic sheets could be reused several times. Experience at landfills in Washington has shown the sheets to last over 5 years before needing replacement.

Temporary gravel haul roads would be built into the active cell to allow delivery of the waste as needed. Full containers of waste would be delivered to the active landfill face from the waste transfer area at the west end of the site by shuttle dump trucks. The trucks would dump the waste at the active face, where bulldozers would spread the waste into 2-foot-thick layers and compact it. These layers would be placed within the 5-acre active area to maximum slopes of 3:1. When the 5-acre area was filled to its intermediate capacity, the interim plastic cover would be moved over the partially filled area to expose a new area for filling.

Daily cover in the active landfill area is not deemed necessary because of the low organic content and soil-like consistency of the waste. In fact, many of the waste stream components are typically used as daily cover at MSW landfills.

(2) Fugitive Dust Control

Fugitive dust would be produced during the proposed landfilling and construction activities from four sources: 1) unpaved roads, 2) paved roads, 3) moving soil with heavy equipment, and 4) wind suspension. Standard fugitive dust control measures have been developed by EPA (1988a), and their effectiveness has been well documented. These standard measures would be used to reduce fugitive dust emissions, and the atmospheric concentrations of particles caused by the emissions, to the maximum extent possible. These standard measures include paving roads, watering both paved and unpaved roads, planting exposed areas with vegetative cover, covering exposed areas with plastic, and watering exposed areas. Existing on-site wells would be used for a water supply. Other miscellaneous strategies include limiting unnecessary traffic, aligning stockpiles with their longitudinal axis parallel with the prevailing wind direction, and wind-screening stockpiles.

(3) Waste Inspection and Acceptance Program

Weyerhaeuser would implement a stringent waste inspection and acceptance program to prevent dangerous or hazardous waste and household or commercial solid waste, as defined by federal or state regulations, from being disposed at the proposed landfill. The program would hinge on a clear set of waste acceptance criteria related to 1) prequalification and training of waste generators, 2) waste characterization and designation, 3) waste inspection, 4) random waste stream audits, and 5) records keeping. Each of these is discussed briefly below.

(a) *Pre-Qualification and Training*. All generators of solid waste, whether within Weyerhaeuser operations or non-Weyerhaeuser generators, would be advised of Weyerhaeuser's waste acceptance criteria and asked to pre-qualify their waste and management procedures to conform to these criteria. Information would be supplied to generators describing acceptable and restricted wastes, and training in waste characterization and designation would be provided.

(b) *Waste Characterization and Designation*. Weyerhaeuser is required by state law to test its various waste materials to confirm that they are properly designated as solid wastes, and are not dangerous or hazardous wastes as defined by state and federal regulations. In compliance with this requirement, Weyerhaeuser has performed extensive testing of each waste type from the Longview mill that would be disposed at the proposed landfill. Tests have included chemical analyses for metals and organics, EPA's toxicity characteristic leaching procedure (TCLP) protocol, fish bioassays, and oral rat toxicity tests. All test results have indicated conclusively that the wastes to be disposed at the landfill are properly designated as solid wastes. Test results are on file with the Health District and Ecology.

Weyerhaeuser indicates that wastes proposed to be imported have also been tested and designated as solid waste. Wastes to be imported would be retested before disposal at the proposed landfill, and test results submitted to Ecology and the Health District for review.

Throughout the life of the landfill, any new wastes to be disposed at the facility, and any changes to existing wastes, would be similarly tested and designated, and periodically all wastes would be reevaluated to assure continued conformance to regulations and acceptance criteria. Non-Weyerhaeuser generators would be required to show evidence that they have properly designated their waste, and no waste would be accepted at the SWRTF without this showing.

(c) *Waste Inspection*. Physical inspection of pre-qualified waste would occur at three locations: the generating source, the SWRTF, and the landfill. Operations personnel at all three locations would be trained to identify unacceptable waste and implement waste-rejection procedures if the acceptability of a certain waste is in question. Unacceptable waste would be handled in accordance with regulatory requirements for the identified class of waste. The waste would either be returned to the source, or shipped to a disposal facility permitted to accept the waste. Follow-up discussions would be held with the waste generator to ensure that such waste is properly managed in the future.

(d) *Waste Audit*. In addition to the routine inspection of waste described above, Weyerhaeuser's Solid Waste Regulatory Compliance Manager would periodically inspect wastes to ensure that the inspection program is effective. Health District personnel would also make random unannounced inspections. In addition, an independent environmental firm would be retained to audit all of Weyerhaeuser's solid waste management procedures on an annual basis, including the waste inspection and acceptance program. The audit would determine whether regulatory and company requirements are being met, and if not, would recommend operational changes.

(e) *Record Keeping*. Records would be maintained of all key information relevant to waste inspection and acceptance as well as other aspects of landfill operation. Records would include certification from generators that their wastes have been properly tested and designated; data on incoming loads (for example, the type, volume, and condition of the waste); waste rejection reports; reports of special incidents such as emergencies, injuries, and safety violations; training and personnel action records; environmental monitoring results; and other reports required under either permit conditions or applicable regulations.

(4) Spill Response

Spill prevention would be a major emphasis in landfill operations. Spill prevention procedures would include selection of the best practically available equipment (for example, "105" tank cars to transport leachate - see Section I.B.1.c, Waste Transportation and Rail Loading/Unloading Facilities); maintenance of equipment in good working order; operator training; and inspections. Facility design would include appropriate containment systems and back-up capabilities.

Weyerhaeuser's response plan for spills of solid waste or leachate would include the following elements:

- Spill response equipment would be maintained on site as detailed in the final Plan of Operation.

- Trained personnel would be available at all times, including landfill operations staff, as well as Longview mill and railroad operations personnel.

- Arrangements would be made to ensure that additional contractor-supplied backup would be made available in the event it is needed.

- Trained personnel and appropriate equipment would be immediately dispatched to the spill site, the source of the spill would be stopped as quickly as possible, and appropriate measures would be taken to keep wildlife and the public away from the spill area until cleanup occurs.

- Any pooled fluids would be contained, collected, and removed for treatment in an approved manner.

- The Health District, Ecology, the local fire department, and potentially affected parties would be notified immediately in accordance with "call-down" lists specifying the notification order for spills at different locations (for example, for a spill of leachate into the Cowlitz River, the Longview and Kelso water plants would be notified first).

- Any contaminated soil would be removed and disposed of in an approved manner.

- A damage assessment would be prepared, and measures would be taken to ensure recovery of the area affected by the spill.

- Monitoring would be conducted as determined appropriate by the Health District, Ecology, or other responsible agency.

(5) Fire Response

Standard fire prevention measures would be used in buildings and maintenance facilities. Most of the waste stream would not present a significant fire hazard, because it would be ash or have a high moisture content. In addition, fire prevention measures would be incorporated into the Plan of Operation, such as proper waste handling practices and effective control of landfill gas should that be necessary in the future.

Weyerhaeuser would maintain an on-site water tank as a source of fire-control water, and would ensure that landfill operations personnel have adequate training and equipment to control fires. Landfill personnel would have access to Weyerhaeuser forest fire control resources currently housed at Headquarters Camp.

g. Proposed Natural Resources Mitigation Plan

The mitigation measures discussed in this section are described in more detail in the *Proposed Natural Resources Mitigation Plan* in Appendix A of this EIS. The *Mitigation Plan* has been revised substantially since the Draft EIS based on recommendations of a Technical Advisory Committee consisting of representatives of federal and state resource agencies. Mitigation measures are developed in more detail for Alternative Site Plan A, because that is now Weyerhaeuser's preferred alternative. However, the same general concepts apply to the Proposal and Alternative Site Plan B. The proposed *Mitigation Plan* will continue to be refined through agency coordination.

(1) Wetlands

The proposed wetland mitigation includes approximately 4 acres of wetland creation and 1 acre of wetland enhancement in the lower reach of the diversion channel, restoration of 0.2 acre of wetland and creation 1.2 acres of wetland in the upper diversion channel, and creation of approximately 0.5 acre of emergent wetland in association with the proposed off-channel ponds in the lower Southern Tributary drainage. In addition, approximately 50 acres of forested wetland and riparian habitat in the upper Sucker Creek watershed would be preserved. The goal of the proposed mitigation is to replace the instream, riparian, wildlife habitat and hydrologic functions of the affected wetlands with created, enhanced, and preserved wetlands of equal or greater value (see further discussion of wetland values and functions in Section II.A.6, Wetlands). Wetland mitigation ratios are based on Ecology-recommended replacement and enhancement ratios.

(2) Vegetation

Closed landfill areas would be planted with a combination of trees, shrubs, grasses, and forbs to mitigate impacts to vegetation (see Section I.B.1.i, On-Site Forest Management and Landfill Reclamation). Trees and shrubs would also be seeded and/or planted around the sedimentation and detention basins and along the diversion channel. Species for planting and seeding would be selected for their compatibility with soil types, ability to minimize erosion, and benefit to wildlife. Native species would be used whenever possible.

(3) Wildlife

Measures proposed to reduce the impact to wildlife as well as increase wildlife use of the area include, but would not be limited to, 1) utilizing diverse grass/forb seed mixes for revegetating disturbed areas to improve forage value, 2) developing patches of shrubs and trees on fill areas to improve habitat structure and diversity, 3) erecting perch/nest poles and bird boxes to improve avian habitat, 4) limiting habitat/vegetation maintenance to late summer and early fall when most wildlife reproductive activities are completed, 5) fencing the leachate pond to restrict wildlife access, and 6) closing all nonessential landfill perimeter roads after landfill closure. The proposed creation, restoration, enhancement, and preservation of wetlands and their buffers would provide additional habitat for wildlife.

(4) Fisheries

The primary mitigation for lost fisheries resources would be the creation of a series of small, interconnected off-channel ponds in a wetland meadow area adjacent to the Southern Tributary near its confluence with Sucker Creek. The ponds would be connected to the main channel through a small outlet drain. Both deep water cover and shallow water forage habitat would be provided in each pond. The ponds would provide habitat for cutthroat trout, coho salmon, and other fish species. Although the diversion channel would be designed primarily for wetland mitigation, it would provide habitat for aquatic species other than fish, as well as terrestrial species.

(5) Monitoring

A monitoring plan for determining the success of the proposed natural resources mitigation measures would also be developed in coordination with resource agencies. The plan would include monitoring the hydrology and vegetation of wetland mitigation areas, monitoring planted and seeded areas to determine the success of revegetation efforts, monitoring the diversion channel to determine wildlife use and accessibility, and monitoring fish populations within the off-channel ponds and the Southern Tributary to determine the success of fisheries mitigation efforts. The leachate pond would also be monitored to determine the effectiveness of the proposed fencing in restricting wildlife access. Photographs of mitigation areas would be taken from permanent photo stations to provide a record of changes in the areas over time.

In addition to a monitoring plan, the final *Mitigation Plan* would include criteria for determining the success of proposed mitigation measures, and contingency plans that would be implemented if these criteria are not met. Contingency plans would ensure compliance with mitigation requirements by requiring modifications to proposed mitigation measures or initiation of alternative mitigation measures.

h. Landfill Monitoring Programs

This section discusses the proposed monitoring programs for groundwater, surface water, and landfill gas. Landfill operations staff or consultants retained by Weyerhaeuser would be responsible for conducting monitoring programs. Specifics of the programs, including the number and location of monitoring wells or stations, as well as monitoring frequencies and parameters, would be incorporated in the Plan of Operation submitted to Ecology with Part 2 of the solid waste permit application (see Section I.B.1.f, Plan of Operation). Results of monitoring and testing would be submitted to Ecology and the Health District, at which time they would also be available for review by the public.

The proposed programs comply with MFS requirements. Additional monitoring requirements may be imposed as conditions of permits and approvals. The Plan of Operation would include contingency plans that would be implemented in the event monitoring programs found violations of standards or permit conditions. Specifics of contingency plans would be developed based on the results of field investigations at the time violations were identified. If monitoring programs determine that there is any threat to human health or the environment, potentially affected parties would be notified immediately.

(1) Groundwater Monitoring

The groundwater monitoring system would include a minimum of three downgradient monitoring wells and one background well. Additional monitoring wells may be required by Ecology. The monitoring wells would be located adjacent to the downgradient side of the active solid waste disposal area and would be designed to test water in the uppermost water-bearing zone. Groundwater samples would be tested on a quarterly basis for the set of parameters listed in WAC 173-304-490. Ecology may require additional parameters to be monitored. Monitoring would continue during the life of the facility and through the 30-year post-closure care period.

If a parameter in groundwater is determined to be above background concentrations, Ecology and the Health District would be contacted within 7 days of receipt of the sampling data. A second round of sampling would be conducted to verify the finding and to determine if additional contaminants were present. If groundwater standards were exceeded, a corrective action plan would be implemented to prevent contamination from spreading and to reduce the contaminant concentrations. Potential corrective actions could include waste removal and liner repair if the waste is not too deep, groundwater collection and treatment, accelerated closure over the leaking area to stop further leachate generation, or other appropriate corrective action approved by Ecology.

(2) Surface Water/HGCS Monitoring

The surface water monitoring plan would include monitoring of surface waters in sedimentation/detention basins, routine water quality sampling, flow measurement, sediment sampling, and visual observations of water quality. Continuous, peak, and/or low-flow monitoring would be conducted to confirm predicted flows out of the landfill at all periods of the year. One permanent site on the Southern Tributary downstream of the railroad would be selected and monitored until the landfill is closed.

Key water quality parameters would be sampled in locations and at frequencies outlined in the solid waste and NPDES stormwater discharge permits. Samples are typically tested for temperature, pH, specific conductivity, chloride, nitrate, nitrite, ammonia, sulfate, dissolved iron, dissolved zinc, dissolved manganese, dissolved copper, chemical oxygen demand, turbidity, and total organic carbon. Ecology may require additional parameters to be monitored. To establish background conditions, at least one sampling station would be located upstream of the project site, or baseline data from previous studies would be used.

If leachate contamination of surface water was discovered, Ecology and the Health District would be notified. The first step would be to determine the source of the contamination. Possible sources include leaks in the liner or in leachate transmission lines, leachate seeps on the side slopes, pump station failure or leakage, or problems with berms, ditches, or detention ponds. Once identified, the problem would be corrected.

In addition to the groundwater and surface water monitoring programs typically required by Ecology, discharge water from the HGCS would be monitored to provide early detection of a potential liner leak. The EIS recommends frequent monitoring of the HGCS for this purpose (see Section II.A.3, Surface Water). If leachate contamination were detected, the discharge line of the HGCS outlet discharging contaminated water would be extended, a sump and pump would be installed in the line, and the discharge would be pumped to the leachate holding pond. If more than one HGCS outlet were discharging contaminated water, the outlets would be connected with a common header pipe.

A temporary pipe system to allow diversion of contaminated HGCS discharge could be installed quickly (no more than a week). If necessary, a permanent diversion system consisting of a concrete sump and underground pipe could be installed.

Following diversion of the contaminated HGCS discharge, options for treatment and discharge would be evaluated. The water would likely be hauled to the Longview mill in rail tank cars as proposed for landfill leachate. Ecology has indicated that a water rights permit may be necessary for this option. Alternatively, if on-site treatment and discharge were determined to be feasible, application would be made for a waste discharge permit pursuant to WAC 173-216. Maximum flow rates from the HGCS are estimated at 220,000 gallons per day (see Appendix G of this EIS), although HGCS flows are expected to be minimal or nonexistent much of the year. The leachate management system would have adequate capacity to collect, store, and transport maximum HGCS flows in addition to normal landfill leachate flows if that became necessary.

Potential corrective actions for a liner leak would be the same as those discussed previously under Groundwater Monitoring.

(3) Landfill Gas and Odor Monitoring

A landfill gas monitoring program would be established to address the buildup of methane, carbon dioxide, mercaptans, hydrogen sulfide, and other gases. The HGCS pipe outlets exiting from under the landfill liner would be checked for methane concentrations on a quarterly basis. Results of the landfill gas migration monitoring would be provided to the Health District, SWAPCA, and Ecology within 7 days of receipt by Weyerhaeuser.

If concentrations were found to be at or above 25 percent of the lower explosive limit in the pipe outlets, immediate steps would be taken to protect health and safety. A corrective action plan would be developed and implemented in coordination with the Health District and Ecology. Corrective actions could include installing an active gas collection system, increasing the vacuum in the extraction system, or adding more gas wells.

If a flare system is required, flare emissions would be sampled from ports provided in the upper portion of the flares. Results would be provided to the Health District and SWAPCA within 7 days of receipt by Weyerhaeuser. If any compound was found at a concentration which poses a threat to health or safety, or is in violation of air quality regulations, a corrective action plan would be implemented in coordination with the Health District, Ecology, and SWAPCA. Corrective actions could include construction of an active gas system, adjustment of the air-to-gas ratio and temperature in the combustion chamber, reduction of gas flow rate to individual flares, or the addition of more flares.

The perimeter of the site would be routinely monitored for odors during low wind conditions. If problematic odors were discovered, wind speed and direction would be checked to help locate the source. An inspection by Weyerhaeuser personnel would be conducted to pinpoint the source and a corrective action plan would be developed and implemented in coordination with the Health District. Corrective actions for odors could include repairs of an automatic flare relight, repairs of a break in the landfill final cover or addition of more intermediate cover, increase in the vacuum in the gas extraction system, or addition of gas extraction wells.

i. On-Site Forest Management and Landfill Reclamation

Constructing and operating the proposed landfill would entail opening and closing individual cells (each approximately 15 to 30 acres) in a planned sequence over the life of the project. The sequencing would result in a step-by-step conversion of land use from forest production to landfill construction, operation, closure, and reclamation. The area of each of these land uses at any one time will depend on the rate cells are opened and closed.

Statutory regulations require that a Forest Practices Application (FPA) be filed through the Washington Department of Natural Resources for removal of merchantable timber. At present, no merchantable timber exists on proposed landfill cells, but merchantable timber is present on the site of proposed support facilities (i.e., the waste transfer area, leachate holding pond, and sedimentation/biofiltration detention basins). An FPA would be filed and approved prior to removal of timber on the facility site. Thereafter, an FPA would be filed and approved prior to the opening of any cell if merchantable timber is present on that cell. Although no merchantable timber currently exists on proposed cell locations, some cells may have merchantable timber by the time they become active.

Once a cell is closed, the surface would be prepared for reclamation. On-site borrow would be used for final cover and topsoil. A reclamation planting plan would be developed and implemented at the closure of each cell. The plantings would include a diverse grass/forb seed mix of native species, shallow-rooted shrubs, and limited areas of mixed forest where topsoil would be deep enough to ensure the integrity of the cover system. The plan would also prescribe vegetation monitoring and maintenance schedules.

Areas of the final cover that might receive trees would be covered with an additional topsoil thickness so that the final cover would not be affected by tree rooting depths or by trees being blown over by wind. The final cover would be designed to allow for strains and grade changes caused by potential differential settlement caused by the weight of the additional soil and trees.

j. Post-Closure Maintenance

Post-closure maintenance and monitoring of the landfill would continue at least 30 years past the final closure of the facility. Activities would include leachate and landfill gas management, groundwater and surface water monitoring, and final cover and vegetation maintenance. Post closure maintenance would continue past the 30-year minimum if there is a need for it, such as for continuing leachate or gas collection.

2. Alternative Site Plan A

Under Alternative Site Plan A, the west lobe of the landfill would be retracted 600 feet, reducing the footprint by approximately 18 acres (Figure I-2). The footprint size would therefore be approximately 312 acres, with a waste capacity of 45 million cubic yards. Direct impacts to wetlands would be reduced by approximately 1 acre compared to the Proposal. The length of the runon diversion channel would be approximately 6,700 feet, or about 300 feet shorter than the diversion channel for the Proposal. The only portion of the diversion channel and associated wetlands mitigation that would be different than that of the Proposal is the section from the 1600 Road to the Southern Tributary. There would also be minor changes in the overall natural resources mitigation plan due to the opportunity to create additional wetlands along the diversion channel. Alternative Site Plan A is currently Weyerhaeuser's preferred alternative.

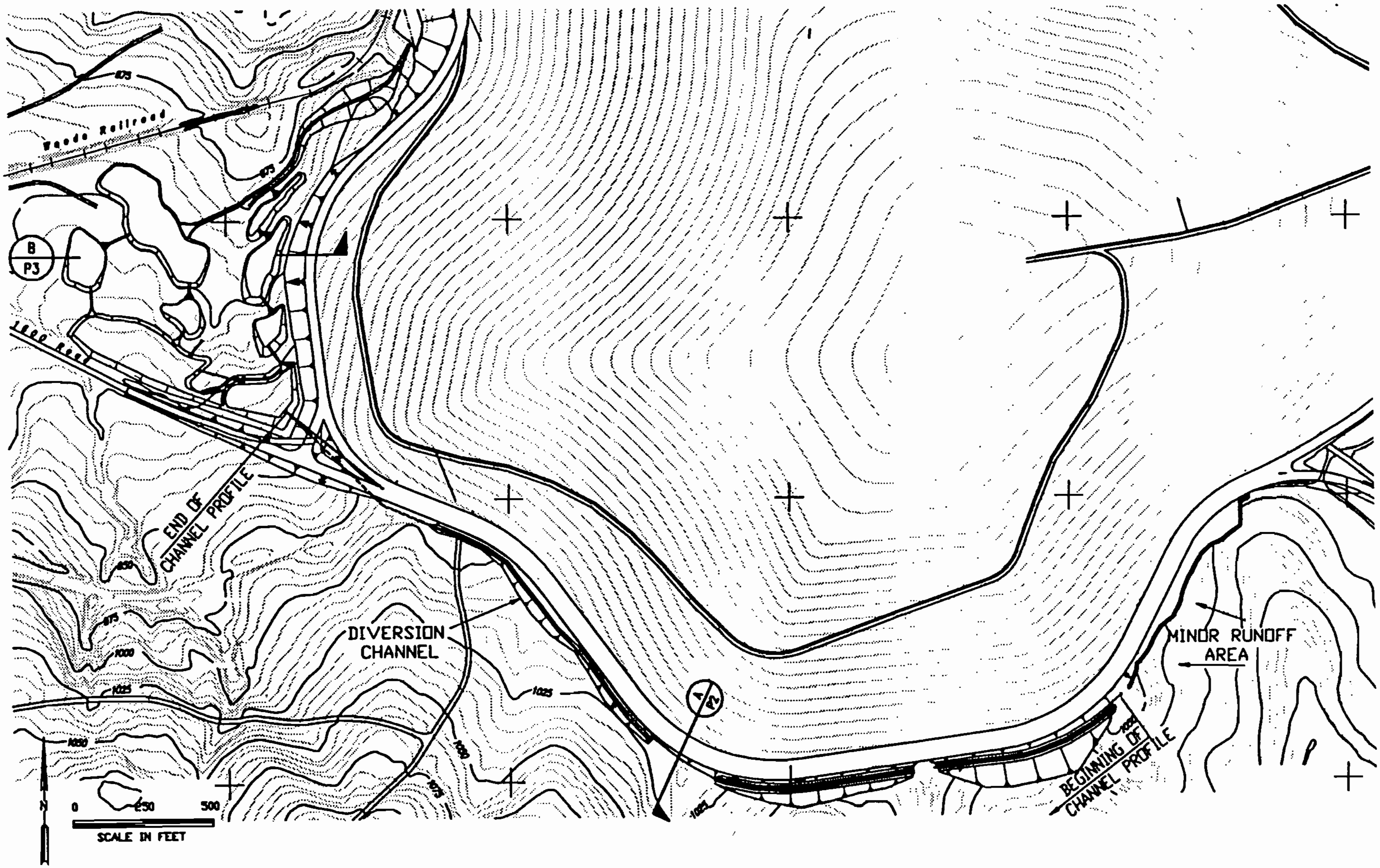
Under this alternative, the lower 1,500 to 2,000 feet of diversion channel would be routed along the western perimeter of the landfill in association with the existing wetland habitat and drainage system in this area (Figure I-11). Additional wetlands would be created by constructing berms to detain floodwaters and to divert water to excavated depressions along the edges of the existing wetlands. Floodwaters would be directed around the existing wetlands except for a small area near the C&C/Woods railroad. A small amount of water corresponding to summer base flow would be directed through the existing wetlands.

Wetlands would also be created at the confluences of the diversion channel and the three main tributaries to the channel on the southern edge of the landfill. Small rock weirs would be constructed just downstream from the confluences to detain water during higher flows and create wetlands. The weirs would be designed to pass summer base flows.

Further detail on the wetland and diversion channel design under Alternative Site Plan A is presented in the revised *Mitigation Plan* in Appendix A of this EIS.

3. Alternative Site Plan B

In this alternative the west lobe of the landfill would be retracted 600 feet and the east lobe would be retracted nearly 1800 feet, eliminating the eastern leachate drainage basin and reducing the landfill footprint by 94 acres (Figure I-2). The footprint size would therefore be approximately 236 acres, with a waste capacity of 32 million yards. This alternative would reduce direct impacts to wetlands by about 1.8 acres compared to the Proposal, and 0.8 acre compared to Alternative Site Plan A. Other features of Alternative Site Plan B, including the



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NORTH

0 500

SCALE IN FEET

Figure I-11
Stream Realignment and Wetland Creation
Source: Interfluve Inc./Beak Consultants, Inc., 1991

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design of the runon diversion channel and associated wetlands mitigation, would be the same as for Alternative Site Plan A.

4. No-Action Alternative

Under the No-Action Alternative, the solid waste permit for the proposed landfill would not be issued. If this occurs, Weyerhaeuser will still have the need for disposal capacity for its nonrecycled solid waste. The current variance for the Mt. Solo Landfill requires that it close by September 1993. Thereafter, Weyerhaeuser will no longer have the option of using that facility.

Weyerhaeuser would coordinate with the Health District and Cowlitz County to develop a plan for waste disposal. The company has indicated that its preferred disposal option under the No-Action Alternative would be to dispose of all or part of its waste at the Cowlitz County Sanitary Landfill, unless the county takes action to prohibit or limit the quantities of industrial waste and construction and demolition waste at that facility. (The Preliminary Draft of the 1992 Cowlitz County Comprehensive Solid Waste Management Plan recommends that the County discourage the use of its landfill as a disposal facility for forest products waste.) Depending on the volume of waste disposed, and the period of time over which this option is used, the disposal capacity of the County Landfill for municipal solid waste could be significantly reduced, resulting in an earlier need for the county to identify other options for MSW disposal (see further discussion in Section II.B.7, Public Services and Utilities). These options could include expansion of the County Landfill, siting of a new in-county MSW landfill, and/or long-haul transport of MSW to an out-of-county landfill.

Other potential options that could be considered by Weyerhaeuser under the No-Action Alternative include development of its own landfill at an in-county or out-of-county site other than the Headquarters Site and long-haul transportation of solid waste to an out-of-county third-party landfill. Also, it is theoretically possible that a third party would develop a new industrial waste landfill in Cowlitz County, in which case Weyerhaeuser could use that facility. Any option requiring the siting of a new landfill implies possible interim use of the County Landfill between the time the Mt. Solo Landfill closes and the new landfill becomes operational.

Weyerhaeuser has determined that none of the options available under the No-Action Alternative meet or approximate the objectives set forth in Section I.A.1, Purpose and Need. Whatever disposal facility is used, Weyerhaeuser's solid waste would contribute to and accelerate the environmental impacts associated with that facility, as well as reduce the site life of the facility. The disposal option(s) that would be selected by Weyerhaeuser, and the volume of waste that would be disposed using any given option, are speculative. Therefore this EIS does not evaluate the off-site environmental impacts of the No-Action Alternative in detail. Section II.B.7, Public Services and Utilities, provides further discussion of the potential impact of the No-Action Alternative on the site life of the County Landfill.

C. Scoping

The Health District held two public scoping meetings for the proposed landfill project. The agenda included an open house prior to each meeting. The scoping comment period was open for 35 days, beginning on May 17, 1991. This included a 14-day extension requested by the Washington State Department of Ecology. During this period, written comments were received at the scoping meetings and through the mail. Verbal comments presented during the public meetings were recorded on video and cassette tapes. All comments were reviewed and considered in the preparation of this EIS.

The major issues of concern identified during the scoping period were water quality of Silver Lake, groundwater quality, noise, wetlands, realignment of the Southern Tributary of Sucker Creek, visual impacts, air quality, and railroad operations. Of these, the most significant issues of concern were potential contamination of groundwater or surface water at the landfill, leading to contamination and eventually fisheries impacts in Sucker Creek or Silver Lake. Concern was also expressed about the effects of a leachate tank car spill in streams or the Cowlitz River. These key issues are addressed in Section II.A.2, Groundwater, and II.A.3, Surface Water.

Section II

Affected Environment, Significant Impacts, and Mitigation Measures

Headquarters Camp
Solid Waste Disposal Facility

A. The Natural Environment

1. Earth

This section is based on a geological evaluation submitted in support of Part 1 of the solid waste permit application (Sweet-Edwards/EMCON, 1991c), as well as a soil survey conducted by Duncan & Steenbrannen (1971).

a. Affected Environment

(1) Geology

The Headquarters Site is underlain by bedrock of volcanic origin, upper Eocene to lower Oligocene Goble Volcanics. The Goble Volcanics are divided into an upper and lower member. The upper member is composed of basalt and andesite lava flows. The lower member is composed mainly of volcanic-derived sedimentary rock with some basalt flows. The landfill would be sited within the lower member of the Goble Volcanics in an area dominated by lithic tuff—rock formed of compacted crystalline volcanic fragments.

Geologic data for the site suggest that the sedimentary layering in the rocks has a gentle dip (5 to 10 degrees) to the northeast. This tilting may have resulted from a regional folding event or from rotation along faults. Several shear zones in outcrops in the area indicate that some small-scale movement along faults has occurred on the site in the past. This is consistent with regionally mapped faults thought to be active between 5 and 50 million years ago. No evidence of recent fault activity or large offsets were observed on the site.

Test pit and well data for the site indicate that the depth of weathering in bedrock is variable. Lithic tuff and tuff deposits easily weather to clays and silts. The original rock texture with volcanic fragments can still be observed in the weathered rocks. The volcanic rock flows are more resistant to weathering and have maintained their structure to a greater degree. For engineering purposes, these rocks can be classified as soils within the upper zones being excavated for the landfill.

(2) Topography

USGS topographic maps (Silver Lake and Mt. Brynion, Washington Quadrants) indicate that the Headquarters Site is located in an area that generally slopes downward from south to north (Figure I-2). The site itself follows the same pattern, sloping from an elevation of about 1,080 feet above mean sea level (MSL) at the south end to an elevation of about 900 feet MSL at the north end. South of the site, the terrain continues to rise, reaching an elevation of 1,600 feet MSL in less than a mile. North of the site, the terrain continues to slope downward to an elevation of 500 feet MSL at the shore of Silver Lake, approximately 1.8 miles from the site.

The site is centered on a northwest-trending valley and ridge pair, following the main stream in the valley. The area, especially the ridge to the south of the site, is characterized by features common to localized landsliding and stream downcutting. The ridge shows evidence of many small landslides that have been eroded over time. Hummocky topography at the foot of this ridge is likely eroded slide blocks and debris. However, no evidence of active landsliding was found on the Headquarters Site itself.

(3) Soils

A soil survey of the Headquarters Site was conducted and soils were mapped in accordance with a soil classification system used by Weyerhaeuser to identify soil characteristics important to timber production. The Weyerhaeuser soil classification system, which is used in the following discussion to characterize on-site soils, differs from the system used by the U.S. Soil Conservation Service (SCS). Most of the soils on site and described below belong to the SCS-defined Olympic Association.

Soils at the Headquarters Site are primarily of two types: the Morgan and the Raught Series. Both soils are silt loams with some clay and were formed by the weathering of the volcanic rocks in the area. The accumulation of clay at approximately 20 inches below the surface contributes to the water-holding capabilities of the soils. These soils are considered to have low to moderate amounts of available nutrients and are well suited to the production of timber.

The Morgan Series can be divided into two horizons. The A Horizon extends from the surface to a depth of approximately 15 inches. It is a dark reddish-brown clay loam, which is sticky, plastic, and strongly acid. The B Horizon, which extends from 15 to almost 60 inches in some areas, is also a dark reddish-brown clay loam with areas of silt and gravel. It is hard, sticky, and plastic, with visible clay films. It is also strongly acidic.

The Raught Series can also be divided into two horizons. The A Horizon extends from the surface to a depth of approximately 10 inches. It is a very dark grayish-brown silt loam with some gravel. It is friable, soft, slightly plastic, and slightly acid. The B Horizon is a dark-brown gravelly, silty, clay loam, which extends from 10 inches to a depth of almost 60 inches in some areas. This soil is slightly hard, friable, sticky, and plastic, with a medium acidity.

b. Impacts of Alternatives

(1) The Proposal

The proposed landfill would significantly alter the existing topography of the site. The landfill would be constructed with side slopes of 4 horizontal to 1 vertical, with benches every 50 vertical feet. The overall slope including benches would be 4.5:1. After landfilling is complete and the final cover is installed, the landfilled surface would range from elevation 900 feet MSL to a maximum elevation of 1,250 feet MSL (compared to the existing on-site maximum elevation of 1,080 feet MSL). The elevation at the crown of the landfill would be about 250 feet above the original ground surface, reflecting a maximum waste thickness of 250 feet.

To create the bottom grading plan contours in preparation for liner construction, approximately 253 acres of the 330-acre footprint would be excavated, and approximately 77 acres would be filled using on-site soils. The excavation and filling plan is designed to maintain a 5-foot minimum separation between the bottom of the landfill liner and the highest measured groundwater elevation, as required by the MFS [WAC 173-304-130(2)(b)(i)].

A total of about 3.9 million cubic yards (MCY) of soil would be excavated. The average depth of excavation would be about 8 feet, with a maximum depth of about 35 feet. A total of about 1.1 MCY of the excavated soil would be used as fill from within the landfill footprint. The average depth of fill would be about 9 feet, with a maximum depth of about 50 feet at one of the perimeter berms. The excess 2.8 MCY of excavated soil would be used for construction of the bottom soil liner and intermediate and final cover. This earthwork would occur incrementally over the life of the landfill. Excess soil would be stockpiled within the landfill footprint until it is used.

The on-site geology was mapped and field-checked for potential stability concerns in conjunction with the site characterization studies. There are no indications of site instability or poor foundation conditions, and the site is considered stable. During final design, slope stability analyses would be performed for the site considering potential failures in both the natural foundation and proposed construction materials. The landfill height, side-slope steepness, and bottom grading plan would be designed to meet standard geotechnical requirements for static and seismic stability. The low compressibility of the site's generally stiff, compact, subgrade soils would result in negligible foundation settlement below the landfill. Filled areas will be compacted in shallow lifts to ensure stability.

Because of the extensive incremental site grading necessary for development of the proposed landfill, there would be a high erosion potential. However, no significant erosion impacts would be expected due to the erosion and sedimentation controls incorporated into the design and the limitation of major construction activities to the dry season. Erosion and sedimentation control measures are described in detail in Section I.B.1.d under Surface Water Management. Soil stockpiles would be covered with plastic or vegetated while awaiting use.

Given the long development life of the project, certain portions of the landfill would be managed as timber for harvest. Soil erosion as a result of normal logging practices would occur when these areas are harvested.

(2) Alternative Site Plan A

Alternative Site Plan A would reduce the landfill footprint by 18 acres by retracting the western lobe 600 feet (Figure I-2). This would avoid filling approximately 1 acre of wetlands and provide a more stable alignment for the diversion channel. The total quantities of earthwork would be proportionately less. Topographic impacts, volumes of excavation and fill, and erosion potential would be similar to those of the Proposal. This alternative is currently the alternative preferred by Weyerhaeuser.

(3) Alternative Site Plan B

The adoption of Alternative Site Plan B would reduce the landfill footprint by 94 acres by retracting the western lobe 600 feet and the eastern lobe 1,800 feet, eliminating the eastern leachate management basin. The total quantities of earthwork would be proportionately less. Topographic impacts, volumes of excavation and fill, and erosion potential would be similar to those of the Proposal.

(4) No-Action Alternative

At this time, the Headquarters Site is being managed for timber production. Without the development of the landfill on this site, the existing topography would remain unchanged. Also, potential soil erosion due to construction would not take place. However, soil erosion as a result of normal logging practices would occur when these areas are harvested.

c. Mitigation

By limiting construction to the drier season, and implementing the erosion and sedimentation control measures incorporated into the design of the Proposal and alternative site plans, no significant erosion or sedimentation impacts would occur. Therefore, no further mitigation measures are proposed.

d. Significant Unavoidable Adverse Impacts

Site topography would be significantly altered under the Proposal and alternative site plans. Significant topographic changes would occur over 330 acres under the Proposal, 312 acres under Alternative Site Plan A, and 236 acres under Alternative Site Plan B. The landfill contours are designed to be naturally graded to form smooth swales and ridges to blend into the surrounding topography.

2. Groundwater

The description of the affected environment in this section is based on data collected during field investigations of the site, including installation of site wells, soil borings, water quality sampling, groundwater level measurements, and permeability testing. These investigations are described in detail in a report by Sweet-Edwards/EMCON (1991c), submitted in support of the Part 1 solid waste permit application. The recharge and discharge relationship was based on rainfall and surface water data collected from the site and described in Appendix E of the *Environmental Technical Report* (Beak, 1991a).

Information in this section related to the impacts of a liner leak on the shallow aquifer system was drawn from the liner leak scenario and shallow aquifer impact analysis contained in Appendices B and E of this EIS, respectively.

a. Affected Environment

(1) Relationship of Geology and Groundwater

The Headquarters Site is underlain by volcanic rocks (lava flows) and volcanic-derived sedimentary rocks (lithic tuffs and tuffs). Lithic tuff is the dominant rock type at the site, comprising approximately 80 percent of the rock found at the site. The lava flows and tuffs are interbedded within the lithic tuff and are laterally discontinuous.

Both the lithic tuff and tuff deposits have weathered into low-permeability silts, clays, and some silty sands. The lava flows also have low permeability controlled by water flow through small fractures and joints. Table II-1 summarizes the hydrogeologic characteristics of the rock types underlying the site.

Table II-1 Hydrogeologic Characteristics of Local Lithology

Rock Type	Hydrogeologic Significance	Water-Bearing Properties	Water Use	Description
Tuff and Lithic Tuff	Comprises part of uppermost aquifer.	Low hydraulic conductivity	None	Generally weathered into yellow to brown sand, silt, and clay. Occurs in discontinuous units at various depths across the site. Interbedded with lava flows.
Lava Flows	Comprises part of uppermost aquifer. Deeper flows serve beneficial uses off site.	Low hydraulic conductivity; potentially higher hydraulic conductivity where fractures are not filled.	None in shallow zones. Moderate in deeper zones.	Blue-gray, hard and fractured, partially weathered, basaltic or andesitic. Occurs in discontinuous units at various depths across the site.

(2) Groundwater Flow

The direction of groundwater flow in the shallow aquifer is generally toward the north. As shown in Figure II-1, the groundwater surface follows the surface topography. Groundwater is present from a depth of 0 to 65 feet in the uppermost water-bearing zone. The water table is deepest below ridges and emerges at the land surface at springs and streams. The rate of groundwater movement across the site ranges from approximately 0.02 feet per day (ft/day) to 0.10 ft/day. Thus it is expected that groundwater would move from 0.6 to 3 feet in a month.

(3) Recharge and Discharge

The groundwater is recharged from infiltration of precipitation. According to water budget calculations, approximately 23 percent of the annual precipitation of 65 inches recharges the groundwater. The remaining precipitation runs into local streams or it evaporates. Of this 23 percent, 22 percent of the precipitation is eventually discharged as base flow in adjacent streams such as Sucker Creek and the Southern Tributary to Sucker Creek.

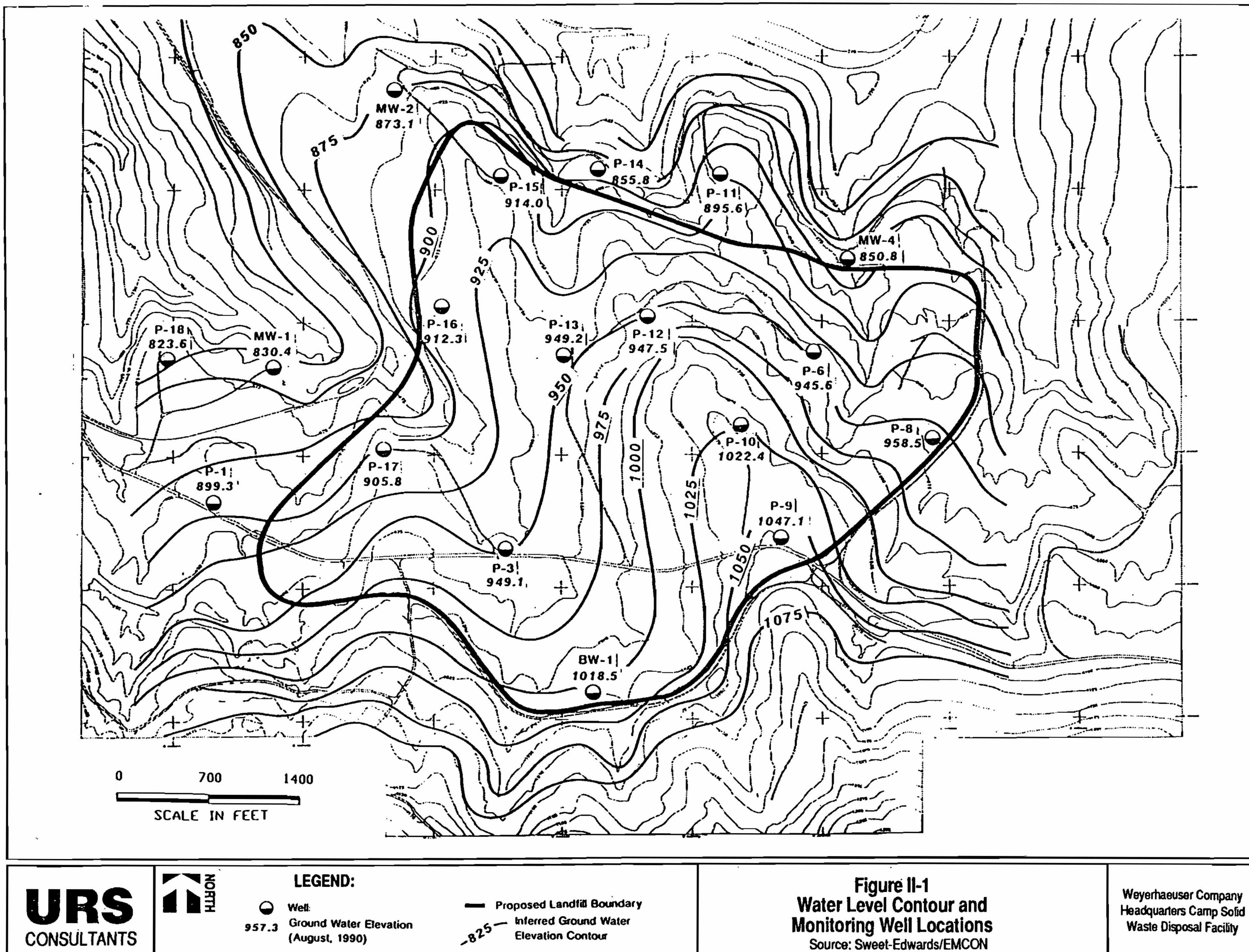

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Figure II-1
Water Level Contour and Monitoring Well Locations
Source: Sweet-Edwards/EMCON

Weyerhaeuser Company Headquarters Camp Solid Waste Disposal Facility

(4) Groundwater Quality

Background data on groundwater quality were collected from October 1989 to January 1991. Parameter concentrations do not violate federal primary drinking water standards. However, iron and manganese are above the secondary standards for taste and aesthetics. Chemical concentrations are related to the type of geologic material through which the groundwater moves. The site data indicate that the concentrations are typical of the shallow aquifer groundwater quality in the region.

(5) Beneficial Use of Groundwater

A beneficial use survey was conducted to determine the extent of groundwater uses in the project vicinity (Sweet-Edwards/EMCON, 1991b). There are no beneficial uses downgradient of the proposed project site.

No residences or residential wells exist within a 1-mile radius of the site. The closest residences using supply wells are located more than 1 mile west of the site. Two Weyerhaeuser-owned wells that service the Headquarters Site are located approximately 0.5 mile west of the proposed landfill.

b. Impacts of Alternatives

(1) The Proposal

No impacts to groundwater are expected during initial construction of the landfill. During the life of the landfill, there are two potential impacts to groundwater: 1) impacts due to a possible leachate leak and 2) impacts due to reduction of recharge to the aquifer.

(a) Liner Leak Evaluation. During normal operation of the landfill, two aspects of the Proposal minimize the potential for leachate contamination of groundwater: the hydrogeologic characteristics of the site and the mitigation measures incorporated into the project design. Table II-2 summarizes the key elements in the site characteristics and landfill design and how they contribute to groundwater protection.

Of the design elements listed in Table II-2, the most important for preventing leachate contamination of groundwater are the LCRS and the composite bottom liner. With the proposed construction quality assurance procedures, protective 1-foot soil cover over the LCRS and bottom liner, and careful placement of homogeneous waste material in the first 5-foot layer, the potential for a leak in the bottom liner is considered low (see discussion of these proposed measures in Section I.B.1.d under Leachate Management).

In the event that a liner leak were to occur, there would be increased potential for contamination of the groundwater and surface water systems. The majority of the leachate would likely migrate laterally through the sand layer of the hydraulic gradient control system beneath the landfill and discharge at the landfill perimeter. The hydraulic gradient control system would have a permeability of approximately 100 to 1,000 times higher than the underlying native material, therefore creating a preferential flow path for leachate. Some leachate, however, could migrate downward through the hydraulic gradient control system and infiltrate into the groundwater system.

Table II-2 Site Characteristics and Design Elements Related to Groundwater

Site Characteristics/ Design Elements	Groundwater Protection
Site Characteristics	
Low-permeability soils	Low permeability and slow groundwater flow
Design Elements	
Composite bottom liner	Flexible impermeable membrane liner over 2 feet of recompacted low-permeability soil would contain leachate and divert leachate to collection system.
Leachate collection and removal	Leachate ponded over the bottom liner would be collected and removed. Under normal operating conditions, leachate levels would be less than a few inches. Maximum leachate level would be 1 foot. Leachate collection sumps would have double composite liner with leak detection.
Surface water management	Interim landfill cover, the use of plastic to keep rainfall off the landfill surface, and prevention of surface water runon would reduce leachate volume generated within the landfill.
Final cover system	A flexible, impermeable membrane and soil cover similar to the bottom liner would effectively eliminate infiltration and thus reduce leachate volume.
Operations and maintenance program	Would verify adequate ongoing functioning of leachate collection and removal system and groundwater and surface water management system.
Hydraulic gradient control system (HGCS)	Monitoring and testing of discharge from the HGCS would allow for early detection of leachate as a result of breaches in the landfill liner system.
Groundwater monitoring	Would detect malfunctions of landfill system prior to contaminated water leaving the site, allowing corrective actions to be taken.

Two liner leak scenarios were developed to evaluate the potential impact on groundwater and surface water systems. One scenario assumes that all leachate from the leak goes directly to groundwater with no loss in volume or concentration. This scenario is discussed below. The other scenario assumes that all leachate flows through the hydraulic gradient control system and discharges into surface water. This scenario is discussed in Section II.A.3, Surface Water.

Determination of Leakage Rate. The evaluation of leakage rates was based on a standard method for estimating leachate leakage from a failed liner. "Extreme worst-case" and "reasonable maximum" leakage rates were estimated using assumed values for key variables (Table II-3). Although useful for analysis purposes, the extreme worst-case leakage rate of 18 gallons per acre per day substantially overestimates the amount of leachate that would be discharged from a potential liner leak. The probability of such a worst-case scenario actually occurring is considered remote and speculative. The reasonable maximum leakage rate (0.3 gallons/acre/day) more closely approximates the maximum amount of leachate that would be discharged from a liner subject to the proposed rigorous construction quality control. It reflects standard liner leak analysis methods documented in Giroud and Bonaparte (1989), and recommended by EPA (1992).

Table II-3 Leakage Rates—Realistic and Worst Case

Variables	Reasonable Maximum Value	Extreme Worst-Case Value
Hole size (square inches)	.005	1.0
Hole density (per acre)	1	10
Hydraulic head over the clay liner (feet)	0.5	2
Permeability of the clay liner (cm/s)	$1x10^{-6}$	$1x10^{-6}$
Condition of the geomembrane/soil interface	Good[a]	Good[a]
Resulting leakage rate (gal/acre/day)	0.3	17.7

[a] The condition of the interface was assumed to be "poor" during and right after construction. For bottom liners, however, the interface can be considered one level better than when constructed, or "good" (Giroud and Bonaparte, 1989). See further explanation in Appendix B of this EIS.

Potential Groundwater Impacts. The significance of the leachate contamination of groundwater resulting from the extreme worst-case liner leak scenario (18 gallons/acre/day) was evaluated. Table II-4 summarizes the assumptions used in the analysis.

All leachate that might potentially leak from the landfill in a 1-year period was assumed to mix with the upper 10 feet of the shallow aquifer. Background concentrations of chemical constituents in the shallow aquifer were assumed to be the highest detected to date in groundwater monitoring at the site. Manmade chemicals were assumed to be nonexistent in the aquifer. If a chemical was not tested in the groundwater, the chemical concentration from the surface water was used if available; when no background data were available, a value of one-half of the detection limit was used.

Leachate constituents that would be produced from the Weyerhaeuser Landfill would be expected to be similar to Mt. Solo Landfill leachate. Therefore, the highest chemical concentrations from Mt. Solo Landfill leachate data and laboratory leachate data were used in the calculations. Because the Mt. Solo leachate is diluted with groundwater, the laboratory data may be more representative of worst-case conditions. However, in some cases, concentrations in the Mt. Solo leachate are higher than the laboratory concentrations. These data are listed in the first column of Table II-5.

Table II-4 Summary of Assumptions for Shallow Aquifer Impact Analysis

- There is no loss in leachate volume during infiltration from the base of the liner to the groundwater.
- There is no decreases in leachate constituent concentrations during infiltration from the base of the liner to the groundwater.
- Decreases in leachate constituent concentrations in the groundwater are due only to mixing. No degradation or adsorption of leachate constituents is allowed.
- The analysis is based on the extreme worst-case leakage rate (18 gal/acre/day), which is 60 times greater than the reasonable maximum leakage rate (0.3 gal/acre/day).
- The highest detected concentrations from representative leachate samples were used.

The laboratory leachate data were obtained by performing an EPA-approved leaching procedure, referred to as the toxicity characteristic leaching procedure (TCLP), on the following waste products that may be disposed at the landfill:

- Power house fly ash
- Power house bottom ash
- Power house wet ash
- Paper mill fly ash
- Paper mill bottom ash
- Milk carton extruder sludge
- Lime kiln grits and dregs-raw
- Lime kiln grits and dregs-mixed with wood chips
- Lime kiln green lime mud
- Clarifier sludge

The equation used to determine the water quality of the aquifer after 1 year and 5 years of a liner leak is included in Appendix B. The calculation involves mixing the volume of water that would pass beneath the landfill during one year with the volume of leachate generated in 1 year. As shown in Table II-5, results indicate concentrations in the groundwater using the extreme worst-case leakage rate and highest leachate concentrations would not violate the Washington State groundwater criteria or the proposed federal standard even after 5 years of a leaking liner.

If a leak is detected, through the groundwater monitoring program, corrective action would be implemented to reduce or halt the impact to the groundwater (see discussion in Section I.B.1.h, Landfill Monitoring Programs). Therefore, the actual impact on groundwater quality would be less than that predicted under the extreme worst-case liner leak scenario and would not be significant.

Table II-5 **Calculated Concentrations of Contaminants in Shallow Aquifer after Liner Failure**

	Concentration (mg/l)				
Constituent	**Leachate (C_l)**	**Existing Aquifer (C_{aq})**	**Aquifer (C_f) 1 Year After Liner Failure**	**Aquifer (C_f) 5 Years After Liner Failure**	**Standards**
pH (units)	11.7 [b]	8.15	8.2	8.4	6.5 to 8.5 [f]
Chloride	330 [a]	3.2	7.5	24	250 [f]
Nitrate-N	1.08 [b]	0.5	0.51	0.54	10 [f]
Sulfate	41 [a]	9.8	10	12	250 [f]
Total Dis. Solids	1050 [b]	396	400	440	500 [f]
Pentachlorophenol	0.005 [a]	0 [e]	0.00007	0.0003	0.001 [g]
Phenols	0.006 [a]	0 [e]	0.00008	0.0004	None
Arsenic	0.002 [a]	0.025 [c,d]	0.025	0.024	0.05 [f]
Barium	4.1 [b]	0.015 [c]	0.069	0.28	1 [f]
Cadmium	0.01 [b]	0.002 [c]	0.0021	0.0025	0.01 [f]
Chromium	0.02 [b]	0.0025 [c,d]	0.0027	0.003	0.05 [f]
Mercury	0.009 [b]	0 [e]	0.0001	0.0006	0.002 [f]
Nickel	0.006 [a]	0.01 [c,d]	0.01	0.01	0.1 [g]
Silver	0.002 [a]	0.005 [c,d]	0.005	0.0005	0.05 [f]
Zinc	0.02 [a]	0.07	0.069	0.067	5 [f]

[a] From Mt. Solo Leachate.
[b] From solid waste leaching analysis.
[c] Not tested in groundwater; surface water value used.
[d] Not detected; one-half of detection limit used.
[e] Not tested.
[f] Washington groundwater criterion (WAC 173-200-040).
[g] Federal maximum contaminant level (MCL).

(b) *Reduction of Recharge*. Another impact of the landfill would be the reduction of recharge to the underlying aquifer because the landfill liner will prevent precipitation from flowing through the soil to recharge the groundwater. The result would be the lowering of water levels below the landfill. This impact should not be significant for two reasons:

- Very little of the rainfall on the landfill site recharges the groundwater aquifer beneath the site. Most of the rainfall is evapotranspirated or discharged via the shallow groundwater system to adjacent streams as runoff. Therefore, the relatively small amount of groundwater recharge prevented by the liner should not significantly lower groundwater levels beneath the site.

- Future water supply well installations in the uppermost aquifer are unlikely. This aquifer is too low-yielding to serve as an adequate water supply.

(2) Alternative Site Plan A

The impacts of a leaking liner and the reduction of infiltration of precipitation would be similar to those described for the Proposal.

(3) Alternative Site Plan B

The impacts of a leaking liner and the reduction of infiltration of precipitation would be similar to those described for the Proposal.

(4) No-Action Alternative

Continued timber management on the site would not be expected to adversely affect groundwater.

c. Mitigation

Due to design elements and operational characteristics of the Proposal and alternative site plans, as summarized in Table II-2, no other mitigation is proposed.

d. Significant Unavoidable Adverse Impacts

With the design and operation measures described in Section I.B.1 and summarized in Table II-2, no significant unavoidable adverse impacts to groundwater would be expected under the Proposal or alternative site plans.

3. Surface Water

This section is based largely on hydrologic and water quality assessments described in Appendix E of the *Environmental Technical Report* (Beak, 1991a), as well as Part 1 of the solid waste permit application (Sweet-Edwards/EMCON, 1991d). Surface water data were collected in the vicinity of the project area from December 1989 through November 1990.

The analysis of erosion and sedimentation impacts in this section is based on calculations described in Appendix F of the EIS. The analysis of the impacts of a leachate spill from a rail tank car is drawn from information in Appendix B of the *Environmental Technical Report* (for a spill into Sucker or Ostrander Creeks) and Appendix H of the EIS (for a spill directly into the Cowlitz River). The probability of occurrence of such a spill is discussed in detail in Section II.A.6, Transportation.

a. Affected Environment

(1) Drainage Features

The main surface water features of the project site are Sucker Creek and the Southern Tributary of Sucker Creek. The Southern Tributary conveys runoff from the western portion of the site and flows northwest where it joins with Sucker Creek 0.6 mile north of the site. Four small unnamed creeks also convey runoff from the eastern portion of the site and discharge directly to Sucker Creek 0.2 to 0.5 mile from the site (Figure II-2). Sucker Creek drains into Silver Lake approximately 2 miles north of the site.

The Silver Lake drainage area is 26,560 acres (41.4 square miles) of which the Sucker Creek drainage area comprises 3,802 acres (5.9 square miles) including the 700-acre (1.1 square miles) drainage area encompassing the project site. Contributions of flow to Silver Lake by Sucker Creek and the Southern Tributary are proportional to drainage areas. Sucker Creek provides approximately 13 percent of the annual surface water inflow to Silver Lake (Moore et al., 1990). The Southern Tributary at the Headquarters Site contributes about 1.7 percent of the annual surface water inflow to Silver Lake.

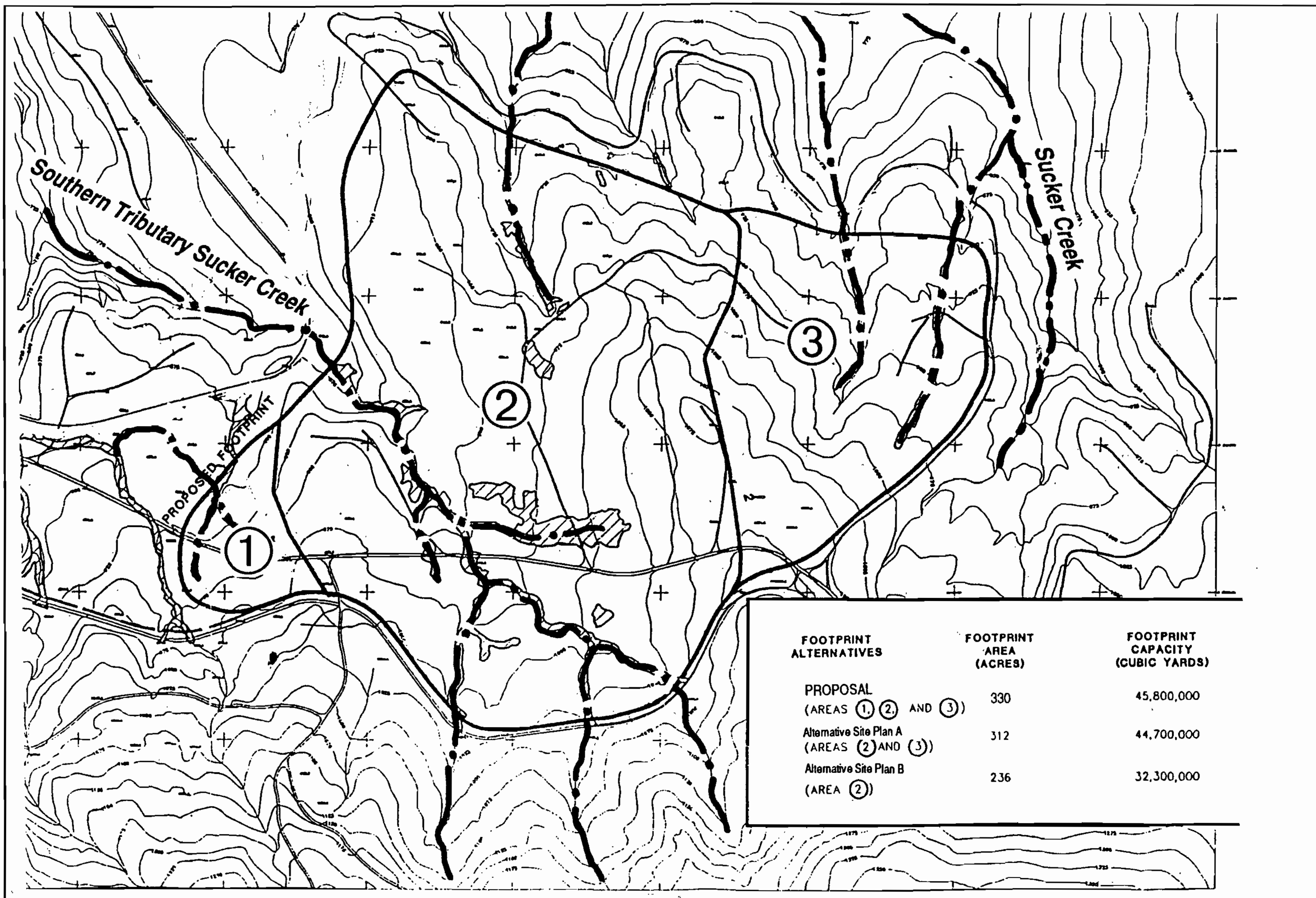
Silver Lake has received research and management focus in recent years due to excessive growth of aquatic weeds in the lake and resulting degradation in lake water quality. Moore et al. (1990) determined that excessive aquatic weed growth in Silver Lake has been accompanied by increased rates of sediment accumulation and nutrient recycling. Sources of nutrients to the lake are both external (contributed by streams flowing into the lake) and internal (contributed by nutrient recycling from the aquatic weeds and sediments within the lake).

A plan for restoring water quality in the lake was developed by Moore et al. (1990). Recommended restoration options include 1) control of aquatic weeds through introduction of grass carp, 2) dredging of sediments from portions of the lake bottom, 3) bottom screening in shallow areas near public-use facilities, 4) waterfowl management to confine use to certain areas of the lake, and 5) nutrient reductions from upstream watershed sources, including the Sucker Creek basin. Moore et al. (1990) recommended that watershed nutrient reduction strategies include construction of sediment basins, maintenance of buffer zones around the lake and feeder streams, septic system evaluation and maintenance, and development of a management plan for timbered areas of the Silver Lake basin. The lake and watershed are presently being monitored for water quality parameters as part of the second phase of the restoration study.

(2) Discharge

Surface water discharge was monitored continuously at the project site at two stream locations and periodically at three stations during on-site studies. Estimates of peak flows were derived by several literature-based methods, including the SCS-hydrograph method using a Type 1a rainfall distribution of 24-hour duration (U.S. Department of Agriculture, 1986).

The Southern Tributary has an estimated mean annual flow of 2.2 cubic feet per second (cfs). Sucker Creek has an estimated mean annual flow of 14.7 cfs just below its confluence with the



FOOTPRINT ALTERNATIVES	FOOTPRINT AREA (ACRES)	FOOTPRINT CAPACITY (CUBIC YARDS)
PROPOSAL (AREAS (1), (2), AND (3))	330	45,800,000
Alternative Site Plan A (AREAS (2) AND (3))	312	44,700,000
Alternative Site Plan B (AREA (2))	236	32,300,000

Figure II-2
Location of Site Drainage

Weyerhaeuser Company
Headquarters Camp Solid
Waste Disposal Facility

Southern Tributary. The mean annual flow of Sucker Creek further downstream at its confluence with Silver Lake has been estimated at 25.4 cfs by Bhagat et al. (1975), about 9 cfs by Moore et al. (1990), and 18.0 cfs by Beak (1991a). About 90 percent of the total annual runoff occurs during November through April in response to rainfall events. Summertime base flows in both streams are very low (less than 1 cfs), and flows may cease during prolonged dry conditions.

Surface water runoff processes on the site are typical of smaller watersheds in humid, forested areas. Little, if any, direct overland flow occurs despite relatively high rainfall amounts. Water reaching the ground surface as precipitation takes one of four main paths. Waters can 1) be evaporated or transpired by plants back to the atmosphere, 2) infiltrate into hillslope soil layers and move rapidly downslope to emerge in stream channels as storm flow runoff, 3) infiltrate to the groundwater table and discharge gradually to stream channels over time as base flow (see Glossary), or 4) further infiltrate to deeper groundwaters.

(3) Floodplains

The Headquarters Site is not located in a 100-year floodplain or floodway as designated by the Federal Emergency Management Agency.

(4) Surface Water/Groundwater Interaction

Surface flow gain or loss along channels on the site was measured seasonally during on-site studies. In general, channels on the site "gain" flow in each season. A "gaining" reach occurs where groundwaters intersect and discharge to stream channels, thereby augmenting and maintaining stream base flows. Base flow is greatest during wet months when rainfall maintains or increases groundwater storage and movement. During summer dry periods, groundwater movement and storage progressively lessen (and the groundwater surface declines), causing a recession in stream base flows.

Water budget calculations indicate that about 23 percent of the mean annual precipitation at the site infiltrates to the groundwater table. Of the 23 percent, 22 percent moves as shallow groundwater which reemerges as surface water flow in adjacent stream channels. The remaining infiltration provides recharge to deeper groundwaters.

(5) Water Quality

Surface waters on and adjacent to the site are designated by the state of Washington as Class AA (extraordinary) fresh waters. Specific state water quality criteria applicable to Class AA surface waters are listed in Table II-6.

During on-site studies, water from five stream locations in the vicinity of the site was monitored to obtain background data on surface water quality. Waters were neutral to slightly acidic, with low buffering capacity. Heavy metal concentrations were below detectable limits or present in trace amounts. The composition of ions and elements in these waters was consistent with the composition of regional precipitation and expected byproducts of local soil and geologic weathering. Overall surface water quality was good.

Table II-6 Water Quality for Class AA Fresh Waters (WAC 173-201-045)

Parameter	Criteria
Fecal coliforms	Shall not exceed a geometric mean of 50 organisms per 100 ml, with not more than 10 percent of samples exceeding 100 organisms per 100 ml.
Dissolved oxygen	Shall exceed 9.5 mg/l (total dissolved gas shall not exceed 100 percent).
Temperature	Shall not exceed 6.0°C due to human activities; nor shall increases exceed t=23/(T + 5), where T is the ambient temperature and t is the temperature at the dilution zone boundary; nor shall receiving water temperature be increased by more than 0.3°C when ambient temperature exceeds 16°C. Temperature increase from non-point-source activities shall not exceed 2.8°C and the maximum water temperature shall not exceed 16.3°C.
pH	Shall be in the range of 6.5 to 8.5, with a man-caused variation of less than 0.2 unit.
Turbidity	Shall not exceed 5 NTU over background when background is 50 NTU or less, or have more than a 10 percent increase when background is greater than 50 NTU.
Toxic, radioactive; or deleterious material concentrations	Shall be below those adversely affecting water uses that cause acute or chronic effects on aquatic biota, or adversely affect human health.
Aesthetic values	Shall not be impaired by the presence of materials or their effects, excluding those of natural origin that offend the senses of sight, smell, touch, or taste.

Surface water temperatures measured on the site generally corresponded to seasonal meteorological conditions. Peak water temperatures occurred in mid-July through early August concurrent with the annual peak in air temperature and solar radiation. Maximum water temperatures rarely exceeded 60°F at the Headquarters Site and 65°F in Sucker Creek. Stream shading and base flow accretion are important to the maintenance of the site's moderate water temperatures. Previous logging activities at the site have reduced the amount of natural vegetative shading.

Turbidity, suspended sediment, and nutrient concentrations were low most of the time, but substantial short-term spikes in concentrations occurred during storm runoff events. Nutrient concentrations were well below drinking water or aquatic toxicity criteria but occasionally exceeded concentrations that promote algal growth. Sucker Creek has been estimated to contribute about 13 percent of the annual phosphorus load to Silver Lake (Moore et al., 1990), of which the Southern Tributary at the site probably accounts for about 1.5 percent and Sucker

Creek at the confluence with the Southern Tributary accounts for approximately 11 percent (Beak, 1991b).

Water quality measured on the site complied with state criteria, except for dissolved oxygen, occasional temperature extremes, and fecal coliform bacteria. Dissolved oxygen values (6.0 to 8.7 mg/l) were consistently less than the state criteria (9.5 mg/l). Average coliform bacteria concentrations (approximately 240/100 ml) suggest at least occasional exceedance of the state criteria for fecal coliforms. The maximum allowable temperature of 16.3°C (61.3°F) was exceeded less than 10 percent of the time in July and August 1990. The specific causes for the dissolved oxygen and coliform non-compliance are unknown.

b. Impacts of Alternatives

(1) The Proposal

(a) *Drainage Features*. Construction of the proposed landfill would result in alteration of surface water features on the site. Existing surface water channels within the project boundaries would be eliminated, including approximately 5,940 feet of the Southern Tributary and its adjacent feeder streams.

Runon to the site and runoff from the site would be controlled by diversion channels and ditches and the three sedimentation/detention basins. Prior to initial landfill construction activity, the Southern Tributary would be rerouted into a permanent diversion channel (Figure I-9). Flow quantities that now exist solely in the Southern Tributary would be divided so that runon would travel via the diversion channel and runoff via on-site ditches and sedimentation/detention basins.

On average, flows in the diversion channel would be up to 30 percent less than existing flows in the Southern Tributary, because storm runoff within the landfill footprint would drain to the sedimentation/detention basins rather than the diversion channel. However, during the summer period when rainfall and runoff are low, the diversion channel would be expected to retain as much or more base flow than now exists in the Southern Tributary for two primary reasons. First, more base flow would be gained from the existing wetlands adjacent to the diversion channel than is gained in the existing Southern Tributary. Second, the bottom of the diversion channel would include a compacted soil-clay layer that would further reduce seepage loss of base flow through the stream bed.

Landfill development would alter the general characteristics and slope of the land surface. However, the amount of drainage area that contributes to existing channels below the site would remain about the same as the existing drainage area.

(b) *Discharge*. During landfill construction, the interim plastic cover on developed cell areas would eliminate any infiltration of rainfall and shed substantially greater runoff volume at a faster rate than occurs under natural conditions. As a result, runoff from these areas would be characterized by higher peak flow rates and lower base flow rates than would naturally occur. However, final design calculations indicate that the three sedimentation/detention basins would have adequate storage capacity to detain peak flows from all storm events up to and including the 100-year storm event following landfill closure and during all interim development stages. Detained stormwater would be released at a rate no greater than the existing peak runoff rate from the site. Therefore, the proposed landfill would not be expected to increase peak flows in the Southern Tributary, in Sucker Creek, or discharging to Silver Lake.

Although the interim plastic lining would increase storm runoff from lined areas during rainfall, the lack of infiltration would decrease base flow contribution from lined areas during periods between rainfall/runoff events. Base flows normally develop in stream channels from the slow release of soil waters or shallow groundwater. The decrease in base flow would vary seasonally and depending on the proportion of drainage area that would be overlain by the interim plastic liner. During dry summer conditions, little reduction in base flow is anticipated, since little if any summer base flow accretion now occurs on the site. During wetter seasons, when base flows are much higher and are contributed from a larger portion of the drainage area, the interim landfill lining could potentially decrease base flow contribution by as much as 30 percent in the Southern Tributary just below the site and 12 percent at the confluence of the Southern Tributary and Sucker Creek.

The effect of these base flow reductions on mean depth, width, and velocity of water in the channel was computed using the hydraulic geometry equations of Linsley et al. (1975). In the Southern Tributary below the site, mean depth, width, and velocity would be decreased by 4, 12, and 12 percent, respectively. At the confluence, mean depth, width, and velocity would be decreased by 2, 5, and 5 percent, respectively. No significant long-term impact to the channel is anticipated from these changes.

Some base flow augmentation would come from surface discharge from the hydraulic gradient control system (HGCS). This system (described in Section I.B.1.d) would collect some groundwater and return it to surface streams, and would help convey groundwater seeps to the streams. Most of this water would eventually emerge as surface water under natural conditions.

Diversion of runoff to the three sedimentation ponds would reduce stream flows in short sections of the existing channel between the landfill boundary and discharge outlets from the ponds. It is expected that flows in these sections would be reduced by about 60 percent and would consist only of groundwater base flows that emerge from under the landfill. This reduction would likely cause gradual changes in these channel sections, such as encroachment of riparian vegetation.

All runoff from the active landfill face itself (approximately 5 acres) would be captured, controlled, and directed into the leachate pond to be treated and discharged off site as leachate. The resulting reduction of runoff from the site would be negligible, since the volume of runoff from the active face would comprise less than 1 percent of the total surface runoff from the site.

During closure of landfill cells, a final cover would be placed which consists of a polyethylene FML overlain by a drainage layer and a soil layer, and planted with shrubs, grasses, and some trees (see Section I.B.1.d(4)(d), Final Cover). This final cover would prevent infiltration of rainfall into the waste. However, rainfall would infiltrate into the soil and drainage layers and move downslope through these layers in much the same manner as it infiltrates into and moves through the soil under existing conditions. Because the final cover is designed to provide efficient subsurface drainage, runoff volumes and rates from areas with final cover would be expected to be slightly greater than under existing conditions. However, the three sedimentation/ detention basins would continue to detain peak flows at or below existing pre-project levels. Therefore, no significant long-term impacts are anticipated.

(c) *Erosion, Sedimentation, and Turbidity*. Erosion and sedimentation impacts were assessed for 1) potential disturbance created by initial first-year construction activities and 2) potential disturbance caused by ongoing cell development within the project area after erosion and sedimentation control measures are in place. Estimates of soil erosion were derived using the physical sediment transport equations of Julien and Simons (1985). For initial first-year construction activities (for example, construction of roads and staging areas), the maximum sediment concentration expected during intense rainfall (a 2-year event) was calculated. For long-term impacts of landfill development, seasonal and annual discharges of eroded soils/ sediments from the site were calculated assuming erosion and sedimentation control. Two assumptions were made regarding control: 1) 25 percent of eroded soils would actually be delivered to the sedimentation basins and swales and 2) 40 percent of delivered sediments would be settled out within the basins and swales. Control at these assumed levels or better has been demonstrated elsewhere (Walker, 1987; Horner, 1988; Ecology, 1990b; Brown and Caldwell, 1991; Faha and Raetz, 1991).

Initial first-year construction activities could cause temporary, short-term total suspended solids (TSS) concentrations of about 1,000 mg/l in the Southern Tributary below the landfill during the initial hours of intense rainfall (a 2-year event). Further downstream at the confluence of Sucker Creek and the Southern Tributary, TSS would peak at approximately 400 mg/l. These predicted peak concentrations are high and would temporarily impair water quality.

Although the sedimentation/detention basins would not be in place during initial first-year construction activities, several erosion and sedimentation controls would be implemented. These include confining construction to the dry season (approximately June through September), installing silt fences, and covering exposed soil areas with plastic, gravel, or geotextile blankets. Such measures would be essential in minimizing erosion and sedimentation until permanent control facilities are operational.

Long-term and cumulative impacts of the landfill on soil erosion and sediment yield would depend on how much bare soil area is exposed, how long these areas are left exposed without cover, and the success of permanent erosion control measures. Seasonal control of exposed soil areas is proposed. Soil disturbance and exposure would occur predominantly in the drier months of June through September, when very little erosive rainfall occurs. During the wetter months of October through May, soils on developed areas of the landfill would be covered with plastic, plantings, gravel, or geotextile blankets.

For purposes of estimating sediment impacts from exposed soil during cell construction and operations, the following acreages of exposed soil were assumed for different seasons of the year (for a more detailed breakdown by month and year, see Appendix F of this EIS).

- Bottom liner or final cover construction: average of 2 acres in May, 21 acres during June and July, tapering down to zero by October, and remaining at zero from October through April.

- Borrow and stockpile areas: average of 1 acre in May, 7 acres during June and July, tapering down to zero by October, and remaining at zero from October through April.

- Ditches and cut/fill banks: 2 acres year round.

A number of permanent erosion control measures would be implemented throughout landfill construction and operation, and runoff would be directed through sedimentation/detention basins and biofiltration swales (see Section I.B.1.d(5)(d), Erosion and Sedimentation Controls). Proper design, frequent monitoring, and ongoing maintenance of these measures and facilities would be necessary to effectively control soil erosion and sedimentation.

With seasonal control of exposed soil and permanent erosion and sedimentation controls, erosion calculations indicate that the annual quantity of sediment discharged from the site would likely be less than existing quantities in nearly all years of landfill construction and operation. This is because the proposed sedimentation/detention basins would contain sediments resulting from existing on-site erosion, as well as sediments resulting from increased erosion during landfill construction.

The annual quantity of sediment discharged from the site could potentially exceed existing sediment discharge in the final few years of landfill operation, when relatively large areas would undergo final grade. Assuming that erosion and sedimentation control efficiency is successfully maintained, the cumulative quantity of sediment discharged from the site over the life of the landfill is expected to be less than would be discharged during the same period under existing conditions. Therefore, no significant adverse impacts to water quality are anticipated due to erosion and sedimentation.

(d) *Nutrients*. Predicted project effects on phosphorus loading from the site were estimated from erosion and sediment discharge calculations, because phosphorus can be bound to sediment particles. Reduction of watershed nutrient inputs to Silver Lake has been cited as one of the potential strategies for restoring lake water quality (Moore et al., 1990).

Long-term effects of the landfill on phosphorus loading from the site would be directly related to the changes in sediment yield. Phosphorus loading to the Southern Tributary just below the landfill site would likely be less than existing conditions in nearly all years of landfill construction and operation. The annual phosphorus loading from the site could potentially exceed existing conditions in the final few years of landfill operation, when relatively large areas would undergo final grade. Assuming that erosion and sedimentation control efficiency is successfully maintained, the cumulative phosphorus loading from the site over the life of the landfill is expected to be less than the phosphorus loading over the same period under existing conditions. Therefore, no significant adverse impacts to water quality are anticipated due to phosphorus loading from the site.

(e) *Temperature*. Water temperatures in the diversion channel would be increased from existing on-site levels by up to 2°C during the first few years of operation until riparian shade is fully established. These temporary increases would likely exceed the Class AA maximum allowable water temperature standard of 16.3°C (Table II-6), although the basis for application of the standard is unclear when an existing stream where standards are already occasionally exceeded (possibly due to human-caused conditions) is compared to a future relocated stream. Exceedances of the standard would likely occur less than 10 percent of the time in July and August. The maximum allowable increase of 2.8°C would probably not be exceeded as a result of the landfill project alone. Water temperatures considered stressful to trout (greater than 18°C) would probably occur for a few midday hours during particularly warm summer days. No long-term, significant effects on water temperatures are anticipated.

Sedimentation and diversion channel ponds could also cause increased warming depending on the design (that is, surface area to volume or depth ratio). Weyerhaeuser would consult with the agencies to develop a final design that would prevent water temperature increases potentially stressful to fish.

(f) *Other Contaminants*. Surface runoff from roads or equipment staging areas could contain oil, grease, and hydrocarbons (from gasoline or diesel fuels). No significant increases in the quantities of these contaminants in runoff are anticipated from the proposed project. Spills or release of oils and grease from machinery would be contained and cleaned up in accordance with state regulations and spill prevention and cleanup plans that would be prepared for the project.

(g) *Contamination by Accidental Leachate or Solid Waste Spills*. Contamination of surface waters by accidental spills of leachate could cause severe degradation of water quality and impacts to aquatic biota. Spills could occur from the rupture of a leachate pipeline (a distance of approximately 600 feet from the surface waters), an exposed valve, or a rail car derailment. Potential spills of leachate during transfer to rail cars would be contained by containment walls at the rail car siding.

A worst-case analysis was conducted of the potential impacts of leachate released into streams near the site (Appendix B of Beak, 1991a). Leachate constituents and concentrations for the proposed landfill were assumed to be similar to those for the Mt. Solo Landfill. In the raw leachate from the Mt. Solo Landfill, the only constituent whose concentration exceeded Washington State and federal maximum contaminant levels is ammonia. In addition, the leachate has a high chemical oxygen demand that could rapidly deplete dissolved oxygen in receiving waters. Therefore, these are the only two constituents of concern, and were the only ones included in the analysis.

The worst-case analysis assumed that a 20,000-gallon leachate tank car derailed, ruptured a 6-inch valve, and spilled its entire contents into Sucker Creek (which flows into Silver Lake) or Ostrander Creek (which flows into the Cowlitz River). Low flow conditions were assumed (0.5 cfs for Sucker Creek and 1.1 cfs for Ostrander Creek).

With an assumed ammonia concentration of 92 mg/l in the leachate, Sucker Creek would have a concentration of 75 mg/l and Ostrander Creek would have a concentration of 62 mg/l during the spill event. These concentrations far exceed EPA standards for acute (25 mg/l) effects on freshwater biota. In addition, the oxygen demand caused by the spilled leachate would likely result in rapid loss of dissolved oxygen. Therefore, under the assumed low flow conditions, water quality in Sucker and Ostrander Creeks would be significantly impaired. (At higher creek flows such as occur during the rainy season, there would be no significant adverse impacts on creek water quality.)

Based on consultations with rail safety experts and other considerations discussed in Section II.B.6, Transportation, the probability of occurrence of a train derailment that results in the rupture of a "105" tank car, releasing its entire contents into a creek at low flow, is so low that the potential for significant adverse impacts to creek water quality could be considered remote and speculative. Low stream flows occur only during periods of low rainfall when there is also reduced leachate production. With reduced leachate production, there is increased capacity to store leachate in the leachate holding pond on site, reducing the need to transport leachate to the Longview mill.

Following a spill into Sucker or Ostrander creeks at low flow, water quality would likely return to prespill conditions within several days. Upon reaching Silver Lake, the leachate would be diluted rapidly in a small area at the mouth of the creek to concentrations below EPA acute and chronic toxicity levels. The dilution capacity of Silver Lake and the Cowlitz River would be sufficient to avoid any significant impacts to water quality and aquatic organisms. Silver Lake may be affected at the mouth of Sucker Creek, but only to the point that dilution of the material reaches approximately 100 to 1. This would happen almost immediately upon discharging to the lake.

A leachate spill into the Cowlitz River was also evaluated (see Appendix H). The analysis assumed that the entire contents of a tank car (20,000 gallons) would be released at the rate of 2,000 gallons per minute (approximately 4.5 cfs) when the river was at a typical flow (7,900 cfs). Given the volume of water moving through the river compared to the volume of leachate, the spilled leachate would be expected to mix completely with river water. Calculations based on this spill scenario indicate that the resulting concentrations of leachate constituents would not measurably increase existing concentrations of these constituents in the river. Concentrations would be below the Washington State criteria for acute and chronic toxic effects on freshwater biota, as well as below state or federal maximum contaminant levels. Therefore, no significant adverse impacts on aquatic biota or water quality would be expected. In addition, if a leachate tank car derailment and spill occurred at the rail crossing of Cowlitz River, the public water supplies of the cities of Longview and Kelso, whose water supply intakes are located approximately 7,100 feet and 10,100 feet downstream of the crossing, would not be affected.

These conclusions would apply even if the Cowlitz River were at an extreme low flow of 973 cfs (reported by Williams and Pearson, 1985, based on a 34-year gauge record at Castle Rock). With regard to the probability of occurrence of a tank car derailment and spill into the Cowlitz River at low flow, the conclusion would be the same as that described above for Sucker and Ostrander Creeks.

No significant adverse impacts would be expected from a spill of solid waste in a stream or the Cowlitz River. Depending on the type of waste spilled, there could be some short-term degradation of water quality until the spill response plan is implemented and the solid waste is retrieved. However, fish and rat bioassays have been performed for all of the different types of waste that would be disposed at the proposed landfill, and no mortalities resulted (Parker, 1990).

These results indicate that a spill of solid waste would not degrade water quality to the extent that it would be toxic to fish or wildlife.

(h) *Contamination by Liner Leakage*. In the event that a leak occurred in the bottom liner of the landfill, leachate could migrate to groundwater or contaminate surface water via end-of-pipe discharge from the HGCS. The impact on groundwater from a liner leak was presented in the groundwater section (Section II.A.2) using an extreme worst-case leakage rate. The impact to surface water quality was analyzed using the same approach and assumptions as described for the groundwater scenario, except that both the extreme worst-case and reasonable maximum leakage rates were assessed (see Table II-3 in Section II.A.2, Groundwater). Concentrations of several constituents were calculated for base flow conditions in the Southern Tributary just below the site and at the confluence of the Southern Tributary and Sucker Creek.

Based on the extreme worst-case liner leak scenario, ammonia concentrations could potentially exceed the EPA chronic standard for freshwater aquatic biota (2.2 mg/l) during lowest base flow conditions. Under these same conditions, dissolved oxygen levels could also be reduced to below the state standard of 9.5 mg/l depending on ambient stream concentrations. As noted in Section II.A.2, Groundwater, the extreme worst-case leakage rate assumed in this scenario (18 gal/acre/day) substantially overestimates the amount of leachate that would be expected to be discharged from a potential liner leak. The probability of such a worst-case scenario actually occurring is considered remote and speculative.

At higher base flow conditions or under the reasonable maximum leakage rate, a liner leak would not significantly affect water quality or cause violation of standards. Further downstream at the confluence of the Southern Tributary and Sucker Creek, liner leak impacts to water quality would be insignificant, even at the lowest base flow conditions or extreme worst-case leakage rate.

(2) Alternative Site Plan A

The exclusion of the western lobe of the landfill under Alternative Site Plan A would reduce the landfill footprint by 18 acres. Because less area would be affected, the overall effects of project development on runoff and water quality would likely be less over time than that predicted for the Proposal. For example, the total volume of runoff discharged from the sedimentation/detention basins would be reduced, as would total leachate production. In addition, the diversion channel would be approximately 1,000 feet shorter than that for the Proposal.

(3) Alternative Site Plan B

The exclusion of the western and eastern lobes of the landfill under Alternative Site Plan B would reduce the landfill footprint by 94 acres. Because less total area would be affected in Alternative Site Plan B, the overall effect of project development on runoff and water quality would be less overtime than that predicted for the Proposal or Alternative Site Plan A. For example, the total volume of runoff discharged from the sedimentation/detention basins would be reduced, as would total leachate production. The diversion channel would be the same length as that for Alternative Site Plan A (1000 feet shorter than the diversion channel for the Proposal).

(4) No-Action Alternative

Sediment and nutrient loading could be somewhat greater than for the Proposal and alternative site plans, because any soil eroded from the site would not be contained in sedimentation/ detention basins.

c. Mitigation

Mitigation measures for potential impacts of the proposed landfill on surface water quality and quantity are incorporated into project design (see Section I.B.1.d under Leachate Management and Surface Water Management). These include extensive erosion and sedimentation control measures, such as the use of interim plastic cover in landfill sequencing and construction. Proper design, regular inspection, and ongoing maintenance of these mitigation measures and facilities are essential to ensure effective control of water quantity and quality. With successful implementation of these features, no additional mitigation for protection of surface water resources would be needed. However, if monitoring indicates that measures and facilities were not providing adequate control, necessary modifications would be undertaken immediately under the direction of Ecology.

In the event of a liner leak, the majority of the leachate would likely flow preferentially through the sand layer of the HGCS and discharge at the landfill perimeter (see further discussion in Section II.A.2, Groundwater). Therefore, monitoring the HGCS discharge would provide an opportunity to detect a liner leak and take corrective action before significant leachate contamination of surface water or groundwater occurs. For this reason, it is recommended that the HGCS discharge be monitored frequently for leachate indicators when water is flowing in the system. If leachate contamination is detected, the flow would be collected and treated as leachate until corrective action occurs.

The use of "105" tank cars to transport leachate would minimize the potential for a leachate spill into the Cowlitz River or one of the small streams crossed by the rail line. If such a spill did occur, the spill response plan would be implemented immediately (see Section I.B.1.f(4), Spill Response). As discussed in that section, appropriate agencies and potentially affected parties would be notified immediately in accordance with "call-down" lists specifying the notification order for spills at different locations. For a spill of leachate into the Cowlitz River, the City of Longview and Kelso water plants would be notified first.

d. Significant Unavoidable Adverse Impacts

Provided the leachate management and surface water management features described in Section I.B.1.d are properly designed, constructed, operated, and maintained during the life of the project and the post-closure period, landfill construction and on-site operations under the Proposal or alternative site plans would not be expected to result in significant unavoidable adverse impacts to surface water resources.

If a derailed leachate tank car fell into Sucker Creek or Ostrander Creek at low flow and ruptured a valve, the resulting leachate spill would significantly impair water quality in these creeks.

Water quality would likely return to pre-spill conditions within a few days. The estimated frequency of occurrence of such a spill event is once in 200 years.

4. Air Quality

This section is based on a report by OMNI Environmental Services, Inc., which is included in Appendix D of the *Environmental Technical Report* (Beak, 1991a); as well as revisions to that report based on a technical review by URS Consultants, which are included in Appendix L of this EIS (OMNI, 1991).

a. Affected Environment

(1) Climate

The climate of Cowlitz County is primarily a mid-latitude, West Coast marine-type climate with moist air; cool, dry summers; mild but rather wet and cloudy winters; and a small range in daily temperature. The number of days with measurable rainfall each month increases from fewer than 5 in midsummer to 20 or more in fall and winter. Annual precipitation ranges from 45 to 60 inches in the lower valleys to between 80 and 100 inches or more along the western slope of the Cascades. A 66-inch annual rainfall value was measured at the Headquarters Site in 1990. The snow line during midwinter along the western slope of the Cascades in Cowlitz County extends down to between 1,000 and 2,000 feet. The elevation of the Headquarters Site is 1,000 feet.

In the winter, the average maximum and minimum temperatures decrease about 3°F for each 1,000 feet of increase in elevation. In summer, the decrease is slightly less at elevations below 3,000 feet. The highest temperatures in summer, and the lowest in winter, usually occur with easterly winds.

The highest winds are generally from the south or southwest. Wind velocities ranging from 40 to 50 mph can be expected each year; winds of 60 to 80 mph can be expected on a less frequent basis.

The number of clear or partly cloudy days in Cowlitz County ranges from fewer than 10 per month in winter, to 15 in spring and fall, to more than 20 in midsummer. In late summer and fall, low clouds and fog frequently fill the lower valleys to a height of 1,500 to 2,500 feet at night, but dissipate before mid-afternoon. Heavy fog can be expected on 3 to 5 days each month in summer and 10 to 14 days in late fall and winter. The amount of sunshine received each month in this area of the state ranges from 20 to 30 percent of the possible sunshine in winter, 35 to 50 percent in spring and fall, and 55 to 60 percent in summer. The number of hours of possible sunshine on a clear day increases from 8 in December to 16 in June.

(2) Air Quality

Three regulatory agencies have jurisdiction over air quality in Cowlitz County: EPA, Ecology, and SWAPCA. Ambient air quality standards have been promulgated for air pollutants known as "criteria pollutants" at both the state and national level (Table II-7). In addition, the state of

Washington has promulgated ambient standards for specific toxic air pollutants (WAC 173-460). Prevention-of-significant-deterioration pollutant increments are not applicable since the proposed landfill will not be a major stationary source (40 CFR 52.21).

Table II-7 Ambient Air Quality Standards [a]

Pollutant	National		Washington State
	Primary	Secondary	
Total Suspended Particulate			
Annual Geometric Mean	No standard	No standard	60 $\mu g/m^3$
24-Hour Average	No standard	No standard	150 $\mu g/m^3$
PM_{10}			
Annual Arith. Mean	50 $\mu g/m^3$	50 $\mu g/m^3$	50 $\mu g/m^3$
24-Hour Average	150 $\mu g/m^3$	150 $\mu g/m^3$	150 $\mu g/m^3$
Sulfur Dioxide (SO_2)			
Annual Average	0.03 ppm	No standard	0.02 ppm
24-Hour Average	0.14 ppm	No standard	0.10 ppm
3-Hour Average	No standard	0.50 ppm	No standard
1-Hour Average	No standard	No standard	0.40 ppm[b]
Carbon Monoxide			
8-Hour Average	9 ppm	9 ppm	9 ppm
1-Hour Average	35 ppm	35 ppm	35 ppm
Ozone			
1-Hour Average[c]	0.12 ppm	0.12 ppm	0.12 ppm
Nitrogen Dioxide (NO_2)			
Annual Average	0.05 ppm	0.05 ppm	0.05 ppm
Lead			
Quarterly Average	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$

[a] Annual standards never to be exceeded; short-term standards not to be exceeded more than once per year unless noted.
[b] 0.25 ppm not to be exceeded more than two times in any 7 consecutive days.
[c] Not to be exceeded on more than 1 day per calendar year as determined under the conditions indicated in WAC 173-475.

Baseline concentrations of criteria and toxic air pollutants were evaluated at the proposed landfill site. Existing concentrations of all air pollutants are low due to the rural nature of this site.

Baseline particulate concentrations were estimated by reviewing data obtained from the Oregon Department of Environmental Quality (DEQ) and Ecology monitoring stations located in environments similar to that of the proposed landfill (Oregon DEQ, undated, and Ecology, 1991). Estimates were developed of a typical annual geometric mean total suspended particulate (TSP) value and a typical annual arithmetic mean PM_{10} (particles with aerodynamic diameters less that 10 microns) value for the landfill site. These estimates ranged from 10 to 25 $\mu g/m^3$ and from

10 to 20 µg/m^3 for the mean TSP and PM_{10} values, respectively. Similarly, estimates for the second-highest 24-hour values ranged from 40 to 80 µg/m^3 and from 30 to 60 µg/m^3 for TSP and PM_{10}, respectively. Both the annual means and second-highest 24-hour estimated values are well below standards (Table II-7). From review of emission inventory data for the airshed supplied by Ecology (Washington Emission Data System), and from monitoring conducted along an unpaved road at the Headquarters Site during the summer and fall of 1990, it was determined that fugitive dust is the largest existing source of atmospheric particles. Small contributions also result from residential heating sources, transportation sources, and the long-range transport of pollutants from sources outside the airshed.

Based on the emission inventory data supplied by Ecology and observations made regarding the rural nature of the site, baseline concentrations of the remaining criteria pollutants and toxic air pollutants were determined to be low. Sulfur dioxide (SO_2) and nitrous oxides (NO_x) are generally associated with major stationary sources such as fossil fuel combustion. Carbon monoxide (CO), ozone, lead, and toxic air pollutants are traditionally associated with urban environments and major industries. In each case, the baseline concentrations would be well below the standards listed in Table II-7 for criteria pollutants and in WAC 173-460 for toxic air pollutants. Baseline measurements of volatile organic compounds (VOCs) were made periodically (once every 6 days) at the Headquarters Site during the summer and fall of 1990. These measurements were made because 1) many air toxic pollutants are VOCs, 2) reactive VOCs are involved in the production of atmospheric ozone, and 3) hydrocarbons that are regulated due to their explosive potential (WAC 173-304-460) are also VOCs. No VOCs were detected at the Headquarters Site.

(3) Odor

Odor is regulated by the state of Washington (WAC 173-400-040) and by SWAPCA (Regulation 400-040). Although specific odor standards are not provided under Washington State codes, if odor unreasonably interferes with property owner's use and enjoyment of his property, recognized good practice must be used to reduce the odors to a reasonable minimum. SWAPCA has specific standards based on measurements made with a commercial instrument called a scentometer. Baseline odor measurements were made periodically (once every 6 days) during the summer and fall of 1990 with a scentometer. No odor was detected with the instrument.

b. Impacts of Alternatives

(1) The Proposal

(a) Air Quality. The proposed landfill could impact air quality in two primary ways. First, the construction activities at the landfill, as well as vehicular traffic, would produce dust that could contribute to the ambient particulate (TSP and PM_{10}) concentrations in the area. Second, the generation of landfill gas and its combustion with flare systems could introduce VOCs (toxic compounds and explosive hydrocarbons) and criteria pollutants (SO_2 and NO_x) into the atmosphere. In addition to these two primary areas of concern, the release of air pollutants from three other minor sources were evaluated; 1) the volatile release from the handling of fresh waste materials, 2) the volatile release from the leachate pond, and 3) emissions from diesel locomotive engines used to power haul trains. Based on calculated emission rates (Parker, 1990, and U.S. EPA, 1985b), these latter three sources of air pollutants were found to have insignificant impacts on ambient air quality.

A two-step process was used to determine the impacts from fugitive dust and from landfill gas generation with its subsequent flaring. First, emission factors were calculated (U.S. EPA, 1973, 1974, 1985a, and 1990a) and then dispersion modeling using EPA models (EPA, 1988b and 1990b) were conducted. Worst-case meteorological conditions were used to model the impact of gaseous pollutants associated with the landfill gas and its subsequent flaring. Summer and early fall wind data were used to model fugitive dust impacts, since emission of particulate material would be at its highest this time of year. (Soil moisture would be at its lowest during the summer and early fall, since seasonal rainfall would be at a minimum and seasonal temperatures would be at a maximum. Also, frozen conditions and snow cover, which reduce dust emissions, do not occur during the summer.) Further detail on the impact analyses for fugitive dust and gaseous emissions is provided below.

Fugitive Dust. Fugitive dust emissions were modeled under controlled and uncontrolled conditions using the EPA Fugitive Dust Model (FDM) (U.S. EPA, 1990b), the best available soil (particulate) size distribution data (Houck et al., 1989 and 1990; Sweet-Edwards/EMCON, 1990a; U.S. Department of Agriculture, 1974; and U.S. EPA, 1985a), and information regarding site operations and design. Modeling was conducted for the operation of cells that were closest to the western property boundary, which is also adjacent to the residence nearest the landfill. By modeling concentrations at that point, the worst-case impact scenario was obtained. The MFS specify that air quality standards must be met at the property boundary, and WAC 173-460 (Controls for New Sources of Toxic Air Pollutants) specifies that standards for specific toxic air pollutants must be met at any area that does not have restricted or controlled public access. The western property boundary near where Headquarters Road enters Weyerhaeuser property and close to the nearest residence is where both these conditions are met. Therefore, the greatest impact to air quality outside of Weyerhaeuser property would occur there.

Emission factors were calculated for storage piles, plastic-covered areas, paved and unpaved roads, the active cell working face, a cell under construction, and the remaining portion of the active cell exclusive of the working face. The uncontrolled modeling scenario assumes no control, including no plastic covering. The controlled modeling scenario assumes 50 percent particulate control with the exception of the area covered with plastic, which was conservatively assumed to be 70 percent efficient in reducing emissions (U.S. EPA, 1973, 1974, 1985a, and 1985c).

The results of the dispersion modeling are shown in Table II-8. Realistic worst-case estimates of TSP and PM_{10} concentrations at the western property boundary (and nearest residence) are well below applicable annual and 24-hour standards. However, it should be noted that high particulate concentrations adjacent to unpaved roads, particularly during the summer, can be expected everywhere in the airshed.

Volatile Organic Compounds. It is estimated that the landfill gas produced by the proposed facility would be approximately 50 percent methane (by volume) and 50 percent carbon dioxide. Trace levels of a variety of other organic compounds and reduced sulfur compounds would also be present. Trace level, in this case, refers to compounds that may be present at up to the several hundred parts per million level (one hundred parts per million is equivalent to 0.01 percent).

Table II-8 Predicted Particulate Impacts and Concentrations at the Western Property Boundary and at the Nearest Residence

	Annual Average (μg/m³)			Second-Highest 24-Hour Average (μg/m³)		
Category	Impact	Ambient Concentration [a]	Applicable Standard	Impact	Ambient Concentration [a]	Applicable Standard
TSP, uncontrolled	3.2	28 [b]	60 [b]	16.7	97	150
TSP, controlled	1.4	26 [b]	60 [b]	7.9	88	150
PM_{10}, uncontrolled	1.5	22	50	7.7	68	150
PM_{10}, controlled	0.7	21	50	3.7	64	150

[a] Sum of impact and worst-case estimate of baseline conditions.
[b] Geometric mean.

The proposed landfill would accept the same type of waste that was accepted at the Mt. Solo Landfill, so the gas produced would be expected to be contain similar trace constituents at similar concentrations. A sample of gas from the Mt. Solo Landfill was analyzed for 42 VOCs using EPA method 8240 (U.S. EPA, 1986a). Only four of these were present in concentrations above detection limits: methyl bromide, 2-butanone, toluene, and total xylenes.

The SCREEN model (U.S. EPA, 1988b) was used to determine the concentrations of these constituents at the western site boundary. Worst-case meteorological conditions (low wind speed and high atmospheric stability) were assumed, as well as no mitigation (no combustion of gas in flares). Modeling results indicate that concentrations at the western boundary would be well under the state of Washington Acceptable Source Impact Levels (ASILs) (Table II-9). In addition, the landfill would not be a major stationary source of hazardous air pollutants (HAPs) under federal criteria. The federal criterion for a major stationary source of HAPs is 10 tons per year of any HAP, or 25 tons per year of a combination of HAPs. The compound 2-butanone is at highest concentration among the HAPs (Table II-9) and its estimated emission rate is 8 tons per year.

Due to the explosive nature of methane, its highest worst-case concentration at the western property boundary was estimated with the SCREEN model. The highest predicted 1-hour average for methane emitted under uncontrolled conditions (no flare) at the western property boundary was 39 ppm (.0039 percent by volume). (Typically, the combined control efficiency for the collection and flare system is approximately 50 percent). The MFS (WAC 173-304-460) require that the lower explosive limit for methane (5 percent by volume) not be exceeded at the property boundary, and that the concentration of methane not exceed 100 ppm in off-site structures.

Table II-9 Air Toxics Concentrations in Landfill Gas, Predicted Maximum 24-Hour Average Atmospheric Concentrations at the Western Property Boundary and the Nearest Residence, and ASILs

Compound	Concentration in Landfill Gas (ppm)	Atmospheric Concentration at Boundary[a] (µg/m³)	ASIL[b] (µg/m³)
Methyl bromide	4	0.2	66.6
2-Butanone	138	0.6	1,964.7
Toluene	0.7	0.04	1,248.8
Total xylenes	0.3	0.02	1,448.6

[a] Highest 24-hour average.
[b] 24-hour average.

Sulfur Dioxide and Oxides of Nitrogen. The potential impact of SO_2 and oxides of NO_x from the landfill gas flare system was evaluated. This task consisted of 1) reviewing the engineering specifications for flare systems proposed for use at the landfill, 2) reviewing NO_x and SO_2 emissions from similar flare systems, 3) estimating the sulfur content of the landfill gas and the corresponding worst-case impact to ambient air of SO_2 produced by the combustion of landfill gas in the flare systems, and 4) estimating NO_x emissions from the flares and their corresponding worst-case impacts to ambient air. It should be noted that the source of SO_2 would be the combustion (oxidation) of the reduced sulfur compounds in the landfill gas, whereas the primary source of NO_x would be the oxidation of atmospheric nitrogen in the high-temperature flare environment, not the oxidation of volatile nitrogen-containing compounds contained in the landfill gas.

As previously noted, the Mt. Solo Landfill contains material similar to that planned for disposal at the proposed landfill. Dimethyl sulfide at a concentration of 11.6 ppm was the only sulfur-containing compound measured above detection limits in a landfill gas sample collected at the Mt. Solo Landfill. Assuming that all the sulfur in the dimethyl sulfide is converted to SO_2 in the flare, the highest predicted hourly average ambient concentration of SO_2 would be 1.18 $\mu g/m^3$ or 0.000452 ppm at the western property boundary, which is many times lower than applicable standards of 0.4 ppm (Table II-7).

The EPA-published emission factor for NO_x from enclosed flares at municipal landfills is 4.9 lb of NO_x per million cubic feet of landfill gas (7.9×10^{-2} g/m^3) (U.S. EPA, 1990a). It should again be emphasized that the primary factor in NO_x production is not the concentration of nitrogen compounds in the landfill gas, but flare combustion conditions. By multiplying the EPA emission factor by the estimated volume of landfill gas generated each year, an emission rate of

0.039 gram per second (g/s) can be calculated. Using this emission factor, the maximum hourly average ambient concentration of NO_x at the western property boundary, as determined by the SCREEN model, is 3.07 $\mu g/m^3$ or 1.63×10^{-3} ppm. This would produce annual average values many times lower than the 0.05 ppm annual standards (Table II-7).

A detailed evaluation of the impact that the proposed landfill would have on the remaining three criteria pollutants (ozone, CO, and lead) was not conducted since they would not be produced in significant quantities by the landfilling activities.

(b) *Odor*. The potential for off-site odor due to landfill gas generation was evaluated by determining the concentrations of odor-causing constituents at the site boundaries using the SCREEN model. Analysis was conducted on sample of Mt. Solo Landfill gas for the four reduced-sulfur compounds generally associated with the odor of pulp and paper mills and landfill gases produced under anaerobic conditions: hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide. Only one of these compounds, dimethyl sulfide, was present at a concentration above the method's detection limit of 5 ppm. Assuming gas generation rates typical of landfills, and worst-case meteorological conditions, the SCREEN model predicted that the 1-hour average concentrations at the western property boundary would be below olfactory thresholds for all four compounds (Table II-10). This indicates that odors would not be present at property boundaries, with the possible exception of short-term odors that may occur during rare meteorological events.

No significant odors would be expected during rail transport of the types of solid waste that would be received at the proposed facility. Solid waste containers would be covered with a tied-down canvas tarp, and would have a rubber gasket on the rear door to reduce the potential for leakage. The containers would be similar to those currently used for rail transport of Snohomish County mixed municipal waste and King County construction, demolition, and landclearing waste to the Roosevelt Regional Landfill in Klickitat County. Odor has not proved to be a problem in these long-haul transport operations. Weyerhaeuser is also currently using this type of container to transport a portion of its industrial solid waste, including deinking sludge, to the Roosevelt Regional Landfill. This train passes through the City of Longview, and City staff indicate there have been no odor complaints.

Table II-10 Concentrations of Odor-Producing Compounds at the Western Property Boundary and Nearest Residence, and 50% Odor Detection Levels

Compound	Concentration in Landfill Gas (ppm)	Atmospheric Concentration at Boundary[a] ($\mu g/m^3$)	50% Odor Detection Level [b] ($\mu g/m^3$)
Hydrogen sulfide	<5	<0.3	5.5
Methyl mercaptan	<5	<0.4	2.4
Dimethyl sulfide	11.6	1.1	51
Dimethyl disulfide	<5	<0.7	66

[a] Highest 1-hour average
[b] Data from Nagy, 1991

Leachate from the proposed landfill would be transported by rail in fully enclosed, steel-jacketed tank cars with a plate steel housing over the manway (see further discussion in Section I.B.1.d, Waste Transportation and Loading/Unloading Facilities). It is unlikely that leachate odors would be detectable even within short range of the full tank cars.

(2) Alternative Site Plan A

All emissions would be somewhat reduced but would be very similar to those of the Proposal.

(3) Alternative Site Plan B

All emissions would be somewhat reduced but would be very similar to those of the Proposal.

(4) No-Action Alternative

Some dust would be produced from timber management activities and on-site truck traffic, but no violations of particulate standards would be expected.

c. Mitigation

The Proposal includes measures to control particulate emission, such as paving, sweeping, mulching, watering, and plastic covering of nonactive areas. Proposed gas control includes a gas collection and, if necessary, a flare system (see Section I.B.1.d(6), Landfill Gas and Odor Control). No further mitigation is required to meet all air quality standards.

d. Significant Unavoidable Adverse Impacts

With the proposed particulate controls, and implementation of active gas control, if needed, no significant unavoidable adverse air quality impacts are expected.

5. Plants and Animals

a. Affected Environment

This section is based largely on the *Environmental Technical Report* (Beak, 1991a); wildlife and fisheries reports in Appendices I and J, respectively, of that report; and the revised *Mitigation Plan* in Appendix A of this EIS. Field surveys conducted to assess the plant and wildlife composition of the site included fish habitat surveys in 1990, seasonal fish population sampling in 1990 and 1991, wildlife surveys (200 person-hours) from February through June 1990, a threatened and endangered plant survey in June 1990, a vegetation cover type survey in June and July 1990, and electrofishing of Sucker Creek in July 1992. Results of the July 1992 electrofishing are presented in a report in Appendix K of the EIS.

The evaluation of the effects of a leachate spill or liner leak on aquatic resources is based on the conclusions of the water quality analyses described in Section II.A.3, Surface Water.

(1) *Plants*

Vegetation at the Headquarters Site consists primarily of young managed forest stands. Age differences between stands are a result of forest management schedules. Because logging activities are continually changing the plant community composition, acreages of individual stands are not discussed.

The most abundant cover type at the Headquarters Site is early seral shrub. This cover type comprises stands that are 5 to 10 years of age. Common species include Douglas fir, red alder, salmonberry, salal, and Oregon grape.

The second most abundant cover type is clearcut/seedling. It includes stands that range from 0 to 4 years of age. Common species found in this cover type include Douglas fir, bracken fern, grasses, and invasive weedy species. The clearcut areas are commonly invaded with western hemlock and red alder.

Other minor cover types and the predominant species within them include: sapling/early pole (11- to 20-year-old stands of Douglas fir, with western hemlock, and red alder); pole (21 to 40 year old Douglas fir, with red alder and western hemlock); early sawtimber (41 to 60 year old stands of Douglas fir, with western hemlock and grand fir); and wetlands, which are discussed in Section II.A.6, Wetlands.

No sensitive, threatened, or endangered plant species are known to occur on the Headquarters Site. The Washington Natural Heritage Program identified five sensitive plant species found in Cowlitz County. Potential habitats of these species on the site were identified initially using topographic maps and aerial photos. The areas identified were then checked in the field for occurrence of these species. None of the species were found during the survey.

(2) *Animals*

Wildlife resources at the Headquarters Site are strongly influenced by past and present forest management practices. These forest management practices result in dynamic habitat conditions as forest stands grow from seedlings to mature large trees (sawtimber). Species associated closely with one or a few early seral stages and those capable of utilizing multiple stages of forest succession are common, while species dependent upon mature or old-growth forest are rare or absent.

(a) Wildlife Habitat. Six wildlife habitat types, corresponding to the cover types discussed above, were identified on the site.

The clearcut/seedling habitat type provides poor to fair wildlife habitat due to disruption associated with timber harvest and seedbed preparation. Small mammal usage of these areas is limited due to the lack of cover. Avian use is primarily by those birds that nest and feed on or near the ground or forage for insects in stumps and woody debris. Black-tailed deer and Roosevelt elk forage on the developing herbaceous layer near protective cover and away from human activity.

The early seral shrub habitat type provides fair to good wildlife habitat because of a more defined shrub layer and increased herbaceous cover. Birds that exploit shrub-dominated habitat (e.g., sparrows, towhees, and some warblers) utilize these areas for nesting and foraging. Brush control measures limit avian populations that require deciduous plant species. Small- and medium-sized mammals, and large mammals such as deer, benefit from the increased cover and food provided by the thick herb and low shrub layers. Habitat usage by elk remains low due to the lack of sufficient cover.

Younger stands of the sapling/early pole habitat type provide wildlife habitat similar to that of well-developed early seral shrub. As these stands age, the overstory canopy excludes more and more light and the resultant decline in shrubs and herbs reduces wildlife habitat quality. Deer and elk use shifts from foraging to cover needs. Bird usage for nesting and cover remains high in the dense stands.

The pole habitat type provides poor to fair wildlife habitat. The closed forest canopy limits sunlight and thus slows the growth of understory herbs and shrubs. Because of the reduction of understory, the number of wildlife species that can use these areas declines. Bird use is primarily by those species that live in the forest canopy. Pole habitat provides good thermal and hiding cover for deer and elk, but high use is dependent upon the availability of adjacent forage areas.

The early sawtimber habitat type provides fair wildlife habitat. With a canopy cover slightly more open and tree spacing less dense than that of the pole habitat type, growing conditions improve for herbs and shrubs in the forest understory. A midstory layer of conifers improves habitat structure. Forest dwelling wildlife replaces those species common to the shrub-dominated stages of the young conifer plantations. Canopy nesting birds are common, but cavity nesters are uncommon due to the lack of suitable snags. Cover is good for deer and elk, and use is high adjacent to forage areas.

The wildlife habitat value provided by the wetlands is fair. Most of the wetlands on the Headquarters Site are emergent wetlands that occur as narrow strips along small streams. Disturbances associated with recent timber harvest and the small amount and linear shape of these wetlands reduce their value as wildlife habitat. Habitat quality is improved in successional scrub-shrub wetlands located along the Southern Tributary of Sucker Creek where it passes through a sapling/early pole stand. The wetlands likely provide most of the amphibian habitat on the site.

(b) *Wildlife Populations*. The Headquarters Site has undergone extensive clearcut harvest in the last 12 years, resulting in the conversion of forested stands to early seral coniferous plantations. Existing wildlife populations are dominated by those species that typically use early seral phases of coniferous plantations. Early sawtimber and older forest dwelling species are uncommon due to the reduced availability of these habitat types.

The avifaunal (bird) community is represented predominantly by birds that nest and forage within habitats dominated by herbaceous, shrub, and conifer sapling species. Bird abundance and diversity is highest in summer and lowest in winter. The most prevalent species observed in winter are the winter wren and song sparrow; during spring, the white-crowned sparrow and song sparrow; and in summer, the willow flycatcher, Swainson's thrush, and white-crowned sparrow.

Primary and secondary cavity nesters are uncommon. Northern harrier and red-tailed hawk were the most common raptors observed, but abundance is low. Upland gamebirds (ruffed grouse and blue grouse) are uncommon as well.

Two big game species, Roosevelt elk and black-tailed deer, use the study area. Overall, use by elk is judged to be low, and use by deer is low to moderate. A lack of suitable cover appears to be an important factor limiting deer and elk abundance. In western Washington, the most productive sites for deer and elk are those that contain a mosaic of forage and cover areas distributed in roughly a 60:40 ratio and are relatively free of human activity (Witmer et al., 1985). At the Headquarters Site, clearcuts and early coniferous plantations provide foraging opportunities for deer and elk, while older forest stands juxtaposed with clearcuts provide cover. Surveys indicated that deer and elk populations within the study area are resident; no indication of significant migration into or through the site was evident.

Amphibian species likely occurring in the project area include the Pacific tree frog, western toad, rough-skinned newt, and western red-backed salamander. The wetlands on the site are important for amphibian populations as they function as breeding and rearing habitat for many amphibians.

No federal- or state-listed endangered or threatened species were identified within the study area during field visits or through agency contacts.

Active bald eagle nests are located on Silver Lake approximately 2.5 miles north of the site. The project site itself lacks suitable foraging and nesting conditions for bald eagles. No bald eagles were observed during field work and use of the site by bald eagles is unlikely.

Four species identified as species of concern by WDW were observed on the Headquarters Site during the field surveys: the turkey vulture, great blue heron, pileated woodpecker, and western bluebird. The occurrence of these species was rare, and no evidence of nesting activities was observed. Use of the Headquarters Site by these species is probably limited to occasional foraging. Potential nesting habitat does exist for the pileated woodpecker in the early sawtimber stand, where some large snags are present.

(3) Fisheries

(a) <u>Fisheries Resources</u>. Fish species in Sucker Creek include cutthroat and steelhead trout, coho salmon, reticulate sculpin, and western brook lamprey. The Southern Tributary contains cutthroat trout, reticulate sculpin, and western brook lamprey. In both streams, cutthroat trout and reticulate sculpin are relatively more abundant than other species.

Cutthroat trout collected in Sucker Creek and the Southern Tributary ranged in length from about 1 to 11 inches, with the majority less than 5 inches. Estimated total numbers of cutthroat trout within the Headquarters Site in June 1990 and January 1991 were 23 and 14, respectively. Estimated total numbers of reticulate sculpin in June 1990 and January 1991 were 369 and 73, respectively. An apparent decrease in numbers of cutthroat trout was noted at the Headquarters Site between the April and June sampling periods, suggesting a possible downstream movement in response to seasonal flow reduction.

Anadromous salmonid (steelhead trout and coho salmon) access to the Sucker Creek drainage was improved in 1988 when the fish ladder at the outlet to Silver Lake was renovated. The presence of juvenile steelhead trout in lower Sucker Creek indicates that spawning was successful in 1989. Coho salmon may also spawn in Sucker Creek, but it was not possible to determine whether the juvenile coho captured in lower Sucker Creek were naturally spawned or were stocked in 1990 by WDF. The Southern Tributary contains very little substrate suitable for steelhead or coho spawning.

In 1991, Weyerhaeuser replaced two culverts on lower Sucker Creek and the Southern Tributary. The old culvert at the 1310 Road crossing previously had been identified as a possible barrier to anadromous fish migration. An electrofishing survey was conducted in July 1992 to determine whether anadromous salmonids had extended their distribution in response to improved passage conditions. Numerous wild juvenile coho salmon were found in lower Sucker Creek and for a short distance up the Southern Tributary. Although none were found above the 1310 Road crossing, the possibility exists that coho salmon and possibly steelhead could use the section of the Southern Tributary between the 1310 Road and the C&C/Woods Railroad.

(b) *Fisheries Habitat*. Fish habitat was described with respect to stream width, gradient, and substrate composition; trout and salmon spawning habitat; quantities of pool, riffle, and run habitat; and location of migration barriers. Stream width of Sucker Creek ranges from about 10 feet near the mouth to 2 to 3 feet where it parallels the eastern edge of the Headquarters Site. The Southern Tributary ranges in width from 8 to 10 feet near its confluence with Sucker Creek to 1 to 2 feet near the southern edge of the Headquarters Site. Shallow riffle habitat comprises 54 percent and pool habitat comprises 16 percent of the Southern Tributary within the project boundary. Suitable substrate for cutthroat trout spawning is in low abundance in the Southern Tributary and is scattered throughout the reach between the mouth and the first fork. Neither the Southern Tributary nor Sucker Creek contains high-quality habitat for salmonid spawning. Neither contain barriers to migration.

b. Impacts of Alternatives

(1) The Proposal

(a) *Plants*. Existing vegetation in the buffer areas would be undisturbed by landfill construction. Existing vegetation elsewhere on site would be either permanently lost, or temporarily lost and eventually converted to a managed shrub/grassland cover type. Vegetation would be permanently lost on approximately 50 acres of the site due to construction of the rail-loading facility, leachate pond, new roads, and support facilities. Temporary vegetation loss and permanent vegetation conversion would occur over the 330-acre landfill footprint as landfill cells are developed, as well as in the stockpile and staging areas associated with the landfill. In addition, 1 acre of early sawtimber and 2 acres of sapling/early pole cover type would be converted to sedimentation and biofiltration basins designed to support aquatic vegetation.

The managed forest communities within the Headquarters Site do not provide any unique habitats nor are they considered rare or uncommon within the region. Therefore, loss of these vegetation communities is not considered to be a significant impact.

(b) *Animals*. Impacts to wildlife resulting from construction, operation, and closure of the proposed landfill can primarily be categorized as those related to habitat loss or conversion, human-related activity, and project-associated hazards. The existing multiple-successional-stage managed forest, which contains several wildlife habitat types, would be converted to one wildlife habitat type (reclaimed shrub/grassland). This loss in habitat diversity would likely reduce the abundance and diversity of the wildlife on the site.

Once cell construction begins, wildlife using a cell location either would be displaced to adjacent unaltered areas that provide suitable habitat or would perish. Displaced wildlife would either compete with established wildlife for resources, resulting in some level of stress, or colonize early seral forest stands that have been created by recent harvest.

Declines in wildlife abundance resulting from habitat loss and wildlife displacement associated with incremental construction of landfill cells are expected to differ little from those resulting from commercial logging of the site. Given these factors, overall adverse impacts associated with habitat loss and wildlife displacement are considered low, although localized losses would occur.

Project operation and project facilities would likely pose hazards to some wildlife. Increased traffic associated with the landfill could increase the incidence of roadkill for some wildlife. Increased noise around the landfill site could inhibit use of areas adjacent to the landfill for wildlife species sensitive to noise disturbance. Leachate collected from the landfill could prove toxic to wildlife attracted to the leachate pond and not deterred by the proposed fence (for example, birds and burrowing mammals or amphibians). Depending upon design of the leachate pond, the pond itself could represent a drowning hazard for some species were they to fall in and be unable to escape. Adverse impacts associated with these hazards are likely to be minimal.

Over the life of the landfill, the wildlife community of the study area would shift from that typical of a managed coniferous forest to one characteristic of shrub/grassland habitat. A few patches of trees would be planted on the closed landfill, but the general loss of habitat structure would likely reduce overall habitat quality for wildlife. Bird species associated with fields or meadows (such as savannah sparrow, western meadowlark, and mourning dove) are likely to be more abundant as reclamation is completed. Lack of downed woody material and other habitat components would reduce small mammal diversity, but numbers of some meadow-adapted species (such as microtine rodents) would likely increase. Use by raptors that hunt open fields and meadows (such as northern harrier and red-tailed hawk) could increase if their prey base (small mammals) is improved. Lack of suitable cover would likely limit deer and elk use to the perimeter of the landfill. Use by wildlife restricted to wetland and its open water component (such as great blue heron) would cease as wetland is converted to an upland herbaceous habitat.

A major spill of leachate into the Southern Tributary could result in significant loss of wildlife (such as amphibians) that use stream or streamside habitats. The probability of occurrence of such an event is so low that the potential for significant adverse impacts on wildlife could be considered remote and speculative (see Section II.A.3, Surface Water).

If a leachate tank car spilled its contents on land, there could be some moderate short-term impacts, such as mortalities of plants or individual animals present in the immediate area at the time of the spill. Plant and animal mortalities, if any, would be due to the presence of chemical oxygen demand and ammonia in the leachate, as well as its high pH. As part of the spill response plan (see Section I.B.1.f(4), Spill Response), measures would be taken as quickly as possible to keep wildlife out of the spill area. Spilled leachate would be contained, collected, and removed for treatment in an appropriate manner. Any contaminated soils would also be removed and disposed of in an approved manner, as deemed necessary by Ecology and the Health District.

Assuming that the entire contents of a tank car (20,000 gallons) spilled in a flat land area and covered it to a depth of 2 inches (either pooling or seeping into the soil), an area of about 0.4 acres could be affected. (If the leachate seeped deeper into the ground or pooled to a greater depth, a smaller area would be affected). After the leachate has spread out and infiltrated into the soil, the potential for impacts to plants and animals would be reduced due to the low soil pH (5.5), buffering capacity of the soil, volatilization of ammonia, and increased surface area exposed to oxygen, which would reduce chemical oxygen demand. Habitat loss could occur as a result of the remedial activities discussed above. The area affected would be less than one acre, and would be reclaimed with habitat features similar to that lost. Therefore, no significant long-term impacts on plants and animals would be expected.

A spill of solid waste would also not be expected to result in significant adverse impacts on wildlife. As discussed in Section II.A.3, Surface Water, results of fish and rat bioassays indicate that the types of waste that would be disposed at the proposed landfill are not toxic to wildlife.

(c) *Fisheries*. Construction of the proposed Headquarters Landfill would result in the total loss of aquatic habitat within the project boundary. This loss would occur during the initial construction of the project when the creek would be rerouted into a diversion channel (Figure I-9). Approximately 2,590 feet of Type 3 stream and 3,350 feet of lower habitat value Type 4 stream (see Glossary) would be affected, or a total of about 5,940 feet of stream.

The Type 3 stream section contained approximately 23 cutthroat trout age 1 and older and 369 sculpin during the field survey. At the time of diversion, most of the fish in this section would be removed by electrofishing and transferred alive to the proposed off-channel ponds (see following paragraph). Any incubating trout embryos present at the time of diversion would be lost. The Type 4 stream section contains sculpin and aquatic macroinvertebrates, but supports few, if any, cutthroat trout.

As discussed in Section I.B.1.g, Proposed Natural Resources Mitigation Plan, the proposed off-channel ponds would be created near the confluence of the Southern Tributary and Sucker Creek. The ponds would provide deep water cover and shallow water forage habitat for cutthroat trout, coho salmon, and other fish species. The probability of success of the proposed ponds is considered high for two reasons:

1. The benefits of off-channel ponds in improving trout and salmon survival and production are well documented (for example, Bryant, 1988; Cederholm et al., 1988; Cederholm and Scarlett, 1981 and 1991; Nickelson et al., 1992a; Peterson, 1982; Peterson and Reid, 1984; Nickelson et al., 1992b; and Tschaplinski and Hartman, 1983). Specifically with regard to coho salmon, studies in other western Washington streams have shown that when side channel and off-channel pool habitat is available, juvenile coho salmon will

seek it out (Peterson, 1982; Peterson and Reid, 1984; Cederholm et al., 1988). It also has been documented in other streams that coho juveniles which spend the winter months in off-channel pool habitat grow larger and have better survival rates than coho juveniles that stay in the main channel (Peterson, 1982).

2. Preliminary engineering studies indicate that the proposed ponds would function in a manner similar to successful ponds described in the literature. For example, construction of similar ponds on a very small tributary to the Clearwater River, Washington produced 331 and 707 age-1 coho smolts in 1987 and 1988, respectively (Cederholm and Scarlett, 1991).

Stream habitat downstream from the Headquarters Site may be temporarily impacted by increases in suspended sediments associated with construction until sedimentation/detention basins stabilize. The short-term increases in suspended sediment loading would increase the amount of sediment deposited on the streambed. The amount of sediment would be greatest just downstream of the landfill boundary and decline rapidly with distance downstream. Sediment deposits can detrimentally impact incubating salmonid embryos by interfering with the flow of oxygenated water around the embryos and can also detrimentally affect fish food organisms (macroinvertebrates) that live on the stream bottom. Most of the fine sediment deposits are expected to be flushed downstream to Silver Lake in high-flow events during the first winter following initial construction.

Since cutthroat and steelhead trout generally spawn in the spring after the major high-flow events, the impact of sediments on survival of incubating embryos would be small. If coho salmon were to extend their present distribution in Sucker Creek upstream into the upper Southern Tributary, sediment deposited in their redds during the first winter could reduce embryo survival. Spawning habitat for coho is very limited in the Southern Tributary above the 1310 Road crossing, particularly in the upper section closest to the landfill boundary. The coho population is presently being maintained through successful spawning in lower Sucker Creek. No reduction in spawning success in mainstem Sucker Creek is anticipated. Therefore, a short-term reduction in embryo survival at a few redds in the upper Southern Tributary is not likely to jeopardize the population or seriously reduce system fry production. Short-term reduction in abundance of aquatic macroinvertebrates could occur in those areas where sedimentation is the heaviest. No long-term effects of sedimentation on survival of salmonid embryos or aquatic macroinvertebrates are anticipated.

The potential impacts of increases in sediment loading to Silver Lake during initial construction activities were assessed for fish and fish food organisms. Short-term decreases in foraging efficiency for sight-feeding fishes could occur during periods of high turbidity in the Sucker Creek arm of Silver Lake. Impacts to fish growth due to decreased foraging efficiency would be minimal since the high-turbidity periods would occur during the colder part of the year when growth rates are typically low. No other impacts to Silver Lake fish or their food resources were identified.

Long-term and cumulative impacts of the landfill to fishery resources of the Southern Tributary, Sucker Creek, and Silver Lake were assessed by considering the predicted concentrations of suspended sediments, plant nutrients, and toxic/oxygen-removing compounds in the water leaving the site. As discussed in Section II.A.3, Surface Water, the sedimentation/detention basins and biofiltration swales would likely maintain sediment and nutrient concentrations in the Southern Tributary below existing levels. Due to the small size of particles passing the sedimentation/detention basins (<15 microns), very little deposition on the streambed is expected. Therefore, no long-term impacts of sediment on either the fish or fish food resources are predicted. Similarly, most of the nutrients in runoff from the site would be removed by the basins and biofiltration swales. The net effect would be a decrease in existing nutrient loading to Silver Lake from Sucker Creek (see Section II.A.3, Surface Water). Therefore, no long-term effects due to changes in nutrient loading are anticipated for fishery resources in the Southern Tributary, Sucker Creek, or Silver Lake.

The effects on aquatic resources of a leachate spill into Sucker or Ostrander creek were evaluated based on the spill scenario described in Section II.A.3, Surface Water. As discussed in that section, the leachate would contain ammonia, which is toxic to fish, and would have a high chemical oxygen demand that could cause suffocation of fish and other aquatic organisms.

During low-flow conditions, a spill into Sucker Creek or Ostrander Creek would kill all fish and most macroinvertebrates downstream to Silver Lake and the Cowlitz River, respectively. However, the probability of occurrence of such a spill is so low that the potential for significant adverse impacts on aquatic resources could be considered remote and speculative (see Section II.A.3, Surface Water). Upon reaching either Silver Lake or the Cowlitz River, the leachate would be diluted rapidly to concentrations below those that harm fish or macroinvertebrates.

A leachate spill directly into the Cowlitz River was also evaluated based on the spill scenario described in Section II.A.3, Surface Water. Water quality calculations indicate that the resulting concentration of leachate constituents in river water would be below levels that could result in significant impacts to fish or macroinvertebrates. As discussed in Section II.A.3, Surface Water, no significant adverse impacts on aquatic resources would be expected from a spill of solid waste in a stream or the Cowlitz River.

Toxic and oxygen-removing compounds could also enter the Southern Tributary if a leak occurred in the polyethylene landfill liner. Under the extreme worst-case liner leak scenario described in Section II.A.2, Groundwater, ammonia concentrations (the toxic component of the leachate) could reach 2.88 mg/l, immediately downstream of the project via the HGCS (see Section II.A.3, Surface Water). Chronic effects to fish have been recorded for ammonia concentrations of 2.2 mg/l. In addition, dissolved oxygen would be reduced below optimal levels for trout due to oxygen-demanding substances in the leachate. Downstream from the confluence of the Southern Tributary with Sucker Creek, dilution would reduce the concentration of ammonia and oxygen-demanding substances well below the chronic toxicity level.

As indicated in Section II.A.2, Groundwater, the extreme worst-case liner leak scenario is considered remote and speculative. Furthermore, the recommended frequent monitoring of the HGCS would allow a leak to be detected and corrective action taken before chronic impacts occurred to fishery resources of the Southern Tributary. Under a reasonable maximum leak scenario, water quality would not be impaired to the extent that chronic impacts could occur to fishery resources.

(2) Alternative Site Plans A and B

For both alternative site plans, permanent loss of existing vegetation would occur over 50 acres of the site due to construction of support facilities, the same as for the Proposal. However, temporary vegetation loss and permanent vegetation conversion in the landfill footprint would occur over 312 acres for Alternative Site Plan A and 236 acres for Alternative Site Plan B, compared to 330 acres for the Proposal. The nature of the resulting impacts on wildlife would be the same as those discussed for the Proposal.

The alignment of the diversion channel proposed in Alternatives A and B would allow both alternatives to take advantage of spring seeps that occur along a portion of the lower 2,000 feet of channel. The seeps indicate that groundwater is very near the soil surface in this area. This high groundwater table would be important in conserving summer base flow in the diversion channel. In addition to potentially reducing infiltration of water from the channel, the seeps would be expected to supplement base flows. The diversion channel for the Proposal would be located to the west of the spring seeps, and therefore would not be able to take advantage of the water provided by the seeps.

The probability of success of the off-channel ponds would be the same for all alternatives.

(3) No-Action Alternative

Under the No-Action Alternative, forest management activities would continue to determine the vegetational composition of the site. Over the next 30 years, most of the mature trees would be removed from the site and each harvested area would be reforested. This would continue the current sequence of plant community succession and species composition. Wildlife diversity and abundance would remain dynamic as forest management alters the site habitat. Existing impacts on wildlife related to human activity (primarily forest management practices) would be less than those expected by human activity associated with the landfill.

Fish species composition and density would remain similar to existing conditions. Small decreases in fish production would be anticipated during the sapling/early pole, pole, and early sawtimber successional stages due to reductions in the quality of detrital material used as food by aquatic macroinvertebrates. Coho salmon distribution could possibly extend upstream to the C&C/Woods railroad crossing of the Southern Tributary. (This would also be possible under the Proposal and alternative site plans).

c. Mitigation

Mitigation measures for impacts on plants, animals, and fisheries are incorporated into the Proposal and alternative site plans (see Section I.B.1.g, Proposed Natural Resources Mitigation Plan). Mitigation measures to compensate for the loss of plants and to increase wildlife use of the site include vegetation management, tree planting, wetland creation, raptor towers, and others. The majority of the mitigation for loss of fish habitat would occur through creation of new habitat in the off-channel ponds. Other measures are proposed to preserve water quality and enhance fish habitat in the Southern Tributary downstream of the landfill. The proposed monitoring and contingency plans would help ensure the success of natural resources mitigation measures. Further detail on proposed mitigation measures, monitoring, and contingency plans is provided in the revised *Mitigation Plan* in Appendix A of this EIS. The *Mitigation Plan* will continue to be refined in coordination with resource agencies.

The leachate pond would be fenced to control wildlife access to the pond. The fencing material and height would be selected to maximize its effectiveness in keeping wildlife out of the pond area. The leachate pond would be monitored on a regular basis by landfill operations personnel, and by a wildlife biologist as part of the monitoring program associated with the *Mitigation Plan*. If wildlife mortalities occur in the leachate pond area, or through any landfill-related activities, the Regional Habitat Program Manager of the Washington Department of Wildlife would be notified, and Weyerhaeuser would coordinate with WDW to determine appropriate additional measures to prevent such mortalities.

The spill response plan (see Section I.B.1.f(4), Spill Response) discussed in the impacts analysis would provide mitigation in the event that a leachate tank car spilled its contents on land or in surface water. As noted previously, the potential for a leachate tank car spill is extremely low.

d. Significant Unavoidable Adverse Impacts

Aquatic habitat within the boundaries of the landfill (2,590 feet of Type 3 stream and 3,350 feet of Type 4 stream) would be permanently lost under the Proposal and alternative site plans. This loss is intended to be mitigated through the successful creation of off-channel ponds and diversion channel. Should this mitigation be unsuccessful, there would be an unavoidable loss of all the aquatic habitat within the landfill boundaries.

If a derailed leachate tank car fell into Sucker Creek or Ostrander Creek at low flow and ruptured a valve, the resulting leachate spill would kill all fish and most macroinvertebrates downstream to Silver Lake and the Cowlitz River, respectively. The estimated frequency of occurrence of such a spill event is once in 200 years.

No significant unavoidable adverse impacts on plants and wildlife would be expected under the Proposal or alternative site plans, due to the abundance in the region of managed forest habitat and their associated wildlife populations; the similarity of the impacts of the proposed landfill to those of commercial logging; proposed mitigation measures; and the absence of sensitive, threatened, or endangered species on the site.

6. Wetlands

Wetland determinations were conducted at the Headquarters Site in November 1989 and October 1990 following the Unified Federal Methodology, and were the basis for a wetland delineation report in Appendix H of the *Environmental Technical Report* (Beak, 1991a). Areas surveyed included the landfill boundary, locations of support facilities, and downstream areas that could potentially be impacted by alterations in surface hydrology resulting from the proposed landfill.

All wetland boundaries within the proposed landfill boundary were flagged in February 1992 for a wetland boundary verification conducted by the Corps of Engineers in March 1992 (see Appendix I of this EIS). This detailed survey of all wetland boundaries within the project area resulted in fewer acres of wetland than that estimated under the 1989 survey.

Information in this section is drawn from both of the above sources, as well as the revised *Mitigation Plan* in Appendix A of this EIS.

a. Affected Environment

Numerous separate drainages collect surface water from the site and flow northwesterly into Sucker Creek. Several drainages are spring fed. The Southern Tributary, the largest drainage on site, is a perennial drainage that accounts for the majority of surface water on the site. Most of the other drainages are intermittent, supporting no surface discharge during the dry season.

The wetlands on the project site are primarily associated with the drainages that flow into Sucker Creek (Figure II-3). These riparian (adjacent to or associated with water) wetland habitats are generally confined to narrow strips of wetland vegetation along the drainages. The wetlands on the Headquarters Site consist of two wetland classes: approximately 9.4 acres of palustrine emergent and 3.6 acres of palustrine scrub-shrub wetlands (Table II-11). A palustrine system comprises all wetland habitat not associated with tidal systems or lake and river systems, including wetlands traditionally called marsh, bog swamp, and small ponds. The United States Fish and Wildlife Service (USFWS) defines each of these classes as follows (Cowardin et al., 1979):

- *Emergent*: wetland habitat characterized by erect, rooted, herbaceous vegetation as the uppermost vegetative strata

- *Scrub-shrub*: wetland habitat dominated by woody vegetation less than 20 feet tall

The USFWS classification system does not include a definition for riparian wetlands. In this EIS, reference to riparian wetlands denotes wetlands located adjacent to a stream and hydrologically controlled by the stream.

The emergent wetland vegetation is dominated by soft rush, Baltic rush, slough sedge, and reedgrass. The scrub-shrub wetlands are dominated by salmonberry, with willow and red alder also present. The herbaceous layer within the scrub-shrub communities is dominated by soft rush, Baltic rush, and reedgrass. Successional scrub-shrub wetland is associated primarily with the Southern Tributary where it passes through sapling/early pole forest stands. Dense, narrow bands of salmonberry also occur along several of the other drainages, having become more predominant in these drainages over the past several years since the last timber harvest.

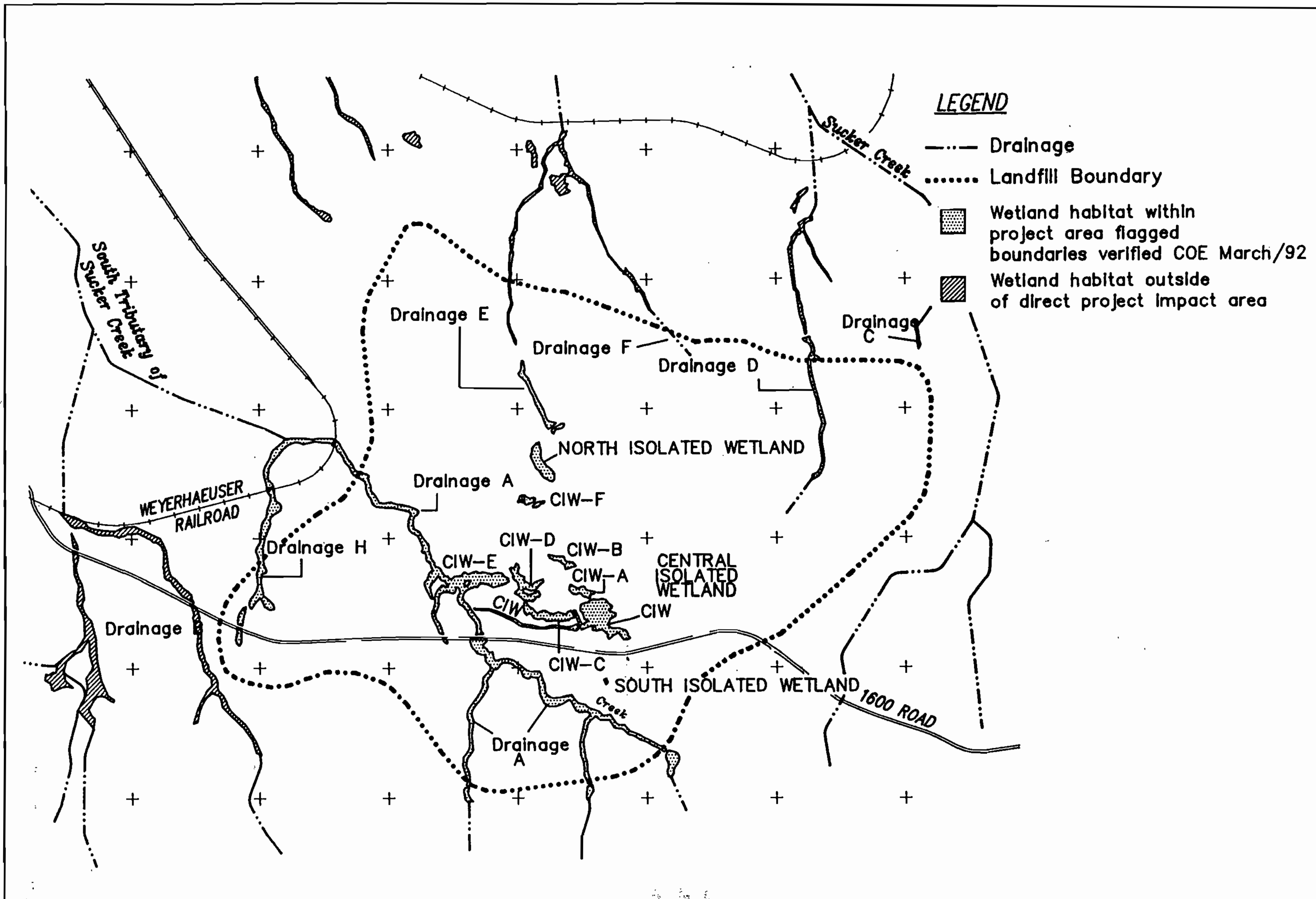


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Figure II-3
Delineated Wetlands within the Project Site

Weyerhaeuser Company
Headquarters Camp Solid
Waste Disposal Facility

Table II-11 Wetlands Within the Project Site

Wetland	Wetland Area (acres)		
	Emergent	Scrub-Shrub	Total
Drainage A	2.8	2.7	5.5
Drainage C	0.09	0.0	0.09
Drainage D	0.33	0.33	0.66
Drainage E	0.49	0.21	0.7
Drainage F	0.0	0.18	0.18
Drainage H	1.1	0.0	1.1
North Isolated Wetland	0.52	0.0	0.52
Center Isolated Wetland	4.07	0.19	4.26
South Isolated Wetland	0.02	0.0	0.02
Total	**9.42**	**3.61**	**13.03**

Wetland habitat not directly associated with the drainages was identified in three general areas. These wetlands are found in swales and depressional areas in the central portion of the site, which have a shallow groundwater table. The configuration of these wetlands has been influenced partially by compaction from logging equipment. Although labeled as "isolated," these systems are typically associated with the drainages through a direct surface or subsurface discharge connection to the on-site drainages. The south isolated wetland is a small wetland pocket (800 square feet) truly isolated from the surface drainages. These wetland systems are composed predominantly of emergent wetland species, although a small portion of the central "isolated" wetland is dominated by willow and salmonberry.

The isolated wetlands on the project site provide forage for deer and elk, surface water retention, groundwater recharge, and surface water biofiltration. Riparian wetlands provide vegetation that enhances streambank stabilization and dissipates surface water runoff into the drainages in addition to providing biofiltration and limited retention values. The dense shrub habitat characteristic of the riparian wetland areas severely restricts or prohibits large animal movement directly along these corridors. Game trails, which are typically located adjacent to these shrubby riparian areas, were also common in and adjacent to the "isolated" emergent wetlands. Passerine bird use of all wetland habitat was noted; observed amphibian use was limited to utilization of ponded water in road ditches by frogs, although salamanders were observed in the Southern Tributary during the fisheries studies.

b. Impacts of Alternatives

(1) The Proposal

The Proposal would result in the filling of approximately 13.0 acres of wetlands, comprising 9.4 acres of emergent and 3.6 acres of scrub-shrub wetlands. The following wetland functions would be lost: 1) stream cover and shading, 2) streambank stabilization, 3) nutrient production, 4) wildlife forage and refuge habitat, 5) surface water retention and biofiltration, and 6) recharge of surface water and groundwater.

Some wetlands downgradient of the landfill boundary may also be impacted by the proposed project. These wetlands lie immediately north of the northern project boundary and are associated with drainages and/or springs in the area. Portions of the upper "watersheds" of these drainages would be affected directly by the landfill. Surface water would be diverted from the landfill into a perimeter drainage ditch with three outlet channels. At each of these channels the water would pass through a biofiltration/sedimentation basin before being diverted back into the local drainages. Wetland impacts could occur within the channel areas where surface water runoff is significantly altered from the existing surface flow pattern and flows are insufficient to continue supporting hydric conditions in the local area.

As discussed in Section I.B.1.g, Proposed Natural Resources Mitigation Plan, a wetland mitigation plan has been developed in coordination with federal and state resource agencies, and is incorporated into the Proposal and alternative site plans. The mitigation includes wetland creation and enhancement associated with the proposed diversion channel and off-channel ponds, as well as preservation of forested wetland and riparian habitat in the upper Sucker Creek watershed and along the lower section of the Southern Tributary. Further detail is provided in the above-referenced section and in the revised *Mitigation Plan* in Appendix A of this EIS. The mitigation strategy is to replace the values and functions of the wetlands that would be lost (see list above).

The probability of success of the proposed wetland mitigation in replacing the lost wetland functions is considered high. A recent review of wetland mitigation projects in western Washington identified the following as common factors contributing to failure of created wetland systems: 1) incorrect final grade, typically resulting in an improper or inadequate hydrologic regime, 2) use of non-native plant species, 3) failure to properly install plants, 4) insufficient buffers to control human encroachment, and 5) wildlife predation (Castelle et al., 1992).

Lack of a suitable hydrologic conditions is the most frequent cause of wetland failure (Pierce et al., 1988, and Vance, 1988). The proposed wetland mitigation concepts include the creation of wetland habitat supported by surface flows from the diversion channel supplemented with groundwater flows. The proposed excavation of upland habitat to similar elevations as adjacent existing wetland systems is expected to provide topographic conditions suitable for maintaining hydric soil conditions and establishing wetland vegetation. In addition, the surface flows from the diversion channel would be diverted through the created wetlands, as well as the existing wetland systems.

Native plants would be seeded, planted, or transplanted in the created wetlands as outlined in planting specifications incorporated in the final *Mitigation Plan.* Permanent buffers would be established around these systems,, and measures taken to avoid deer and browse impacts as necessary. The ability of the local mineral soils to accommodate wetland systems is evidenced by the wetland conditions that have occurred as a result of local soil compaction from the operation of heavy logging equipment.

Failure to comply with permit conditions has also been identified as a significant factor in failure of wetland mitigation (Bill, 1991; and Castelle et al., 1992). The final *Mitigation Plan* would include criteria for determining the success of proposed mitigation measures, a monitoring plan to determine whether the implemented wetland mitigation meets these criteria, and contingency plans that would be implemented if the criteria are not met. These would be developed in coordination with resource agencies, and monitoring results would be submitted to agencies. Agency coordination would be ongoing until the proposed wetland mitigation is well established.

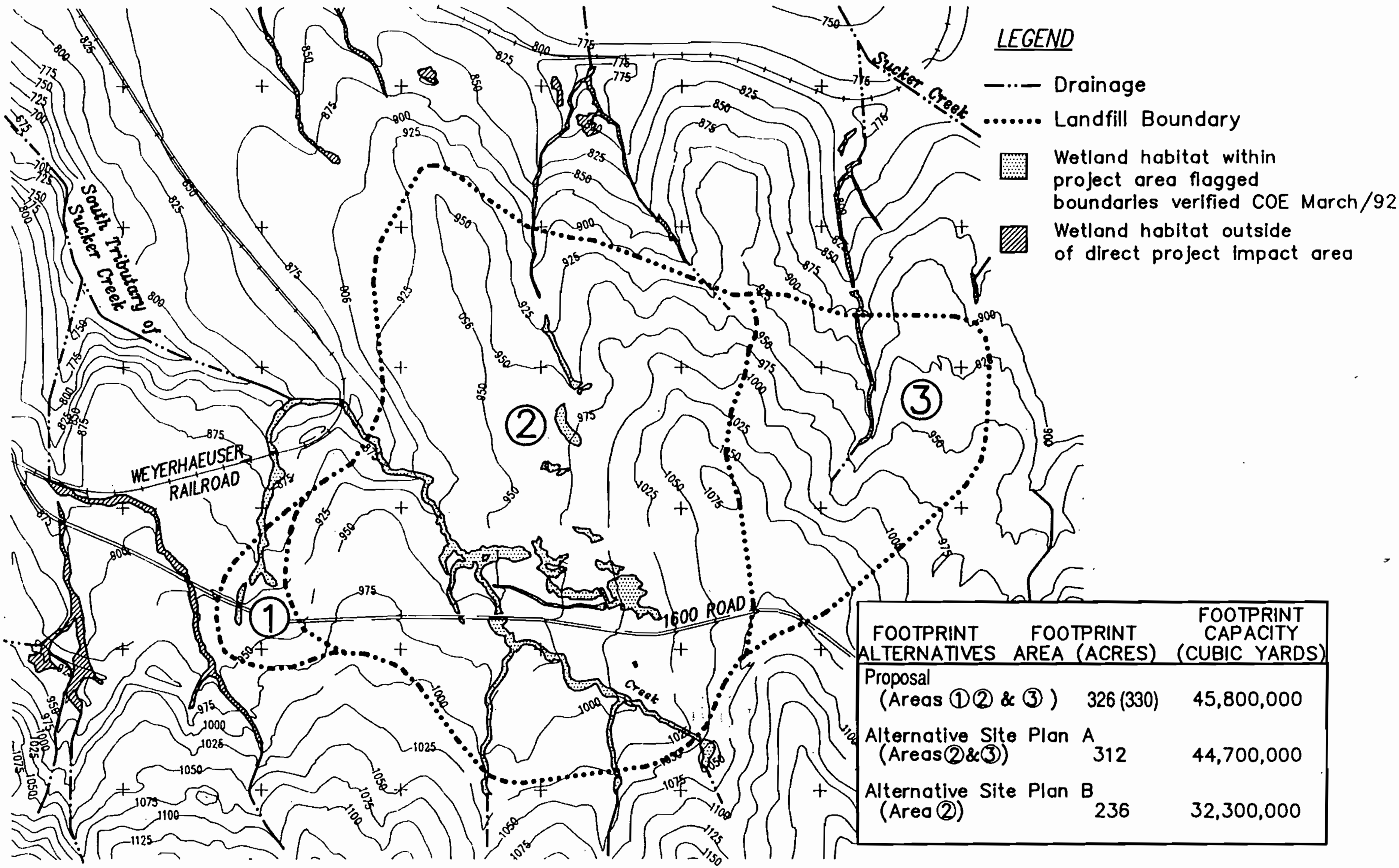
Although the wetlands that would be affected by the proposed landfill provide important functions to the local drainage area, they are not highly unique habitats. The plant communities found within these wetlands provide limited structural and species diversity, although they do provided a variation in habitat from the adjacent upland timberlands. If forested wetland systems can be developed over time through the proposed mitigation, such systems would provide higher wildlife habitat value than the existing wetland systems found on the project site. The proposed protection of existing forested and riparian wetland systems from permitted harvest activities assures no alteration of these systems, and an increase in undisturbed wetland habitat within the local managed forest. Forested wetlands are considered one of the more difficult wetland systems to replace (Bill, 1991).

(2) Alternative Site Plan A

Impacts and mitigation for Alternative Site Plan A would be similar to those for the Proposal, except that the western lobe of the footprint would be reduced, avoiding loss of approximately 1.1 acre of wetland habitat (Figure II-4). Total wetland acreage loss for Alternative Site Plan A would be approximately 11.9 acres. As noted previously, Alternative Site Plan A is now Weyerhaeuser's preferred alternative, because it reduces wetland filling and improves the conservation of summer base flow in the diversion channel (see Section II.A.5, Plants and Animals), without substantially reducing solid waste disposal capacity. It also provides an opportunity for wetland creation and enhancement immediately adjacent to the project area.

(3) Alternative Site Plan B

Alternative Site Plan B reduces the footprint to the minimum size that would still meet the purpose and need of the project. The total wetland acreage lost to fill would be approximately 11.2 acres, avoiding approximately 1.8 acres of wetland habitat compared to the Proposal. Impacts from the loss of these wetlands, and mitigation measures incorporated into the project, would be the same as for the Proposal and Alternative Site Plan A.



FOOTPRINT ALTERNATIVES	FOOTPRINT AREA (ACRES)	FOOTPRINT CAPACITY (CUBIC YARDS)
Proposal (Areas ①② & ③)	326 (330)	45,800,000
Alternative Site Plan A (Areas②&③)	312	44,700,000
Alternative Site Plan B (Area②)	236	32,300,000

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Figure II-4
Wetlands of Alternative Footprints

Weyerhaeuser Company Headquarters Camp Solid Waste Disposal Facility

(4) No-Action Alternative

If the landfill were not developed, all of the on-site wetlands would continue to serve their current functions. The vegetative structural component of the wetlands would continue to follow a successional pattern associated with the age of, and logging activity within, the managed timber stands.

c. Mitigation

Mitigation for impacts on wetlands is incorporated into the Proposal and alternative site plans (see Section I.B.1.g, Proposed Natural Resources Mitigation Plan). Further detail on the proposed mitigation is provided in the revised *Mitigation Plan* in Appendix A of this EIS. The *Mitigation Plan* will continue to be refined through coordination with resource agencies. No further mitigation is recommended.

d. Significant Unavoidable Adverse Impacts

Development of the Proposal would result in the significant unavoidable loss of approximately 13 acres of wetlands within the landfill footprint. Wetland losses for Alternative Site Plans A and B would be approximately 11.9 and 11.2 acres, respectively.

To offset this unavoidable adverse impact, wetland and riparian habitat mitigation has been incorporated into the mitigation plan (see Appendix A of this EIS). If mitigation is successful, wetland biologic and hydrologic functions would be replaced within riparian areas in the immediate project vicinity and local Sucker Creek drainage.

B. The Built Environment

1. Noise

a. Affected Environment

This section is based on a noise report by Michael R. Yantis Associates, which is included in Appendix L of *The Environmental Technical Report* (Beak, 1991a); as well as an addendum to that report, which is included in Appendix P of this EIS.

(1) Definitions

Noise is commonly defined as unwanted sound that disrupts normal human activities or diminishes the quality of the human or natural environment. The two categories of noise sources to consider are stationary and transient. Transient noise sources, such as automobiles, trains, or airplanes, are mobile, of short-term duration, and move throughout an affected area. Because they are temporary, they are often excluded from regulation. Stationary noise sources are generally associated with a specific land use or site and are subject to noise standards. Noise can result from one specific source or, more commonly, from a broad range of sources and frequencies blending together to form the area's noise environment.

Noise or sound is measured in sound pressure levels, expressed in units called decibels (dB). Because humans have better hearing sensitivities in the higher frequency range, the apparent loudness of sounds from different sources may differ considerably even though the overall sound pressure level (i.e., decibel level) is the same. For this reason, sound level measurements are adjusted, or weighted, to reflect the characteristic sensitivity of the human ear to various frequencies. The weighting scale that corresponds closest to the range of human hearing and perception of the loudness of sounds is the A-weighting scale. This scale de-emphasizes the low-frequency sounds. Sound pressure levels measured using the A-scale are expressed as dBAs.

A number of noise descriptors have been devised by acousticians to rate noise levels. The following are descriptors used in this analysis to describe the noise environment affected by the proposed project.

- *Ambient noise*: all noise generated in an area, including noise from background and incidental sources.

- *Maximum noise*: the highest noise level emitted from a given source.

- *Equivalent sound level* (L_{eq}): the steady-state sound level that expresses the average overall noise for a specific period and that defines the same acoustical energy as the time-varying sound level during a given time period, usually 1 hour.

- *Day-night noise level* (L_{dn}): the 24-hour noise level based upon the average hourly L_{eq} in which the noise levels measured during the night (10:00 p.m. to 7:00 a.m.) are weighted by applying an additional 10 dB to nighttime L_{eq} values due to the increased sensitivity during sleeping hours.

Human response to noise is directly related to the perceptibility of the noise. Individuals with acute hearing can detect an increase of about 0.5 dB in the mid-frequency range. Normally, noise level changes of less than 3 dB are perceived as barely noticeable. A 3- to 4-dB change would be discernible to most people, a 5-dB change would be noticeable to almost everyone, and a 10-dB change would be judged by most individuals as either twice or half as loud.

(2) Regulations and Standards

Local, state, and federal laws, regulations, and guidelines have been established to protect the public from excessive noise. Transportation noise and daytime construction noise are normally exempt from regulation. The applicability of the Cowlitz County, Washington State, and federal regulations and guidelines are discussed here.

(a) <u>Cowlitz County</u>. The Cowlitz County Code regulates nuisance noise but not noise emitted from general sources received at property lines or from public roadways. Railroad operations are exempt from the Cowlitz County noise regulations. Federal guidelines are used to evaluate the significance of railroad noise impacts.

(b) *Washington State*. The Washington State Administrative Code (WAC) rules establishing maximum permissible noise levels have been adopted by many local governments. For the purposes of this analysis, the WAC rules are used as the applicable noise regulations for the project. Enforcement of these rules is left to local agencies.

WAC Chapter 173-60 (state regulations) specifies maximum permissible noise levels for designated land uses through an "Environmental Designation for Noise Abatement" (EDNA). The EDNA of any property is based on typical present, future, and historical land uses. Class A EDNA lands are those used for human habitation, including residential areas, recreational areas (camps, parks, camping facilities, resorts, etc.), and community service institutions (hospitals, orphanages, etc.). Class B EDNA lands are those requiring protection against noise interference with speech, such as commercial areas, offices, theaters, stadiums, and other property not used for human habitation. Class C EDNA lands are those properties involving industrial uses of such a nature that higher noise levels are normally anticipated. This EIS assumes that the rail line, SWRTF, and landfill are all Class C EDNA.

Permissible noise levels depend on the EDNA of the noise source as well as the EDNA of the receiving property. For industrial noise sources, such as the proposed project, the maximum permissible sound measurable at a residential property (Class A EDNA) is 60 dBA between the hours of 7:00 a.m. and 10:00 p.m., and 50 dBA between 10:00 p.m. and 7:00 a.m. These maximum levels may be exceeded by 5 dBA for a total of 15 minutes, 10 dBA for a total of 5 minutes, or 15 dBA for a total of 1.5 minutes during any 1-hour period.

Among the sources exempt from the provisions of WAC 173-60 are construction activities at temporary construction sites except between the hours of 10:00 p.m. and 7:00 a.m.; motor vehicles on public roads when regulated by WAC 173-62; and surface carriers engaged in interstate commerce by railroad.

Legal counsel for Weyerhaeuser has determined that both the Columbia & Cowlitz and Woods rail operations are integral to interstate commerce and are exempt from Washington State noise regulations (McCullough, 1992). This is consistent with the fact that both rail operations are currently regulated and subject to periodic noise monitoring by the Federal Railroad Administration (FRA, 1992). The FRA regulates noise emissions from locomotives and rail cars pursuant to the provisions of 40 CFR Part 201. Therefore, although exempt from Washington State noise regulations, operations on the C&C/Woods line are subject to FRA noise regulations and other federal noise guidelines (see discussion below).

(c) *Federal Regulations*. The FRA regulations governing noise emissions from train operations, as set forth in 40 CFR Part 201, are complex and do not lend themselves to concise summary. The FRA regulations pertain to noise emitted from locomotives and rail cars, rather than noise received at residential properties. They take into account the type and age of the train, number of rail cars, train speed, and other factors. The regulations also specify the distance at which measurements are taken, and the type of measurement device to be used. FRA noise regulations do not apply to the sound emitted by a warning device, such as a horn, whistle, or bell, when operated for the purpose of safety.

(d) *Federal Guidelines*. Community noise exposure guidelines developed by the EPA and Federal Interagency Committee on Urban Noise (FICUN) provide a basis for the states and other jurisdictions to establish and enforce noise regulations and land use policies. The FICUN guidelines recommend that total noise levels in a residential environment not exceed an L_{dn} of 65 dBA.

In addition, EPA Region X has adopted guidelines for evaluating the impact of noise increases at residential and other sensitive receptors. The Region X guidelines consider that an increase of less than 5-dBA over present ambient levels is a slight impact; a 5-dBA to 10-dBA increase, a significant impact; and an increase of 10 dBA or more, a very serious impact. Community reaction to noise is typically assessed by the L_{dn} noise level, which represents the 24-hour noise environment into which noise events are introduced by the project. Similarly, community reaction to noise *increases* is assessed by looking at increases in the L_{dn} noise level. A 1-hour L_{eq} may be used to assess noise increases when a 1-hour period is sufficient to encompass the typical noise environment affected by the project.

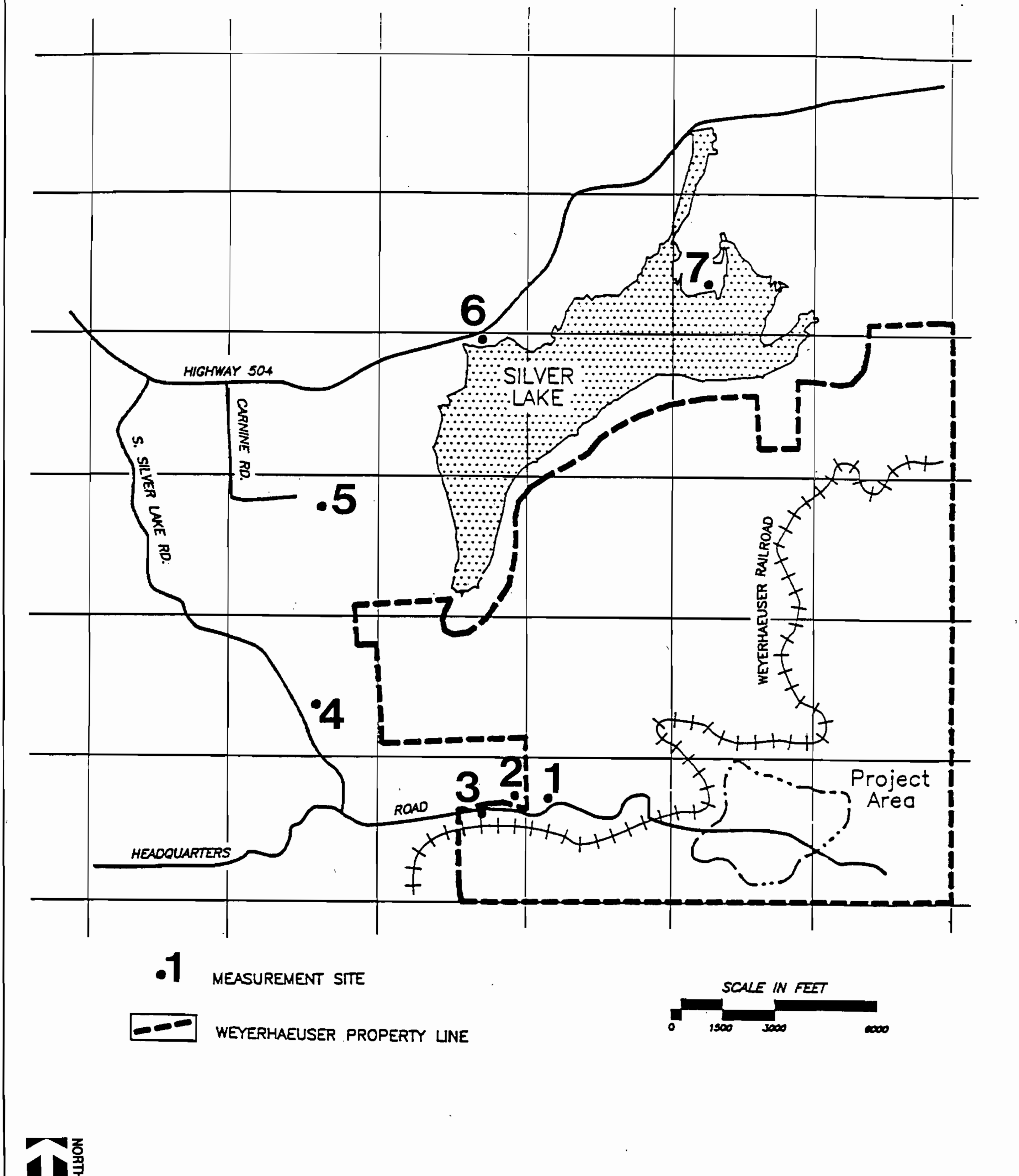
(3) Headquarters Site

(a) Landfill Area. The ambient noise environment in the vicinity of the site is a result of a variety of human and natural sources, including distant logging activities (chain saws, log handling equipment, whistles), vehicular and logging truck traffic, trains, aircraft, wind, birds, and, at a considerable distance, outboard motors. The site is located completely on Weyerhaeuser property and is surrounded by land under forestry management, consisting mostly of young, third-growth forest stands.

Noise measurements were taken by Michael R. Yantis Associates (Beak, 1991a, Appendix L) at locations that were likely to show the greatest sensitivity to increased noise resulting from the project, including residences in close proximity to the site or in direct line-of-sight. The locations of the measurement sites are shown in Figure II-5. The property line of the closest residence is located along Headquarters Road approximately 1.5 miles from the site. Several communities are located on the north shore of Silver Lake; the closest to the site are Waldon Island and Streeters Resort at a distance of approximately 3.5 to 4 miles. There are no residents along the south shore of the lake. Other residents are located 3 to 5 miles from the site along South Silver Lake Road and at the end of Carnine Road.

Due to the noise generated by traffic on nearby roadways and the contribution of periodic wind noise at some locations, the measured ambient noise levels were found to be somewhat higher than typical rural noise levels. The levels ranged from quiet background noise of about 30 to 35 dBA to over 90 dBA at a measuring site near Headquarters Road and directly adjacent to the existing railroad line. The measurements are shown in Table II-12.

The passage of vehicular and logging truck traffic along Headquarters Road is a major contributor to the noise level in the vicinity of the roadway. Average Daily Traffic (ADT) volumes on Headquarters Road range from approximately 600 vehicles east of the I-5 interchange to 300 vehicles east of South Silver Lake Road. The weekday noise measurements at Location 1 were taken from 11:30 a.m. to 10:30 p.m. at a distance of 60 feet from the center of the roadway. The recorded midday levels of 60 to 65 dBA are considered representative of the weekday noise



URS CONSULTANTS	**Figure II-5** **Noise Measurement Locations** Source: Beak Consultants, Inc., 1991	Weyerhaeuser Company Headquarters Camp Solid Waste Disposal Facility

levels experienced by residents along Headquarters Road. Noise levels decrease substantially in the late afternoon to about 40 dBA in the late evening.

Table II-12 Daytime Ambient Noise Measurements

Location	Average Noise Level L_{eq}[1] (dBA)	Major Source(s)
1. Headquarters Road (60 feet from Centerline)	63[2]	Traffic
2. Headquarters Road (Private Property Line)	49	Wind/No Traffic[3]
3. Railroad (200 feet from Railroad at Private Property Line)	80[4] 87[5]	Train
4. South Silver Lake Road	46	Wind
5. Carnine Road	38	--
6. Highway 504 at Silver Lake	59	Traffic
7. Streeters Resort	52	Motorboats

[1] 2- to 5-minute averages unless otherwise noted.
[2] 5-hour average
[3] Measurements do not include traffic noise.
[4] 1-hour average
[5] 10-minute average

(b) *Rail Line*. At one time, the Weyerhaeuser-owned Woods rail line handled six round trips per day. Currently, Weyerhaeuser runs one round trip on the line between the Longview and Green Mountain mills and an occasional log train between the Longview mill and the Headquarters Site. Noise measurements were not made along the rail line in Longview.

Railroad noise levels measured at Location 3 (shown in Table II-12) are average hourly (L_{eq}) and maximum noise levels recorded from a passing train measured at the property line of a Headquarters Road resident 200 feet from the Woods rail line tracks. The maximum noise level for the nearest resident to the Headquarters Site was measured at 87 dBA during the 10 minutes it took the train to pass the location. The 1-hour average L_{eq} of 80 dBA as a result of the passing train is estimated to be approximately 15 to 20 dBA higher than the daytime hourly L_{eq} in the area. The calculated average day-night noise level (L_{dn}) for residences along Headquarters Road, including all existing traffic and rail noise sources, is 67 dBA.

The noise level of the passing train measured at Location 3, when corrected for differences in distance and number of engines, appears to be in compliance with FRA rail carrier operation standards specified in 40 CFR Part 201, Subpart B. Ongoing FRA inspections of the rail line will help ensure continued compliance with FRA standards in the future.

(c) <u>Longview Mill Area</u>. The Weyerhaeuser mill complex in Longview is located in an industrial area (Class C EDNA). Existing noise sources at the mill complex include mill operations and activities at the waste transfer station, including waste loading, truck and rail traffic, and heavy equipment operation. Rail traffic consists of three round trips per day. (As noted previously, only one of those three trains currently runs on the Woods line past Headquarters Road.) Historically, there have been five to six trains per day operating from the mill. The site of the existing 6-acre open sort yard and transfer station operations is the proposed location for the SWRTF. The site is situated well within the mill boundary. Consequently, mill operations were not considered to be a significant contributor to ambient noise levels in the area, and a noise survey was not undertaken.

b. Impacts of Alternatives

This section discusses the noise impacts of the proposed project and alternatives. The prediction models used in this analysis accounted for factors influencing outdoor sound propagation and sound level reduction, or attenuation, such as intervening distance (that is, wave divergence), air absorption, vegetation, and topography. The results of the analysis provide the basis for determining the impact on the local noise environment at each site during construction and operation of the proposed landfill.

Noise impacts are considered significant if noise attributable to the project results in:

- An increase of more than 5 dBA (typically L_{dn}) in sound levels in neighboring residential areas (EPA Region X guidelines).
- A noise level of more than 65 dBA (typically L_{dn}) in neighboring residential areas (FICUN guidelines).
- Noise levels at residences greater than 60 dBA during daytime hours and 50 dBA during nighttime hours, allowing for short-duration exceedances during any 1 hour (Washington State noise regulations).

Mitigation is generally required for any operation that violates a regulatory requirement and recommended for any operation that fails to meet noise levels established by federal guidelines.

(1) The Proposal

(a) <u>Landfill Construction</u>. The construction of the proposed landfill and ancillary or support facilities (such as administrative and maintenance buildings, loading and unloading yards, the leachate storage pond, sedimentation/biofiltration basins, offices, rail sidings, and parking areas) includes cell construction (clearing, excavating, stockpiling cover, and installing liners, leachate systems, and stormwater systems), which will recur every 2 to 3 years. The construction noise levels were estimated using a reference level of 100 dBA as the combined equipment noise level at 50 feet from the noise source area. The mix of equipment used during construction was assumed to include 4 bulldozers, 10 scrapers, 2 dump trucks, and 1 grader.

Predicted noise levels at previously monitored receiving locations identified in Table II-12 were then calculated using the combined equipment noise level at eight sound frequencies and the attenuation for divergence, air absorption, barrier effect, and vegetation at each frequency. The noise generated by equipment at the Headquarters Site is predicted to propagate beyond the site boundaries but remain below the daytime ambient noise levels measured at the selected receiving locations shown in Table II-12. Based on the predicted levels, noise would not increase by more than 2 dBA at any location as a direct result of landfill construction. Construction noise would be audible at times at off-site locations when ambient noise levels are low, and would be similar to that generated by log truck movements at the site.

Transportation noise during construction would result from increased truck traffic and construction crew vehicles along Headquarters Road. Traffic noise was predicted using the U.S. Department of Transportation computer model STAMINA. The model predicted that increased traffic along Headquarters Road would raise average noise levels by about 1 dBA, a barely perceptible increase.

The predicted noise levels generated during construction activities at the proposed site would not have a significant effect on the ambient noise environment of the nearest residence or sensitive receptor. The noise levels and increases are allowable under all guidelines and regulations as long as construction is limited to daytime hours between 7:00 a.m. and 10:00 p.m.

(b) *Landfill Operation*. Operational noise levels at landfill area receptors were estimated by measuring and predicting the noise levels of a bulldozer (D-9 Caterpillar) in operation at the landfill site and using the attenuation from vegetation and topography to predict noise impact from various equipment sources expected at the site.

Measurements were made at two locations: Headquarters Road residence (Location 2), and Carnine Road (Location 5). The measured ambient and bulldozer noise level at the Headquarters Road and Carnine Road locations were 2 dBA above the ambient levels of 50 dBA and 49 dBA, respectively. Since the bulldozer was not audible during the period of the measurements, the 2 dBA difference was most likely due to an increase in ambient noise levels rather than the added noise of the bulldozer.

Landfill equipment operating daily on the proposed site at any one time is expected to consist of up to five haul trucks, one bulldozer, one additional piece of equipment (such as a water truck), and 5 to 10 leachate pumps. Based on this equipment mix, the predicted noise levels at the two locations were calculated to be approximately 5 dBA less than the existing measured ambient levels. Field measurements by Michael Yantis Associates when a single bulldozer was operating (Appendix L of Beak, 1991a) indicated that the bulldozer noise was not audible at either measurement location or at Streeters Resort (Location 7). Noise from multiple pieces of equipment operating at the same time could be audible at times at off-site locations. However, the results of the measurements and predictions indicate that on-site operational noise would not propagate to receivers at levels that would exceed permissible state levels and recommended federal levels.

The amount of roadway traffic resulting from commuting workers and assorted delivery trucks during operating hours is expected to be significantly less than the traffic anticipated during construction. Roadway traffic noise along Headquarters Road would not result in noise levels that exceed those recommended in federal guidelines. The discussion of the SWRTF later in this section evaluates noise due to truck transport of solid waste to the Longview mill (or from the mill during a temporary rail shutdown).

(c) *Rail Line*. Train noise was calculated from previously measured levels, correcting for attenuation of distance and air absorption. Hauling waste to the site and leachate away from the site is predicted to increase average hourly noise levels (L_{eq}) by more than 10 dBA during the hour in which each of the four pass-bys for the two projected daily trains at receiving points located within 200 feet of the rail line. This would be a very noticeable noise increase to affected residents, particularly when the train whistle was sounding. However, as discussed in the following paragraph, it would not be considered a significant noise increase under applicable federal guidelines, which apply to the L_{dn} rather than the hourly L_{eq}.

The L_{dn} at the nearest residences along Headquarters Road is predicted to increase from the existing level of 67 dBA, which reflects traffic noise and noise from one daily train round trip, to 70 dBA, which reflects the addition of two train round trips per day. The predicted increase takes into account the sound of train whistles, and assumes that trains do not run on the Woods line during nighttime hours (10:00 p.m. to 7:00 a.m.). The increase of 3 dBA (L_{dn}) over ambient levels is considered a slight impact by EPA Region X guidelines. The increased noise levels at residential receiving points along Headquarters Road are predicted to exceed the FICUN guideline of 65 DBA (L_{dn}). However, estimated existing noise levels along Headquarters Road already exceed the guideline. Furthermore, it should be noted that the additional two round trips per day would be within the historical level of railway use (up to 5 or 6 train round trips per day).

No noise measurements were made along the rest of the rail line. However, the increased noise levels within 200 feet of the rail line are expected to be similar to the levels discussed above for the residences along Headquarters Road. Noise level increases (L_{dn}) would likely be less for residences along the rail line in the Longview area. Three train round trips per day currently occur on that portion of the line, compared to one round trip on the Woods line past Headquarters Road. Therefore, the existing L_{dn} at residences along the Longview portion of the line would be expected to be higher than the existing 67 dBA (L_{dn}) predicted for residences along Headquarters Road.

(d) *SWRTF*. Due to the location of the SWRTF in the central portion of the Longview mill complex, construction of the SWRTF and waste sorting and transfer operations would not be expected to result in significant off-site noise impacts.

In the event of a temporary but sustained rail shutdown, about 84 truck/trailers per day (168 one-way truck trips per day) would be required to transport solid waste from the SWRTF to the landfill site. The increase in hourly L_{eq} from this traffic along Headquarters Road, as predicted by the standard Federal Highway Administration traffic noise model, would be 4 dBA. The average daily noise level, L_{dn}, would increase by less than 2 dBA, which is considered a slight noise impact under EPA guidelines. Noise level increases would be less in the Longview area due to the higher ambient noise levels.

During normal landfill operation, about 225,000 cubic yards of solid waste per year would be transported to the SWRTF by truck (see Section II.B.6, Transportation). This would require about 19 truck/trailers (38 one-way trips) per day. Noise level increases would therefore be less than those predicted for the situation analyzed in the previous paragraph, and would not be significant.

(2) Alternative Site Plan A

Noise levels generated during construction and operation of the landfill under this alternative footprint would be the same as those discussed above for the Proposal's conceptual footprint. The alternative footprint would provide an additional buffer zone of approximately 600 feet on the western boundary of the site. The increased intervening distance and vegetation would attenuate construction and operational noise propagating from the western boundary of the site. The result would be a barely perceptible reduction in the noise level predicted for the conceptual footprint at the residences along Headquarters Road, a noise level that has been determined to be insignificant. Noise levels at other receptors will remain the same as those predicted for the Proposal. Traffic and railway noise levels and impacts are expected to be the same as those identified for the proposed project.

(3) Alternative Site Plan B

Noise levels generated during construction and operation of the landfill under this footprint would be the same as those measured and predicted for the proposed footprint. The noise levels at the receptors would be the same as those for Alternative Site Plan A, discussed above. Traffic and railway noise levels and impacts would not be substantially different from the proposed project.

(4) No-Action Alternative

Without the project, there would be no noise impacts at the landfill site except those associated with forest management activities. Occasional rail noise would continue, and may (as it has done historically) exceed current levels as well as levels expected with the proposed project.

c. Mitigation

Although no regulatory requirements or federal guidelines would be exceeded, the noise increase from additional landfill-related train traffic would be very noticeable at residences within 200 feet of the line during the time trains are passing. Therefore, it is recommended that the number of train trips be kept to the minimum necessary for efficient landfill operation, and that trains be scheduled during daytime hours to the maximum extent possible.

d. Significant Unavoidable Adverse Impacts

Noise levels expected from landfill construction and operation would not be considered a significant noise impact under applicable federal regulatory requirements and guidelines. This is true for the Proposal as well as alternative site plans.

2. Human Health

The evaluation of human health impacts in this section is based on the worst-case analyses of impacts on groundwater, surface water, and air quality in Sections II.A.2, II.A.3, and II.A.4, respectively. To determine the potential for human health impacts, results of these analyses were compared with federal and state standards designed to protect human health. The discussion of dioxins and furans in this section is based on correspondence from BAS Laboratories Limited (1992), which is included in Appendix P of this EIS.

a. Affected Environment

For a human health risk to exist, two components must be present: 1) toxicity or hazard (the potential for a substance, organism, or situation to cause some type of adverse health impact) and 2) exposure (the potential for a susceptible individual to come into contact with that substance, organism, or situation). Exposure pathways may include direct contacts with toxic materials, such as through inhalation of emissions from a source facility, or indirect contacts, such as through contamination of food or water supplies. Therefore, a description of the affected environment for human health risks requires that potential exposure pathways be examined in order to define potentially exposed populations.

The primary potential exposure pathways relevant to the proposed landfill are 1) exposures via water contamination and 2) exposures via air contamination. Each of these pathways, and potentially exposed populations via each pathway, are discussed below.

(1) Exposures via Water Contamination

Landfill leachate consists of the water-soluble constituents of solid waste. Leachate contains a variety of biological and chemical contaminants that are contained in the waste or formed during waste decomposition. Leachate can potentially contaminate groundwater or surface water if it is not contained.

Due to concern about the potential for leachate contamination of water supplies, the MFS (WAC 173-304-490) require that groundwater monitored at the site boundary meet primary drinking water standards as specified in WAC 248-54. In addition, the MFS require that a landfill not cause a violation of any receiving water quality standard or violate chapter 90.98 RCW from discharges of surface water runoff or leachate. Therefore, leachate management and surface water management are key elements of the design of a landfill. Section I describes the leachate management and surface water management systems.

The populations potentially affected by water contamination from any landfill would be those people using groundwater located downgradient from the landfill and those using surface water downstream from the landfill or from a spill. The beneficial use survey conducted to identify users of groundwater downgradient of the site found no such users (see Section II.A.2, Groundwater). The nearest groundwater well is over 0.5 mile west of the Headquarters Site boundary at Weyerhaeuser's Headquarters Camp. The well, which is controlled by Weyerhaeuser, is not downgradient from the site. It provides water from an aquifer over 150 feet deep. The closest resident north of the site (in a downgradient direction) is approximately 2.5 miles from the site boundary, which is outside of the Sucker Creek basin.

Surface water bodies that could potentially be impacted by on-site operations include the Southern Tributary, Sucker Creek, and Silver Lake. In addition, Sucker Creek, Ostrander Creek (a tributary to the Cowlitz River), and the Cowlitz River itself could be affected if a railroad accident discharged leachate from a tank car en route to the Longview mill. The only one of these water bodies used as an approved drinking water supply is the Cowlitz River, which supplies the cities of Longview and Kelso. However, Silver Lake is a popular place for recreational fishing and bathing. Potential exposure routes via surface water would include ingestion of fish caught by sports fishermen or dermal exposure and incidental ingestion of water during swimming or other water sports.

(2) Exposures via Air Contamination

Two types of air emissions from the proposed landfill could potentially result in human health impacts: 1) fugitive dust emissions from construction activities and vehicle traffic and 2) emissions of landfill gas from the gas collection/control system, particularly flare emissions.

Landfill gas contains trace amounts of toxicants that are known to be harmful to human health at high concentrations. Furthermore, landfill gas contains certain odorous constituents, such as hydrogen sulfide and mercaptans. A variety of health complaints can result from odor itself, unrelated to the toxicity of the odorous constituent.

Due to potential human health and odor concerns related to landfill gas, gas control is a key element in the design of landfills. In addition, SWAPCA regulations require submission of Notice of Construction and Application for Approval for the installation of landfill gas control systems. SWAPCA reviews the proposed design and evaluates emissions data from such facilities before granting approval.

b. Impacts of Alternatives

(1) The Proposal

The following sections evaluate the impacts of the Proposal on exposed populations via each of the two pathways discussed under Affected Environment.

(a) <u>Exposure via Water Contamination</u>.

Groundwater. Section II.A.2, Groundwater, summarizes concentrations of chemical constituents in the shallow aquifer resulting from an extreme worst-case liner failure. Concentrations were estimated from chemical analysis of leachate from the Mt. Solo Landfill. Based on information on known chemical toxicities (U.S. EPA, 1992), the contaminants most likely to affect human health would be barium, cadmium, chromium, mercury, pentachlorophenol, and phenols. Results of the groundwater analysis indicate that no chemical constituents from the landfill would be present at concentrations that exceed Washington State groundwater criteria or proposed federal maximum contaminant levels (MCLs). These criteria are intended to protect public health (U.S. EPA, 1991a; Ecology, 1990b). Therefore, even in the case of an extreme worst-case liner failure, which is considered remote and speculative, groundwater contamination would not occur to a degree that would adversely affect human health. Furthermore, as noted previously, there is no consumption of groundwater downgradient of the site.

A number of comments on the Draft EIS expressed concern about the presence of dioxins and furans in pulp mill waste. Dioxins and furans currently occur periodically at very low concentrations in the ash component of the Weyerhaeuser pulp mill waste that would be disposed at the proposed landfill. However, dioxins and furans have a very low water solubility, are strongly bound to soils and small particles, and are not easily leached. Therefore, it is unlikely that dioxins or furans would be present in the leachate from the proposed landfill at levels that would pose a significant risk to human health or the environment (see correspondence from BAS Laboratories Limited, 1992, in Appendix P of this EIS). In addition, Weyerhaeuser has implemented process improvements to reduce or eliminate dioxins and furans from its pulp mill wastes, and further improvements are planned.

Surface Water. Two different types of worst-case scenarios were evaluated to determine the potential effect of the landfill on human health via surface water. First, the effect of a liner leak on surface water quality was evaluated. This analysis was based on the same extreme worst-case leakage scenario used above for groundwater. Second, because landfill leachate would be transported by railroad to the site, the effect of a leachate spill during railroad transport was evaluated in Sucker Creek, Ostrander Creek (a tributary to the Cowlitz River), and the Cowlitz River itself.

If a leak occurred in the bottom liner of the landfill, leachate could migrate to the groundwater or contaminate surface water through end-of-pipe discharge from the HGCS. To determine the effect of an extreme worst-case liner leak, the resulting concentrations of potentially toxic chemicals in the Southern Tributary under low flow and high flow conditions were compared to restrictive state and federal standards designed to protect human health. As shown in Table II-13, none of the potential contaminants were found to exceed these standards.

Further downstream, at the confluence of the Southern Tributary and Sucker Creek, and eventually at Silver Lake, contaminant concentrations would be reduced much further through dilution. Therefore, no adverse impacts on human health would be expected from ingestion of Silver Lake water or fish caught in the lake, even under the extreme worst-case liner leak scenario. The recommended frequent monitoring of the HGCS discharge (see Section II.A.3, Surface Water), in conjunction with surface water and groundwater monitoring, would allow a liner leak to be detected and corrective action taken before any chronic buildup of contaminants in Silver Lake or its fish resources occurred.

As discussed in Section II.A.3, Surface Water, results of modeling indicate that a leachate derailment and spill into Sucker or Ostrander Creek at low flow would significantly impair water quality downstream to Silver Lake or the Cowlitz River, respectively. However, the probability of occurrence of a derailment incident that results in a rupture of a "105" tank car, releasing its entire contents in a creek at low flow, is so low that the potential for significant adverse impacts on creek water quality could be considered remote and speculative.

Table II-13 Estimated Surface Water Concentration as a Result of a Liner Leak Scenario

Constituent	Regulated Levels for Drinking Water ($mg L^{-1}$)	Concentration in Southern Tributary	
		Low Flow	High Flow
Barium	1.0 [a]		
Cadmium	0.01 [a]	0.002	0.002
Chromium	0.05 [a]	0.003	0.0026
Mercury	0.002 [a]	< 0.0001	< 0.0001
Pentachlorophenol	0.001 [b]	< 0.001	< 0.001
Phenols	None	< 0.001	< 0.001

[a] Washington State groundwater criteria.
[b] Proposed federal MCL.

In the event that such a spill did occur, the spill response plan would be implemented immediately (see Section I.B.1.f(4), Spill Response). As part of this plan, appropriate measures would be taken to keep the public away from the spill area until cleanup occurs. There would be no significant impact on water quality downstream in Silver Lake or the Cowlitz River, and water quality in the creek would be expected to return to prespill conditions within several days (see Section II.A.3, Surface Water). Therefore, there would be minimal potential for direct exposure to raw leachate or contaminated water, and no significant adverse impacts on human health would be expected. Also, since a spill situation is a one-time event rather than a frequently occurring or continuous event, it is highly unlikely that there would be any opportunity for adverse health effects to occur through chronic exposures or through buildup of pollutants in fish.

As discussed in Section II.A.3, Surface Water, the probability of occurrence of a derailment resulting in a leachate spill into the Cowlitz River at low flow is also so low that the potential for significant adverse impacts on creek water quality could be considered remote and speculative. If such an event did occur, modeling results indicate that, even at minimum river flow, potential contaminants would be reduced below levels that could result in significant adverse health impacts. Given the volume of water moving through the river compared to the volume of leachate, dilution of the leachate would be expected to occur rapidly. Therefore, the public water supplies of the cities of Longview and Kelso, whose water supply intakes are located over a mile downstream of the rail crossing, would not be affected.

For any leachate spill into the Cowlitz River, the Longview and Kelso water plants would be notified immediately. In addition, trained personnel and appropriate equipment would be immediately dispatched to the spill site, and the source of the spill would be stopped as quickly as possible (see Section I.B.1.f(4), Spill Response). The emphasis, however, would be on spill prevention through the use of "105" tank cars operating at low speeds (see Section II.B.6, Transportation).

(b) *Exposure via Air Contamination.*

Fugitive Dust Emissions. To determine the possible impact of fugitive dust emissions on human health, a scenario was constructed and fugitive dust emissions were modeled using an EPA-validated model (see Section II.A.4, Air Quality). The scenario assumed operation of the landfill cells that were closest to the western boundary where the nearest residence is located. The results of the dispersion modeling showed that project construction will not increase fugitive dust emissions so that human health is adversely affected.

Landfill Gas Emissions. The potential impact of SO_2 and NO_x from the landfill gas flare system was evaluated. Under worst-case conditions, the maximum hourly average ambient air concentration of NO_x and SO_2 at the western boundary do not exceed EPA standards. These standards are health-based; therefore, no health impact is expected from fugitive dust.

The air quality impacts of toxic volatile organic compounds (VOCs) contained in the landfill gas were also estimated using an EPA-validated model. Landfill gas collected at the Mt. Solo Landfill, which receives the same type of solid waste as the proposed landfill, contains four VOCs at concentrations above the detection limits: methyl bromide, 2-butanone, toluene, and total xylenes. Assuming worst-case conditions and no mitigation (that is, no combustion of gas in flares), concentrations of these four VOCs at the nearest residence would be well under the state Ambient Source Impact Levels (ASILs) promulgated to protect human health (see Table II-9 in Section II.A.4, Air Quality). Therefore, no significant adverse impacts on human health would be expected.

Odor. The potential odor impact was evaluated with the SCREEN model on the common sulfur compounds generally associated with the odor of pulp and paper mills (methyl mercaptan, dimethyl sulfide, and dimethyl disulfide) and on hydrogen sulfide, which is often associated with anaerobic respiration at landfills. Using data from gas concentrations at the Mt. Solo Landfill and gas generation rates typical of landfills, it was found that 1-hour averages at the western property boundary were below olfactory thresholds for all four of the compounds (see Table II-10 in Section II.A.4, Air Quality). These data indicate that odor would not occur at property boundaries, with the possible exception of short-term odors during rare meteorological events. Therefore, no significant human health impacts due to odor would be expected.

(2) Alternative Site Plans A and B

The impacts analysis for the Proposal also applies to alternative site plans, although air and leachate emissions would be slightly less for the alternatives.

(3) No-Action Alternative

Potential human health risks associated with a landfill would not occur at the Headquarters Site if the proposed landfill is not built. The potential for air emissions and surface and groundwater contamination would be transferred to another disposal site.

c. Mitigation Measures

Mitigation measures for potential human health impacts are incorporated into the Proposal and alternative site plans and discussed in Sections II.A.2, Groundwater; II.A.3, Surface Water; and II.A.4, Air Quality.

d. Significant Unavoidable Adverse Impacts

With proper design, operation, and long-term maintenance of the proposed landfill facilities, the probability of a significant unavoidable adverse impact on human health would be extremely low under the Proposal and alternative site plans. The low toxicity of the material to be stored at the landfill, redundant protective systems designed into the landfill to prevent human exposure, provisions for environmental monitoring, the use of "105" tank cars for leachate transport, and the proposed spill response plan, would help ensure that construction and operation of the landfill would not significantly affect human health.

3. Land Use

This section focuses on the change in land use that would occur as a result of the proposed landfill. Factors that affect compatibility with adjacent land use, such as air quality and odor, water quality, noise, aesthetics, and transportation, are discussed in other sections of the EIS.

Information in this section is drawn in part from the land use analysis in the *Environmental Technical Report* (Beak, 1991a). The Cowlitz County Comprehensive Plan (1981a) and the City of Longview's Zoning Ordinance and Comprehensive Plan (1986 and 1983) were also reviewed. In addition, the Cowlitz County Department of Community Development was contacted to assist in evaluating the consistency of the proposal with land use plans and policies.

a. Affected Environment

(1) Land Use

The Headquarters Site is part of approximately 440,000 acres of Weyerhaeuser-owned commercial timber land known as the St. Helens Tree Farm (approximately 330,000 acres lie within Cowlitz County, with the remainder located in Clark County). The majority of the timber on the site has been harvested within the past 50 years. Stand ages range from recent clearcut to 60 years. Three areas within the site are managed for forest research activities.

The site is bordered to the west and south by the Weyerhaeuser-owned Columbia & Cowlitz/ Woods Railroad tracks and is transected by a Weyerhaeuser haul road (the 1600 Road) that is an extension of the Headquarters Road (or South Silver Lake Road). Residential development occurs along the eastern portion of Headquarters Road, about 1.5 miles from the proposed Headquarters Site. Several residences are also located along South Silver Lake Road, approximately 4 miles from the site. Two communities at Waldon Island and Streeters Resort are located on the north end of Silver Lake, approximately 3.5 to 4 miles from the site. The town of Castle Rock, with a population of 2,000 people, lies approximately 5 miles west of the Headquarters Site.

Silver Lake lies approximately 2.5 miles north of the northwest boundary of the proposed landfill. Seaquest State Park is located on the northwest shore of Silver Lake.

Land use along the rail line is characterized by forested lands and open space near the Headquarters Site and scattered residential development between the community of Ostrander and the eastern limits of the city of Longview. Within Longview, the rail line passes through areas characterized by commercial, industrial, and residential land use.

(2) Recreation

There are no recreation plans for lands within the proposed landfill boundary, for Weyerhaeuser lands surrounding the Headquarters Site, or along the rail line. Informal recreational use (i.e., hunting, berry picking, and sightseeing) likely occurs along the rail line and on Weyerhaeuser property under an open lands policy where Weyerhaeuser Company allows the public access to its property. Recreational opportunities under this policy are available throughout the St. Helens Tree Farm (see (1), Land Use, above).

(3) Land Use Plans and Policies

Relevant policies in the Cowlitz County Comprehensive Plan (Cowlitz County, 1981a), and the consistency of the proposed landfill with these policies, are discussed in the Impacts section. That section also discusses the consistency of the proposal with land use-related provisions of the state Minimum Functional Standards for Solid Waste Handling (MFS).

b. Impacts of Alternatives

(1) The Proposal

(a) *Changes in Land Use*. Construction of the proposed landfill at the Headquarters Site would result in the removal of approximately 380 acres of highly productive forest land from timber production. The affected area represents less than 0.1 percent of the approximately 440,000-acre St. Helens Tree Farm of which it is a part. Land use would change from a forest management use, with harvest at 45- to 50-year intervals, to a landfill operation, and finally, to a shrub and grass community after closure of the landfill. Future use of the land for forestry would be precluded for an indefinite period of time.

(b) *Recreation*. The Headquarters Site represents less than 0.1 percent of the Weyerhaeuser lands available for informal recreational use in the general project area. The current informal recreational use of the Headquarters Site would not be allowed while the landfill is in operation. As the landfill is incrementally closed, informal recreational activities such as walking, berry picking, and sightseeing could occur in closed areas.

Informal recreation use along the rail line would not likely be affected by the addition of two daily round trips to the existing two round trips by Weyerhaeuser trains.

(c) *Consistency with Land Use Plans and Policies.*

Cowlitz County Comprehensive Plan. The Headquarters Site is located in an unzoned area designated Forestry-Open Space in the Cowlitz County Comprehensive Plan (Cowlitz County, 1981a). The Comprehensive Plan goal for the Forestry portion of the Forestry-Open Space designation is to "maintain and promote an adequate commercially productive forest land base." The goal of the Open Space portion of the designation is to "conserve unique wildlife habitats, natural features, and recreation areas of Cowlitz County." Timber management, agriculture, residential, and outdoor recreation that are complementary to other encouraged uses are recommended for the Forest-Open Space classification. Industrial uses are discouraged unless they are related to commercial timber uses or production support.

Because landfills are not addressed under the Forestry-Open Space designation, or elsewhere in the Comprehensive Plan, a direct evaluation of the consistency of the proposed landfill with the Plan is difficult. However, development of a landfill at the Headquarters Site would not result in the loss of any unique wildlife habitats, natural features, or recreation areas. Furthermore, the purpose of the proposed landfill is to support commercial timber management activities in the area by providing convenient disposal of forest products manufacturing waste. Therefore, the Proposal appears to be consistent with the intent of the Plan.

Comprehensive plans have no regulatory authority. Rather, they provide guidance for the development of zoning regulations, which serve to implement plan policies. Therefore, the consistency of a proposal with the local comprehensive plan is most conclusively determined by whether it complies with the implementing zoning. In this case, as noted previously, the proposed landfill site is located in an unzoned area of the County. However, under the County zoning code (CCC 18.10), the zone that implements the Forestry-Open Space designation in the Comprehensive Plan is the Forestry-Recreation (FR) zone.

The stated purpose of the FR zone is "to provide for the maintenance of a stable commercial forest land base for the development and sustained production of forest products and to protect this resource from the intrusion of incompatible uses. Compatible uses, such as recreation, water use, and wildlife habitat, are also permitted subject to such conditions necessary to eliminate incompatible aspects of such uses." Permitted uses in the FR zone include sanitary landfills (CCC 18.10.255 and 18.10.260).

The fact that the goals of the FR zone clearly reflect the goals of the Forestry-Open Space designation in the Comprehensive Plan, and that sanitary landfills are permitted outright in this zone, substantiate the above conclusion that use of the Headquarters Site for a landfill appears to be consistent with the intent of the Plan.

Minimum Functional Standards. The MFS (WAC 173-304) were promulgated under the authority of Chapter 70.95 RCW to protect public health; prevent land, air, and water pollution; and conserve the state's natural, economic, and energy resources.

WAC 173-304-130(2)(e) specifies the following locational standards applicable to the Proposal:

> No facility's active area shall be located within two hundred feet measured horizontally, of a stream, lake, pond, river, or salt water body, nor in any wetland nor any public land that is being used by a public water system for watershed control for municipal drinking water purposes in accordance with WAC 248-54-660(4).

A stream, as defined in the MFS, has an annual average flow of 20 cfs or more. No such stream exists on the site. Wetlands that exist on the site are proposed to be filled, so a variance from the MFS would be needed for landfill construction.

WAC 173-304-130(2)(j) specifies locational standards for land use regarding proximity to airports, national parks, residential areas, and critical habitat. The proposed landfill meets these standards. That section of the MFS also specifies that no landfill shall be located so as to be at variance with locally-adopted land use plans and zoning requirements unless otherwise provided by local law or ordinance. Based on the above analysis, the proposed landfill is not at variance with the Cowlitz County Comprehensive Plan, and is therefore consistent with this provision of the MFS.

(2) Alternative Site Plans A and B

Land use and recreation impacts from the development of the landfill under the alternative site plans would be similar to those of the Proposal. However, 362 acres of highly productive forest land (18 acres less than the Proposal) would be removed from commercial timber production under Alternative Site Plan A; and 286 acres (94 acres less than the Proposal) under Alternative Site Plan B.

(3) No-Action Alternative

Without the Proposal, land use at the site would continue as managed commercial forest land. The impacts described above would not occur.

c. Mitigation

No mitigation is proposed.

d. Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts on land use would be expected.

4. Aesthetics

This section is based on an aesthetics analysis by Robert Shinbo Associates, which is included in the text of the *Environmental Technical Report* (Beak, 1991a). Based on U.S. Geological Survey topographic maps and helicopter reconnaissance, sixteen viewpoints were initially identified from which the landfill could potentially be viewed. These viewpoints were selected so as to be representative of potential views of the site from different directions and distances, and from different types of viewpoints (for example, private residences and publicly accessible roads and facilities).

Each viewpoint was visited and, if the landfill site was actually visible, a photograph of the site was taken. Permission was requested and granted to photograph from several viewpoints located on private property. Photographs were not taken from ten of the sixteen viewpoints because some obstruction, usually thick vegetation, blocked the view of the site. Most of the viewpoints were general areas rather than specific locations. In these cases, photographs were taken from the location with the most unobstructed and expansive view of the landfill site.

Of the six viewpoints from which photographs were taken, three were selected for further analysis: the Mount St. Helens Visitor Center, Spirit Lake Highway, and South Silver Lake Road. These three were selected because they are publicly accessible and likely to be recognizable by those familiar with the Silver Lake area, offer views of the site similar to those from adjacent privately owned property, represent both near and far views of the site, and are located on land not owned by Weyerhaeuser. Most importantly, the selected viewpoints allow an analysis of the range of potential visual impacts that would result from the proposed landfill.

Using visual imaging and 3-D modeling software, the landform and vegetative cover of the landfill was simulated and merged with photographs of the selected views. The same techniques were also applied to an aerial photograph of the Headquarters Site.

In 1990, when the photographs were originally taken, the closest view of the proposal from a publicly accessible roadway was obstructed by existing vegetation and was therefore not photographed. A viewpoint farther to the west on South Silver Lake Road was used for the simulations. In 1992, additional tree harvesting occurred, making a portion of the site visible from the closer viewpoint. Therefore, this closer viewpoint is now addressed in the impacts analysis in this section.

a. Affected Environment

(1) Site Description

The Headquarters Site is currently managed as private timber land. Topographically, it is gently rolling to moderately sloped; most of the site faces north (Figure II-6). The average slope within the site is 10 to 15 percent, and the steepest slope is 40 percent. Second- and third-growth Douglas fir cover most of the site and logging roads and an abandoned rail line traverse the site. The highest elevation, near the southeastern perimeter, is 1,080 feet above mean sea level (MSL). The lowest elevation, along the northwestern perimeter of the site, lies at 850 feet MSL.

Visually, the site is similar to adjacent lands in all directions. Previous forest practice has been to clear-cut and replant the area with Douglas fir seedlings. The primary road traversing the site, the "1600" Road, is unpaved but carries daily truck traffic transporting logs harvested east of the site to the main public roads to the west.

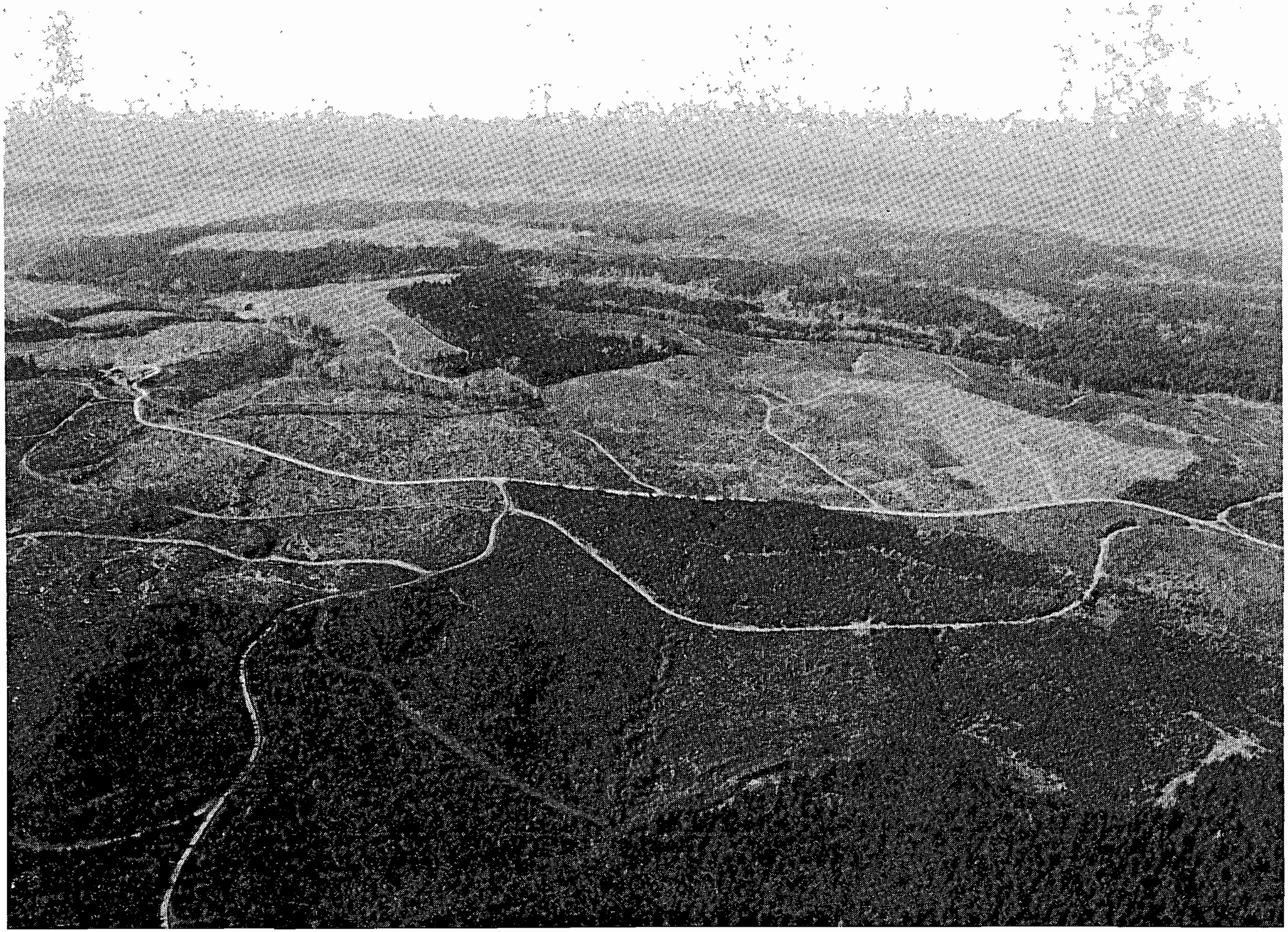


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Figure II-6
Headquarters Site: Aerial View Looking North
Source: Beak Consultants, Inc., 1991

Weyerhaeuser Company
Headquarters Camp Solid
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West of the site is the old Headquarters Logging Camp from which the site derives its name. Several structures exist in the camp and provide the Weyerhaeuser Company with offices, machine shops, and fire-fighting equipment storage.

(2) Site Viewsheds

A viewshed encompasses the entire area that views an object. It is similar to a watershed that encompasses the entire drainage area for a stream or lake, except that a viewshed is not necessarily one single contiguous area. It may be made up of patches or contain large holes within its border because hills, existing trees, and structures block the view of the object from any given viewpoint.

The viewshed for the Proposal extends in all directions, but the areas to the east and south are not significantly impacted since they are not generally accessible by the public. The land is owned by the applicant and is expected to continue operation as productive forest. The portion of the viewshed that is visible to the public generally lies to the west and north.

Publicly accessible areas that can view the site include a few locations along Spirit Lake Highway, some private homes on Goat Island and the south-facing hills north of Spirit Lake Highway, the surface of Silver Lake, some points around the Mt. St. Helen's Visitor Center, a few locations along South Silver Lake Road, and some homes served by South Silver Lake Road. Almost all of these viewpoints view the site from a distance of over 3 miles and have obstructed views due to vegetation and hills between the viewpoint and site.

It appears that a relatively short stretch of the Spirit Lake Highway south of the Silver Lake Cemetery affords the greatest number of people a view of the site. This is due to the automobile traffic on this publicly accessible roadway and the lack of any obstructions along this portion of the road. The distance from this point is 5 miles and the view of the site is partially obstructed by forest lands north of the landfill, between the site and Silver Lake.

The closest publicly accessible viewpoint appears to be a point on South Silver Lake Road approximately one mile west of the site. Recent clearcutting has opened up views of the northwestern portion of the site from this viewpoint, particularly to the existing rail line and the northwestern portion of the proposed footprint. As trees become reestablished in the clearcut area, views of this area of the site will again be screened. Assuming an average growth rate of 2 to 3 feet per year, trees will likely be tall enough to provide screening in approximately 5 to 10 years. Views of the northwestern portion of the site could be reopened through future clearcutting, which typically occurs on a 40- to 45-year cycle in the project area.

The southern portion of the proposed landfill footprint, where landfill construction is proposed to begin, is located behind a ridge which obstructs the view from the above viewpoint. Homes on this stretch of South Silver Lake Road are generally sited parallel to the road, so their primary view is north toward Silver Lake rather than east toward the site.

b. Impacts of Alternatives

(1) The Proposal and Alternative Site Plans

The aesthetic impacts are based on construction, operation, and maintenance activities that would, at times, occur simultaneously over the life of the landfill. Construction and operation activities involve four independent processes, each of which would have a potential impact on the viewshed; 1) construction of support facilities, 2) vegetation management and initiation of landfill operations, 3) phasing or sequencing of disposal areas, and 4) post-closure maintenance and use.

Additional facilities to be constructed would include temporary stockpiles and staging areas on the site to facilitate phased construction of the landfill cells. These facilities would be moved periodically as additional areas are opened up and finally removed from the site altogether when the landfill is completed. These temporary structures would be visible to some residents along South Silver Lake Road.

A transfer station and leachate holding pond would be built adjacent to the rail loading yard northwest of the landfill footprint. The leachate pond and most of the facilities and activity associated with the transfer station would be screened from view by the trees retained as a visual buffer (see Section I.B.1.a, Buffer Zone, and Figure I-2). A series of three sedimentation/ detention basins would be constructed along the northern and western perimeters. The low profile of the basins and surrounding vegetative screening would keep the basins hidden from off-site views.

Vegetation would be cleared as needed before construction of a new landfill cell. The clearing would be similar to the current forest management practices, and therefore would be in keeping with the existing visual expectations. However, once cleared, the area would be subject to cell construction and landfill preparation activities.

Typical construction of a single landfill cell would create several conditions contributing to aesthetic contrast. Following clearing of vegetation on an individual cell footprint, the cell would be graded. Grading would expose the underlying soil, creating visual contrast between the soil and surrounding vegetation. Overall, visual contrasts would be much more stark than for normal timber harvesting activities because of complete vegetation removal and soil exposure. After grading, the bottom liner and leachate collection system would be set in place and landfill activities would begin. The black plastic liner and granular soil layer containing the leachate collection system would contrast in color and texture with the surrounding visual character.

The filling of the cell with solid waste would create contrast similar to that created by grading activities, but landfilling activities would be more visible to off-site areas due to height. When a landfill cell reaches capacity it would be covered with black plastic material. Again, the black plastic would contrast with the surrounding vegetation and would create some low levels of glare. Placement of soil over the plastic cover material and revegetation of the cell would occur as each cell was completed, and according to a specific revegetation plan.

If needed, an active gas control system would be installed at the proposed landfill (see description in Section I.B.1.d(6), Landfill Gas and Odor Control). The flare would be located near the transfer facility or leachate pond, where it would be screened from view by the trees retained as a visual buffer (Figure I-2). If gas manifold pipe is placed above the surface of the landfill rather than buried, the relatively small-diameter (4 to 12 inches) plastic pipe would be screened from view by the grasses and shrubs to be planted on the closed landfill.

Construction and operation of the initial landfill cells would occur in the southwestern portion of the landfill footprint. Changes and increased activity in this area would not be visible from the closest publicly accessible viewpoint (about 1 mile west of the site on South Silver Lake Road) due to an intervening ridge. By the time the landfill extended into areas currently visible from this viewpoint, trees would likely have reestablished in the recently clearcut area and would screen the landfill from view (see Affected Environment section). If landfill operation continues for over 40 years, trees could again be cut, reopening views of the landfill. Views from homes along this stretch of South Silver Lake Road would not be significantly affected, because the primary view from these homes is north to Silver Lake rather than east to the site.

The final landfill elevation including the cover would be about 170 feet above the site's existing high point of 1,080 feet. This change would probably be most apparent when viewed from two residences along South Silver Lake Road, which would have a relatively unobstructed view of the western edge of the landfill from a distance of about 2.5 miles (Figure II-7). The trees retained as a visual buffer (Figure I-2), future growth of trees in the foreground, and phased revegetation of the landfill, would mitigate, but not completely eliminate, views from these homes and their backyards.

The Mt. St. Helens Visitors Center and the surface of Silver Lake are probably the most publicly accessible viewpoints, other than roadways, that could view the landfill. The views from the Visitors Center would be relatively distant (approximately 3.5 miles) and obscure (Figure II-8). Most windows and outdoor viewing areas associated with the Visitors Center orient toward Mt. St. Helens, which is to the east, and not to the site, which is to the south. Boaters or other users of Silver Lake would have views of the landfill at distances ranging from 2.5 to 3 miles. Because of the distance and proposed cover of natural plantings, most users would probably be unaware of the landfill after completion.

Travelers along the Spirit Lake Highway, near the Silver Lake Cemetery, would see approximately 30 to 40 percent of the proposed landfill from a distance of about 5 miles (Figure II-9). Similarly, residents located on the hills north of Silver Lake would also see portions of the Headquarters Site from a distance of about 4 to 5 miles. At such distances, the landfill would not appear significantly different than typical clearcut harvest activities that occur sequentially throughout these viewsheds.

The final revegetated landfill would be designed to simulate rolling hills surrounding the site. The landfill footprint would be revegetated with grasses and shallow-rooted shrubs, with a few patches of trees. Drainage swales and riparian areas outside the footprint would be planted in a mix of low shrubs and small trees. These features would prevent the Headquarters Site from appearing as a smooth, continuous slope and would create a more visually diverse landscape (Figure II-10).

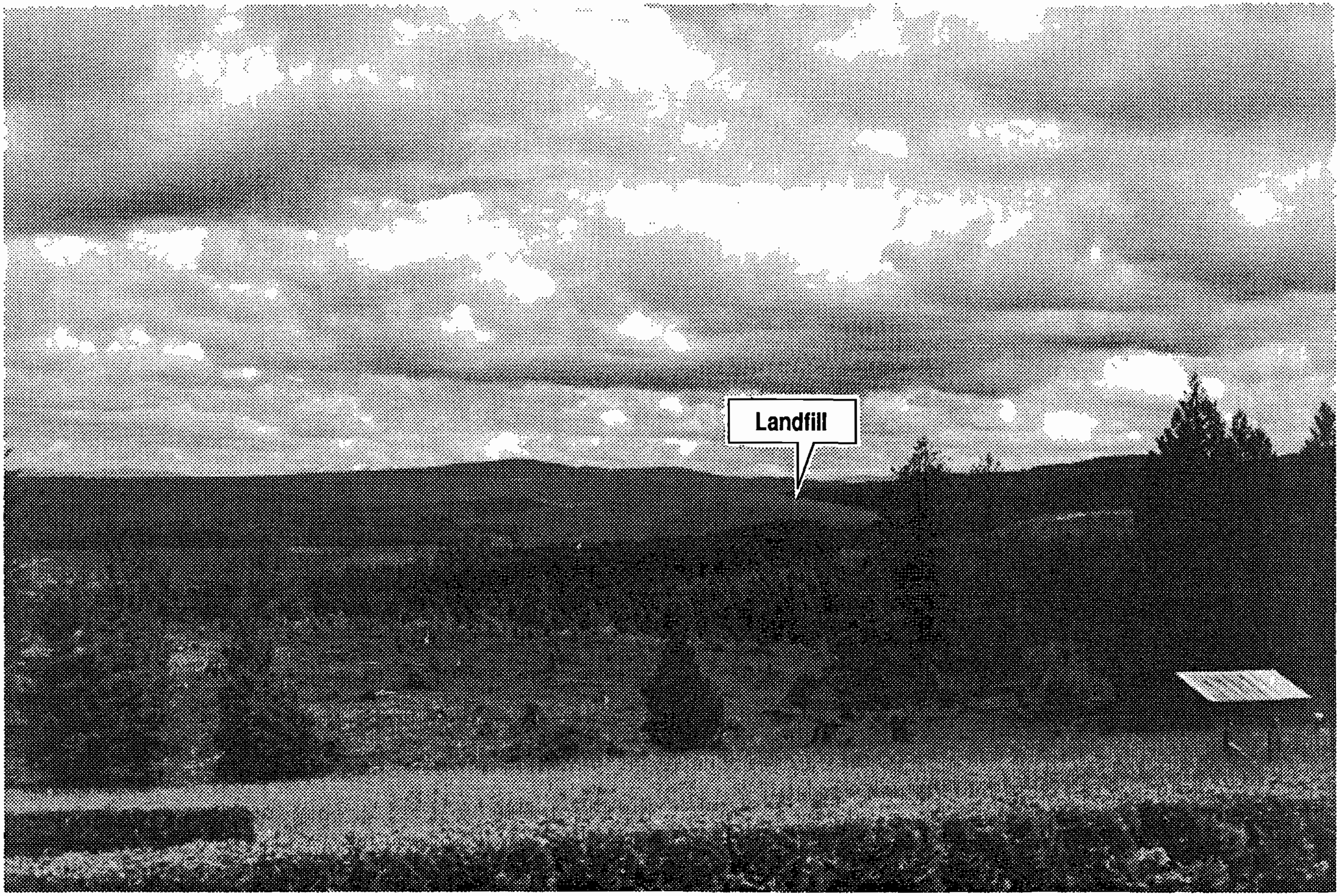

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Figure II-7
Simulated View East from South Silver Lake Road
Source: Beak Consultants, Inc., 1991

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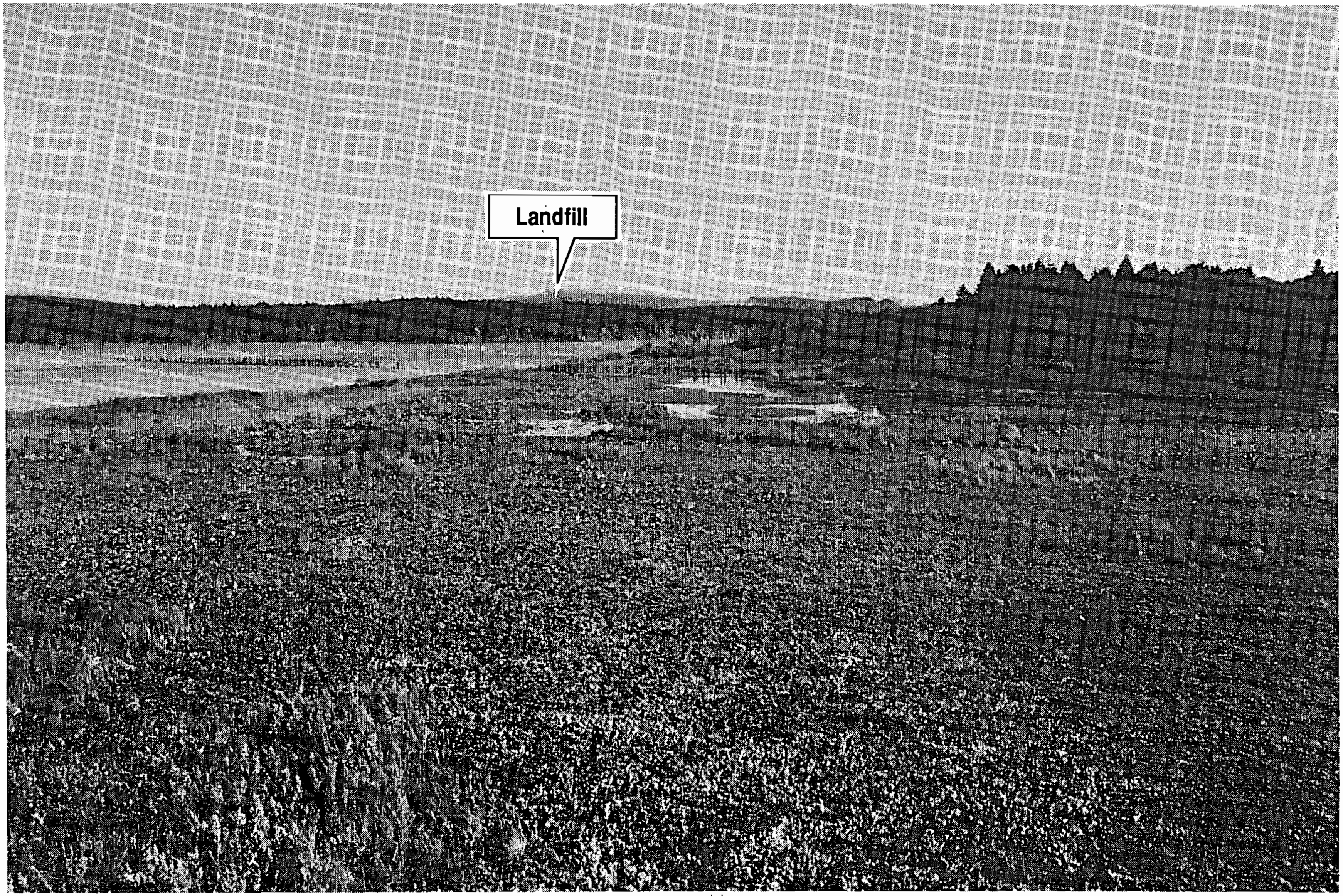

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Figure II-8
Headquarters Site: Simulated View East from Mt. St. Helen's Visitor Center
Source: Beak Consultants, Inc., 1991

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Headquarters Camp Solid
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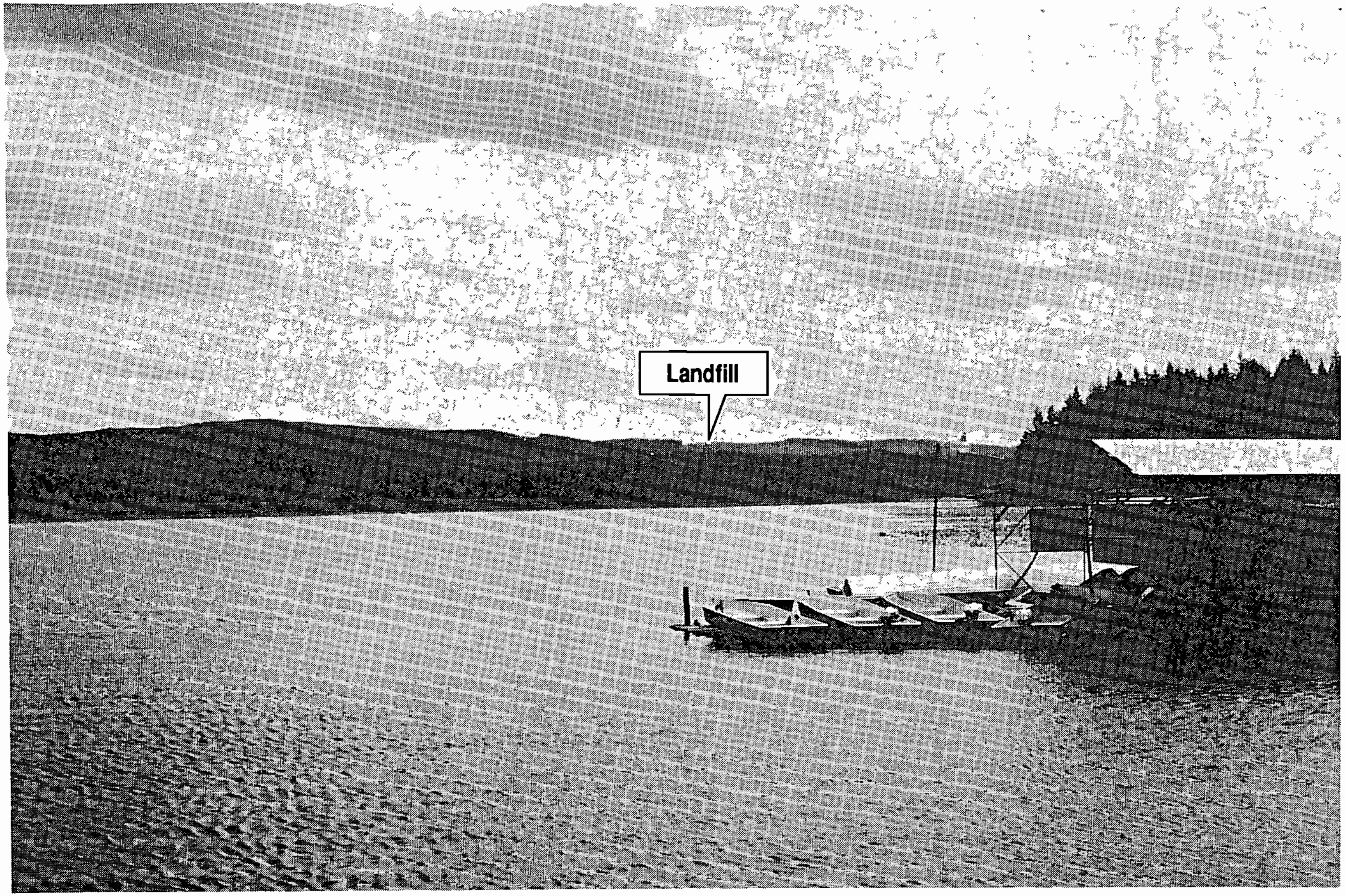

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Figure II-9
Headquarters Site: Simulated View from Spirit Lake Highway
Source: Beak Consultants, Inc., 1991

Weyerhaeuser Company
Headquarters Camp Solid
Waste Disposal Facility

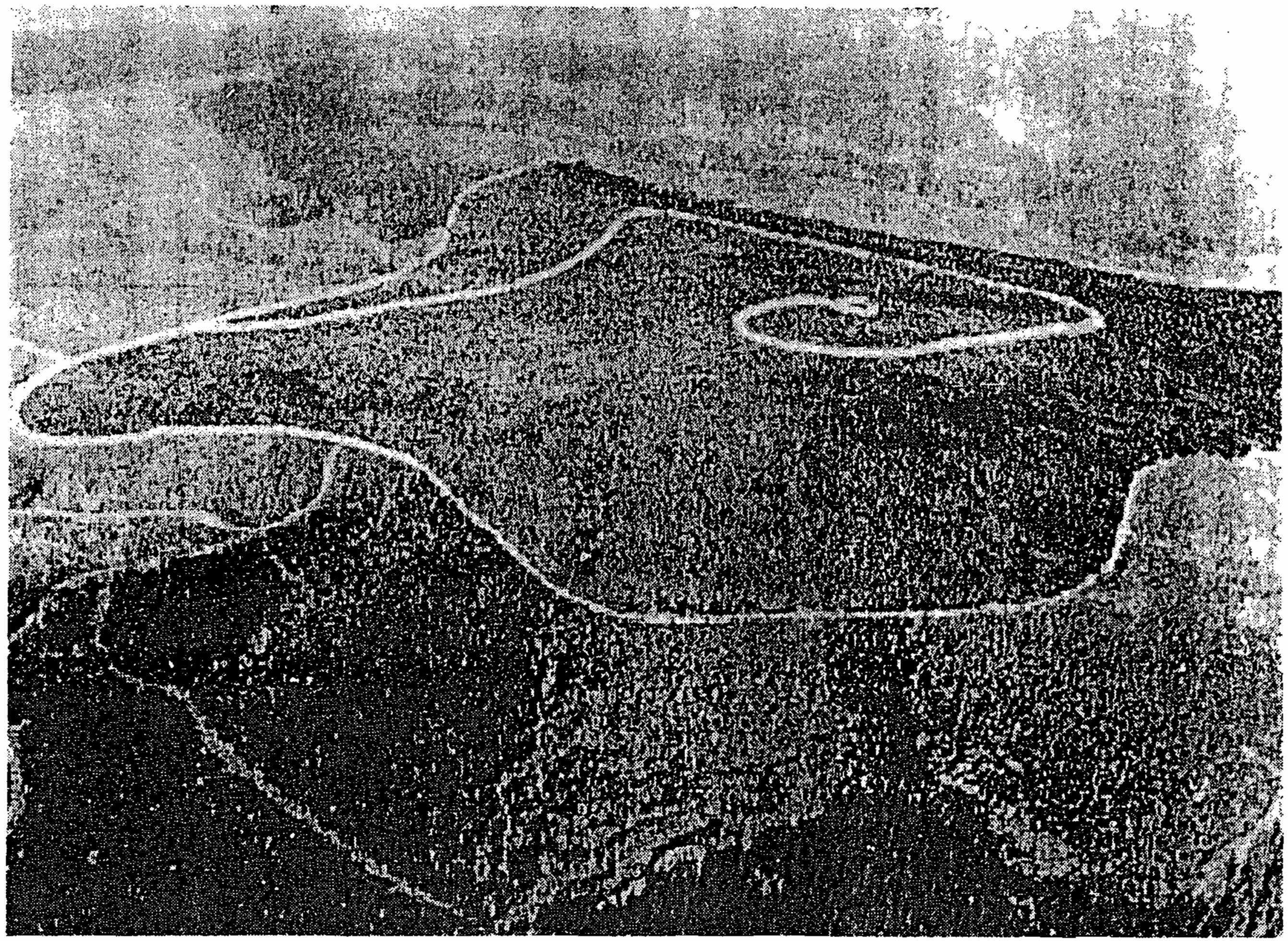

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Figure II-10
Headquarters Site: Simulated View after Complete Reclamation
Source: Beak Consultants, Inc., 1991

Weyerhaeuser Company
Headquarters Camp Solid
Waste Disposal Facility

For up to six months a year, the landfill active area would have to be lighted up to about 3 hours per day (about 1 hour at dawn and 2 hours at dusk). Active area lighting would consist of portable, directional light fixtures on 20- to 30-foot standards placed immediately adjacent to the cell being filled. The fixtures would be similar to those used on road construction projects. They would project a confined pattern of intense light in the direction aimed. The lights would be directed towards the south or east, away from residences to the north and west, whenever possible. Therefore, no direct light would fall on adjacent property, and views of bright light sources from off-site locations would be minimal. Some indirect light, probably in the form of a soft glow behind the reflector shield, would be visible from distant viewpoints. Active area lighting would not be present after 7:00 p.m.

Other lighting for the project would include fixed lighting, and headlights on landfill equipment and vehicles. Fixed lighting, which would be on every night, is proposed only for the maintenance building in the existing Headquarters Camp area, and for the transfer area. No fixed lighting is proposed for the access road to the landfill.

The maintenance facility and transfer area lighting would be similar to that used in light commercial applications and would not cause significant off-site light. Seven sets of headlights (on two pieces of landfill equipment and five trucks) could be visible at any one time. They would be similar to headlights on logging trucks and other heavy equipment which frequent the area. Headlights would generally not be present after 7:00 p.m.

Visual impacts could change during the 30- to 50-year life of the landfill. Changes in development such as the number and location of homes, public structures, and public facilities, as well as changes in surrounding vegetation might alter views of the landfill.

(2) No-Action Alternative

Aesthetics impacts as a result of not building the landfill on the site would be limited to occasional forest clear-cutting on the site as timber stands mature. This would be visible from areas near Silver Lake as are many other forest-cutting activities in the region. There would be no visible change in topography as a result of the landfill mound.

c. Mitigation

The following mitigation measures are proposed for the Headquarters Site:

- **Vegetative buffers:** Retaining existing stands of vegetation west of the transfer area would block or diminish the view of the proposed landfill from South Silver Lake Road and the residences served by this road.

- **Wetland replacement:** Replacement of wetlands displaced by the Proposal would lessen the visual loss of these features as well as offer additional screening and enhancement of the proposed project area.

- **Screening rail and road alignments:** New plantings or earthen berms located adjacent to the road and rail line at the landfill site would block or diminish the view of these features.

- **Naturally contoured grading:** Naturally contoured grading would appear more like the surrounding hills, making the proposed landfill less noticeable.

- **Phased revegetation:** Planting portions, or cells, of the landfill immediately after filling, rather than waiting until total completion of the landfill, would decrease the amount of waste that is visible at any one time and accelerate the natural look of the completed project.

- **Use of earth-tone colors on project structures:** Light and glare impacts generated from on-site facilities would be minimized by building and treating facilities with earth-tone-colored materials compatible with the surrounding environment.

- **Controlled lighting:** Active area lighting would consist of directional light fixtures, and would be directed to the south and east whenever possible.

d. Significant Unavoidable Adverse Impacts

The Proposal would alter the existing visual character of the site during and after completion of the landfill. The change would be most apparent and dramatic at or within 0.5 mile of the site. However, given the projected continued use of the adjacent lands for commercial forest production, close public view of the Proposal should be infrequent. The distance from the landfill and existence of view obstructions would tend to decrease the visual impact from publicly accessible viewpoints. Therefore, no significant unavoidable aesthetic impacts would be expected under the Proposal or alternative site plans.

5. Historic and Cultural Preservation

This section is based on a cultural resources report in Appendix N of the *Environmental Technical Report* (Beak, 1991a). An on-ground reconnaissance level survey for cultural resources was conducted on the Headquarters Site.

a. Affected Environment

The Headquarters Site is within the traditional territory of the Lower Cowlitz Indians. No long-term encampments have been recorded within the site. However, short-term camps associated with economically significant plant gathering and game hunting have been identified in other areas of Cowlitz County.

Reviews by the Washington State Office of Archaeology and Historic Preservation, St. Helens Ranger District, and the Cowlitz County Historical Museum indicated that no sites, including those eligible for or listed in the National Register of Historic Places, were previously recorded in or near the Headquarters Site. No evidence of cultural resources was found during the on-ground survey.

b. Impacts of Alternatives

(1) The Proposal

The proposed landfill would not impact any known historic or cultural resources at the Headquarters Site, although a potential exists for previously unknown resources to be encountered during construction.

(2) Alternative Site Plan A

Alternative Site Plan A would have impacts similar to those of the Proposal, but a smaller area of the site would be disturbed by construction.

(3) Alternative Site Plan B

Alternative Site Plan B would have impacts similar to those of the Proposal, but the area of the site disturbed would be the smallest of any of the site plans considered.

(4) No-Action Alternative

There would be less potential for disturbing previously unknown cultural resources because logging activities would not require complete vegetation removal and grading.

c. Mitigation

Before beginning landfill construction, Weyerhaeuser would retain a cultural resources expert to conduct a 100 percent survey of the site. If any cultural resources were discovered, construction would be delayed in that area while a Section 106 review process of the National Historic Preservation Act (Advisory Council on Historic Preservation, 1966) was followed. The resource site would be protected until the evaluation was complete and clearance was received to proceed with construction. A similar procedure would be followed to protect any previously unknown cultural resources encountered during landfill construction.

d. Significant Unavoidable Adverse Impacts

There would be no significant unavoidable adverse impacts to known cultural resources from the project.

6. Transportation

This section is based on a report by Kittelson and Associates, Inc., which is included in Appendix K of the *Environmental Technical Report* (Beak, 1991a); as well as information on rail safety included in Appendix J of this EIS.

a. Affected Environment

(1) Access

(a) *Rail*. The Headquarters Site is served by the Weyerhaeuser-owned C&C/Woods rail line (Figure II-11). From the Longview mill to Ostrander junction, a distance of 8.2 miles, the C&C/Woods line is relatively flat with few sharp curves. There are 10 at-grade crossings of local arterials in this section, most of which are controlled by advanced warning flashing signs without automatic gates. The locations of the crossings and type of control are shown in Table II-14.

Table II-14 At-Grade Crossings - Columbia & Cowlitz Railroad

Crossing Location Control	Control
Industrial Way	Flashing signal without automatic gates
Washington Way	Flashing signal without automatic gates
State Route 4	Flashing signal without automatic gates
32nd Street	Flashing signal without automatic gates
30th Street	Flashing signal without automatic gates
Pacific Highway	Flashing signal without automatic gates
15th Street	Flashing signal without automatic gates
Fishers Lane	Cross-buck signs
Columbia Heights Road	Flashing signal with automatic gates
5th Street	Cross-buck signs

From Ostrander junction, the C&C/Woods line proceeds east to the Headquarters Site, a distance of about 10.5 miles, and on to the Green Mountain mill. The first 5.5-miles of track east of Ostrander junction has a number of sharp curves, and most of the grade exceeds 2 percent. For approximately the next 3 miles, the railroad has a grade of over 3 percent, and the steepest section has a grade of 3.7 percent. The remaining 2 miles to the Headquarters Site are relatively flat. An existing siding at the site is currently used for switching log cars.

(b) *Truck*. As noted in Section I.B.1.c, Waste Transportation and Rail Loading/Unloading Facilities, trucks would carry waste from the mill to the landfill site in the event of a temporary but sustained rail disruption. It is approximately 22 miles from the Longview mill to the Headquarters Site. Trucks accessing the Headquarters Site from the mill would travel east on Industrial Way to Third Street, then east on SR 432 (Tennant Way) to I-5 (see truck route in Figure II-11). Trucks would travel northbound on I-5 and exit at Headquarters Road, travelling east on Headquarters Road and South Silver Lake Road to the site. Figure II-11 shows the haul route from the mill to the site.

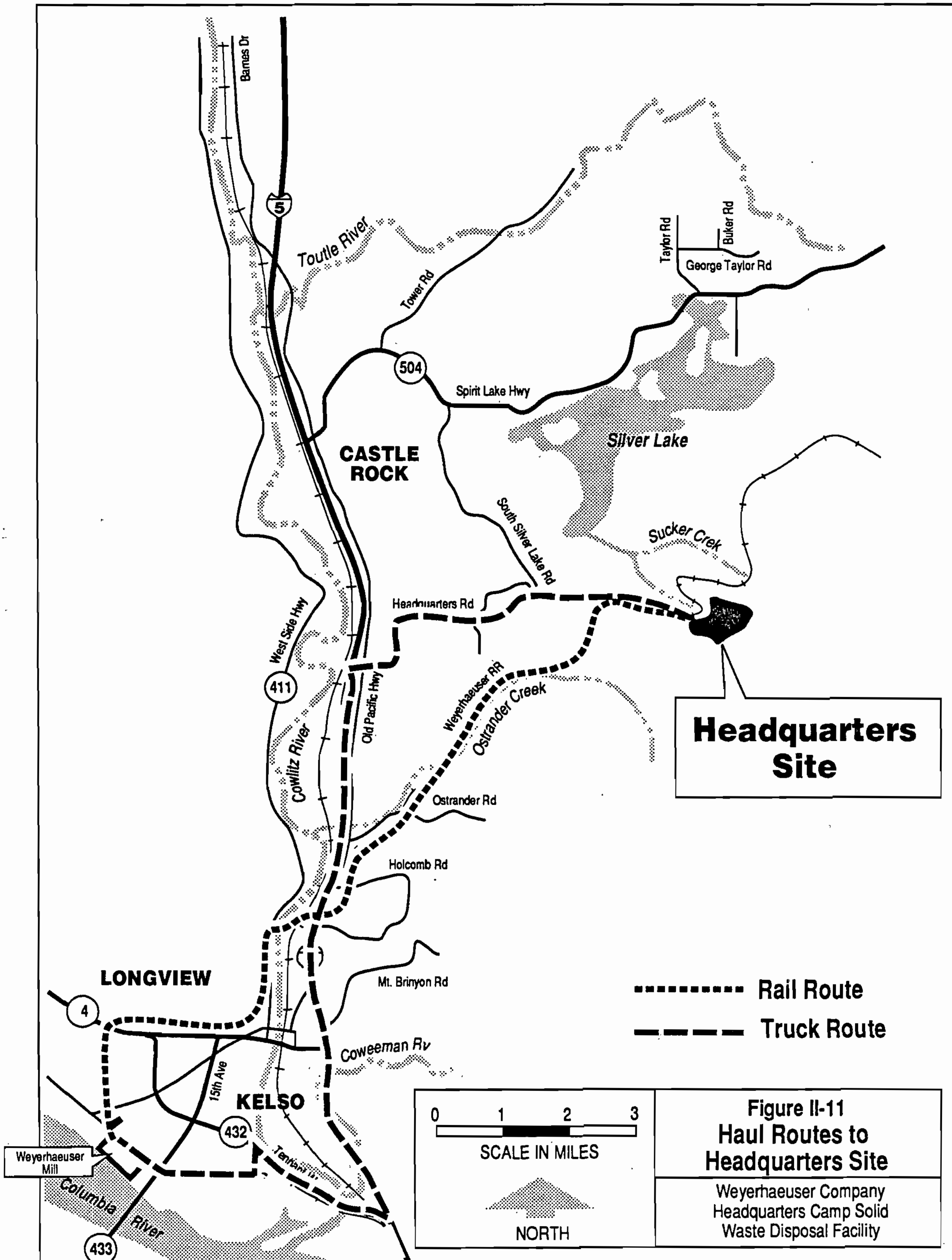

Figure II-11
Haul Routes to Headquarters Site

Weyerhaeuser Company
Headquarters Camp Solid
Waste Disposal Facility

South Silver Lake Road is a two-lane county road. Headquarters Road is also a county road, but it changes to a private road owned by Weyerhaeuser as it approaches the Headquarters Site. It is a narrow two-lane road with narrow, unpaved shoulders. Approximately 2 miles of this road has a grade of approximately 8 percent. There are no signalized intersections on Headquarters Road between I-5 and the site.

(2) Accident History

Seven derailments have occurred on the C&C/Woods rail line between the Longview mill and the Headquarters Site since 1987. These were the result of defective tracks (at times due to vandalism), fill/slope instability during unusually wet weather, old and/or poorly maintained equipment, high-speed operation, and overweight cars.

Track and operations inspections were conducted in 1989 and 1990, resulting in a number of recommendations for improvements. Recommendations included a reduction in operating speeds to 10 to 12 mph, a reduction in car weights, drainage improvements, and a major track upgrade from the mill to Headquarters Camp, including replacing most bolts, double spiking curves, replacing worn ties, replacing the rail at some of the curves, and adding concrete aggregate ballast to the road bed.

Implementation of these recommendations was completed in 1992, and the C&C/Woods line is now fully in compliance with FRA rail safety standards for Class 2 rail lines (49 CFR Part 213). FRA regulates all aspects of rail operations, including tracks, locomotives, and cars. In particular, it inspects air brakes (air brakes in all cars must be functioning and must be controllable from the locomotive), inspects the contents of rail cars to make sure materials are being transported in appropriate containers, checks on the licensing and training of engineers, and monitors noise emissions from rail operations to make sure they comply with FRA noise emissions standards (FRA, 1992).

FRA has conducted locomotive and equipment inspections of the C&C/Woods line, and all FRA recommendations resulting from these inspections have been implemented. At least 30 days before movement of solid waste or leachate begins, FRA would perform a full track and operations inspection, and require that any needed upgrades be implemented before such movement begins (FRA, 1992).

One derailment has occurred on the C&C/Woods line since it was upgraded to FRA Class 2 standards. The most likely cause of this incident, which occurred in July 1992, was a wheel assembly on a rail car that was not properly maintained, and froze rather than pivoting freely on a curve. In addition, bolts on "gauge bars" (bars that ensure the proper spacing between the rails) may also not have been tightened sufficiently. Since the derailment, Weyerhaeuser has stepped up inspection of car wheel assemblies, and assigned full-time track inspectors to walk the entire length of the C&C and Woods lines every week. The inspectors check track gauge, spikes, bolts, and ties. They carry tool bags, and perform repairs immediately whenever feasible. If not, the problem areas are indicated with yellow paint, and a message is sent to the maintenance section crew to perform the needed work as soon as possible.

(a) *Highway*. Highway accident rates are typically calculated as a rate per 1 million vehicle miles driven over a 1-mile section of highway for a period of 3 years. These rates can then be compared to statewide averages for similar types of highways. During the period from April 1987 to April 1990, Washington State Department of Transportation (WSDOT) data and Cowlitz County data show that a total of 88 accidents occurred on SR 432 between SR 433 and I-5 and included one fatality (Beak, 1991a, Appendix K). This equates to an accident rate lower than the WSDOT average for this type of highway (two accidents per million vehicle miles). The accident rates calculated for the other roads along the haul route for this site fall within reasonable expectations for roadways of their type.

(3) Rail Operations

Two trains now provide rail service from the mill to the Headquarters Site. One train leaves Longview at approximately 6:30 a.m., arrives at the Headquarters Site about 9:00 a.m. to drop off rail cars containing logs, then leaves about 9:30 a.m. to return to Longview. The second train leaves the Green Mountain mill east of the Headquarters Site at approximately 9:00 a.m., arriving in Longview at about 11:00 a.m. At 12:30 p.m. this train leaves Longview to return to the Green Mountain mill, stopping at the Headquarters Site to pick up empty rail cars left by the first train. Train speed does not exceed 12 mph. The line has historically carried five to six trains per day. This can be done with efficient scheduling, two or more trains heading the same direction at the same time, and proper use of sidings for staging and passage.

(4) Highway Operations

Traffic Volumes. Existing ADT volumes were provided by the WSDOT and Cowlitz County for the roads within their jurisdictions. Manual counts were taken by Beak (1991a, Appendix K) to supplement this information and are shown in Figure II-12.

Level of Service. Level of service (LOS) is a method of quantifying the operation of a transportation facility. It is measured as a grade on a scale from LOS A (extremely favorable conditions) to LOS F (unacceptable delay, breakdown of facility). LOS D is generally the minimum acceptable design standard for signalized intersections and LOS E for unsignalized intersections (Transportation Research Board, 1985).

LOS was calculated by Beak for each key intersection along the truck haul route from the Longview mill to the Headquarters Site (Table II-15). These intersections all operate at an LOS of C or better.

Intersection Sight Distance. Sight distance was determined to be adequate at all key intersections associated with the proposed truck haul route from the mill to the site.

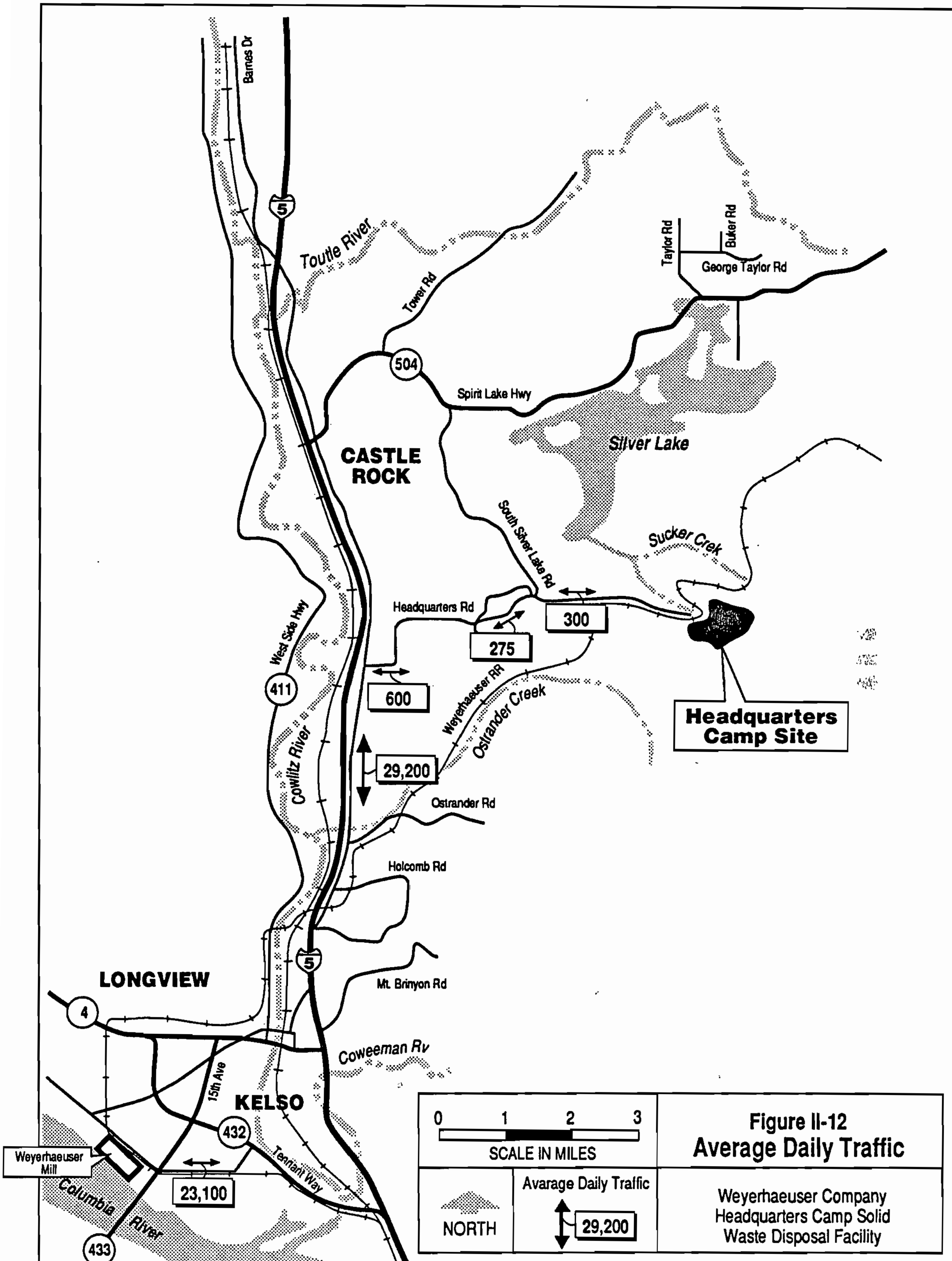

Figure II-12
Average Daily Traffic

Weyerhaeuser Company
Headquarters Camp Solid
Waste Disposal Facility

Table II-15 Existing and Predicted Levels of Service

	Existing	With Proposal
L.O.S. - A.M. Peak Hour		
I-5 northbound ramps and Headquarters Road	A	A
I-5 southbound ramps and Headquarters Road	A	A
SR 433 and Industrial Way	C	C
L.O.S. - P.M. Peak Hour		
I-5 northbound ramps and Headquarters Road	A	A
I-5 southbound ramps and Headquarters Road	A	A
SR 433 and Industrial Way	C	C

b. Impacts of Alternatives

(1) The Proposal and Alternative Site Plans

(a) Rail Operations and Safety. It is proposed that up to two additional round-trip trains be run daily for a total of four trips. The first additional train is expected to begin round-trip operations leaving the Longview mill complex after 6:00 a.m. and return before 12:00 noon. The second additional train is expected to leave the Longview mill complex after 12:00 noon and return before 6:30 p.m. The C&C/Woods Railroad line can accommodate these two additional round trips with no significant impacts on rail facilities and no significant conflicts with existing use of the line. Combined with the existing use of the line, the proposed level of use would result in four round trips per day, which is within the historical use level of five to six round trips per day.

The potential for derailments on the Woods line would be expected to decrease compared to the historical incidence due to improvements already implemented by Weyerhaeuser or improvements that would be implemented as part of the proposed project. Improvements already implemented include upgrading the track to federal Class 2 standards, weekly walking inspections of the entire line between the Longview mill and the Headquarters Site (implemented following the July 1992 derailment), inspection and maintenance of locomotives in compliance with federal standards and FRA recommendations, and an enforced maximum speed of 12 mph (checked regularly with a radar gun).

Improvements that would be implemented as part of the proposed project include the use of new or refurbished rail cars to transport containers of solid waste; and the use of "105" tank cars to transport leachate from the landfill to the Longview mill wastewater treatment plant. The rail cars would meet common carrier, main line standards specified in 49 CFR Part 215, while the tank cars would meet the performance specifications of 49 CFR 179.105 . The use of new or refurbished rail cars, combined with the walking inspections implemented recently, would likely have prevented the derailment on the Woods line that occurred in July 1992.

One of the key concerns expressed during scoping and in comments letters on the Draft EIS is the potential for spills of leachate from ruptured rail tank cars. The historical incidence of derailments on the C&C/Woods line cannot be used to predict the likelihood of a leachate spill, because most derailments do not result in sufficient damage to tank cars to cause a release of the contents. According to rail safety experts consulted for purposes of this Final EIS, the probability of a rupture of a "105" tank car in a derailment at the proposed speeds of 10 to 12 mph is "remote" (FRA, 1992) and "would require a combination of improbable events" (Washington Utilities and Transportation Commission (WUTC), 1992). Correspondence with these agencies is included in Appendix J.

Based on nationwide statistics, the incidence of release of hazardous materials for rail cars carrying hazardous materials on Class 2 tracks is 0.368 releases per million car miles (Weyerhaeuser, 1991c - see Appendix J). Given the number of tank car miles per year required to transport leachate from the proposed landfill (11,560 car miles per year), approximately 0.0043 releases per year would be expected, or one release every 200 years. The actual rate of occurrence of leachate spills would likely be less than this, because the nationwide statistics used in the calculation include trains traveling at higher speeds than 10 to 12 mph (Class 2 standards allow speeds up to 25 miles per hour). In addition, the statistics include rail cars of all types (such as hopper-type cars and tank cars other than "105" cars).

Due to the special performance characteristics of the proposed "105" tank cars (see Section I.B.1.c, Waste Transportation and Rail Loading/Unloading Facilities), the potential for spills is much lower than for other types of tank cars. Nationwide over the past 5 years, there have been two accidents resulting in significant releases from "105" tank cars (see Appendix J). FRA and WUTC rail safety experts have stated that they can recall no derailment incident resulting in a release from more than one tank car, and that the probability of such an incident is "extremely remote" (FRA, 1992 and WUTC, 1992). Therefore a scenario involving leachate spills from multiple tank cars is considered remote and speculative and is not evaluated in this EIS.

Given the number of rail car miles per year required to transport solid waste to the proposed landfill (83,890 car miles per year), and the nationwide incidence of release discussed above, approximately 0.03 releases of solid waste per year would be expected, or one release every 30 years. The actual rate of occurrence of solid waste spills may be more than this, because nationwide statistics also include tank cars, which are less likely to spill in an accident. This is offset to an unknown degree by the fact that nationwide statistics also include rail cars traveling at higher speeds than would be allowed under the Proposal.

(b) *Highway Operations and Safety*. During rail transport of 1,000,000 cubic yards of waste per year from the Longview mill to the landfill site, delays would be experienced by automobiles when the trains cross at-grade intersections with local arterials. Assuming 15 to 20 cars per train (including 1 locomotive) and an average train speed of 7 mph, delays would be approximately 3 to 4 minutes and would occur four times between 6:00 a.m. and 6:30 p.m. During the evening peak hour of automobile traffic, these trains would result in an average delay on SR-4 (assuming random automobile arrival) of 10 to 15 seconds per automobile during the 1-hour p.m. peak period. This level of average vehicle delay equates to a LOS B if measured as a signalized intersection.

In the event that trucks were used to haul solid waste to the site during a temporary rail shutdown, it would require an average of 10 truck/trailers (20 one-way trips) per day during the peak hours. This would not be expected to change the LOS of the SR 433/Industrial Way and I-5 ramp intersections from that shown in Table II-15, nor would it significantly increase the accident potential along the haul route.

During normal landfill operations, it is estimated that up to 225,000 cubic yards of solid waste per year would be transported by truck to the Longview mill. This includes 150,000 cubic yards from non-Weyerhaeuser generators within Cowlitz and Wahkiakum Counties, as well as 75,000 cubic yards from Weyerhaeuser operations outside the two-county area. (The remaining 75,000 cubic yards of imported Weyerhaeuser waste would arrive by train at the Longview mill). Transportation of 225,000 cubic yards of waste per year would require up to 3 truck/trailers (6 one-way trips) to and from the mill during the peak hours. This is substantially less traffic than would occur in the situation analyzed in the previous paragraph, and the same conclusions would apply.

(2) No-Action Alternative

If the proposed solid waste landfill facility is not constructed, changes to truck and rail activities would be varied. Rail operations on the existing line from the mill complex to the Headquarters Site would remain at one to two trains per day or could increase to historical levels as the Green Mountain Mill needs dictate. There might be additional rail activities heading east from Longview, using existing tracks along the Columbia River, if Weyerhaeuser decides to long haul its waste to a landfill in eastern Washington or Oregon. One train or less per day would be used.

Roadway impact would occur if Weyerhaeuser's industrial solid waste were shipped by truck to the County Landfill or to other disposal sites. Assuming 750,000 cubic yards of waste per year from the Longview mill (see Table I-1), total truck traffic would be approximately 60 trucks per day, six days per week, or five trucks per hour in a 12-hour day.

c. Mitigation

No significant adverse impacts are expected; therefore, no mitigation is recommended.

d. Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts on transportation would be expected for the Proposal.

7. Public Services and Utilities

This section discusses the existing solid waste landfills in Cowlitz County and analyzes the impact of the Proposal and alternatives on Cowlitz County's solid waste management activities. Water supply is discussed in the Groundwater section of this EIS (Section II.A.2). Other public utilities and services, including fire and police protection, schools, communications, sewer, electricity, and health services, are not analyzed because the proposed landfill would have little or no impact. This section is based on information contained in the Preliminary Draft of the

1992 Cowlitz County Comprehensive Solid Waste Management Plan (Cowlitz County and SCS Engineers, 1992), which has been circulated for public and agency review.

a. Affected Environment

(1) Existing Landfills in Cowlitz County

Two solid waste landfills in Cowlitz County currently receive industrial and solid waste generated by Weyerhaeuser's Longview pulp and paper mill: the privately operated Mt. Solo Landfill and the Cowlitz County Central Sanitary Landfill (County Landfill).

The Mt. Solo Landfill is located along the Columbia River near the city of Longview. Mt. Solo is currently permitted to accept industrial solid wastes that are defined as "by-products from manufacturing operations such as scraps, trimmings, packing, and other discarded materials not otherwise designated as dangerous waste under chapter 173-303 WAC" [WAC 173-304-100(39)].

Cowlitz County has operated the County Landfill since 1975. It is located on Tennant Way, east of Longview, and covers about 100 acres. Recent analysis shows the largest portion of the County Landfill's solid waste comes from residential sources (45 percent). The landfill also accepts solid wastes from commercial (38 percent); industrial (11.5 percent); and construction, demolition, and land-clearing sources (5.5 percent) (Cowlitz County, 1991).

(2) Existing and Forecasted Waste Stream

Table II-16 displays the total amount of solid waste by source landfilled at the Mt. Solo and County Landfill from 1989 to 1991. Weyerhaeuser was responsible for the largest portion of industrial waste landfilled at the Mt. Solo facility for these 3 years (over 67 percent). However, Weyerhaeuser contributed only a small fraction (less than 8 percent) of solid waste landfilled at the County Landfill for the same period. The portion that Weyerhaeuser contributed to the County Landfill would have been even smaller, but about 40,824 cubic yards of industrial solid waste was sent to the County Landfill when Mt. Solo was temporarily closed from October to December 1990 (see Section I.A.3 for composition of Weyerhaeuser waste stream and forecast waste quantities).

Waste stream forecasts for the County Landfill have been prepared for the Preliminary Draft of the 1992 Cowlitz County Comprehensive Solid Waste Management Plan. The forecasts are based on historical records of solid waste received at the County Landfill, and assume a 2 percent annual growth rate in Cowlitz County solid waste generation. In 1993, the county expects to receive 148,711 cubic yards of solid waste at the landfill. The annual volume of solid waste received is expected to increase to 170,822 cubic yards by the year 2000, reaching 208,231 cubic yards by the year 2010. These forecasts represent compacted in-place solid waste volumes. The forecasts do not include industrial solid wastes landfilled at the Mt. Solo Landfill that could potentially be disposed at the County Landfill when Mt. Solo closes in September 1993.

Table II-16 Solid Waste Landfilled at Mt. Solo and Cowlitz County Sanitary Landfills [a]

Source/Year (Cubic Yards)	1989	1990	1991
Mount Solo			
Weyerhaeuser	496,950	327,570	200,000
Other Sources	356,793	68,376	75,000
Total	**853,743**	**395,946**	**275,000**
Cowlitz Co. Landfill			
Weyerhaeuser	0	68,746 [b]	12,902
Other Sources	198,770	173,051	176,512
Total	**198,770**	**241,797**	**189,414**

[a] Waste volumes include daily cover.
[b] Includes 40,824 cubic yards of waste sent by Weyerhaeuser to the County Landfill when Mt. Solo was closed.

(3) Landfill Capacity

Cowlitz County recently initiated an expansion plan for the remaining unfilled area of the County Landfill. The planned four-phase expansion will cover approximately 41 acres and have a total in-place waste disposal capacity of approximately 3.7 million cubic yards. Phase 1, which has a footprint of approximately 9 acres, opened in January 1992. Based on the waste stream forecasts discussed in the previous paragraph, Phase 1 is expected to reach capacity in 1994. Phase 2, which also has a 9-acre footprint, will be constructed in mid-1994 and reach capacity in 1997. Phase 3, with a footprint of approximately 19 acres, will be constructed in mid-1997 and reach capacity between 2003 and 2007. Phase 4 will consist of filling an area of approximately 4 acres between the old unlined landfill and the new lined landfill. Phase 4 will be constructed prior to completion of filling in Phase 3, and will reach capacity between 2007 and 2012. Therefore, the total expected life of the Cowlitz County Landfill is 15 to 20 years.

In November 1991 the Cowlitz-Wahkiakum Health District approved a variance that allows expansion of the Mt. Solo Landfill's capacity by a maximum of 375,000 in-place cubic yards. Under this variance, the landfill must close by September 1, 1993. Generators such as Weyerhaeuser who are currently using the Mt. Solo Landfill will have to find other waste management alternatives.

b. Impacts of Alternatives

(1) The Proposal

The Proposal would have a beneficial impact on the Cowlitz County solid waste system by providing approximately 45.8 million cubic yards of industrial waste disposal capacity, thereby preventing the potential adverse impacts discussed under the No-Action Alternative (4) below.

(2) *Alternative Site Plan A*

Alternative Site Plan A would have impacts similar to those of the Proposal, except that it would provide slightly less industrial waste disposal capacity (approximately 45 million cubic yards).

(3) *Alternative Site Plan B*

Alternative Site Plan B would have impacts similar to those of the Proposal, except that it would provide substantially less industrial waste disposal capacity (approximately 32 million cubic yards).

(4) *No-Action Alternative*

If the proposed landfill is not constructed, Weyerhaeuser would have to dispose of its industrial solid waste at an existing permitted disposal facility. Whatever facility is selected, Weyerhaeuser's solid waste would contribute to and accelerate the environmental impacts associated with that facility, as well as reduce the facility's life.

Weyerhaeuser has indicated that its preferred disposal option under the No-Action Alternative would be to dispose of its waste at the Cowlitz County Landfill, unless the County took action to prohibit or limit the disposal of industrial solid waste at that facility. (The Preliminary Draft of the 1992 Cowlitz County Comprehensive Solid Waste Management Plan recommends that the County discourage the use of its landfill as a disposal facility for forest products waste.) Due to the uncertainties associated with Weyerhaeuser's future waste stream (see Section I.A.3.b, Disposal Requirements), the effect that Weyerhaeuser waste would have on the life of the County Landfill cannot be determined precisely. However, if the company's waste generation remained at the current level of approximately 220,000 cubic yards per year, it would more than double the volume of waste disposed at the County Landfill. Therefore, the landfill would reach capacity in approximately 7 to 10 years, as compared to 15 to 20 years without Weyerhaeuser waste.

If Weyerhaeuser's waste generation rate increased to 750,000 cubic yards per year as the company anticipates (see Section I.A.3.b, Disposal Requirements), it would increase the waste disposed at the County Landfill by 5 times or more, depending on when the expected waste increases took place. This means that the landfill could reach capacity in as few as 3 to 4 years.

Although the above estimates are approximate, they indicate the range of site life reduction that could be caused by disposal of Weyerhaeuser waste at the Cowlitz County Landfill. If Weyerhaeuser selected this disposal option under the No-Action Alternative, the County would have to identify, evaluate, develop, and implement other options for disposal within a much shorter time period than currently anticipated. Other generators of industrial solid waste and construction and demolition waste within Cowlitz and Wahkiakum counties may also decide to dispose of their waste at the County Landfill under the No-Action Alternative. This would further reduce the life of the landfill.

Other options available to Weyerhaeuser under the No-Action Alternative, including long-haul transportation of waste, are discussed in Section I.B.4., No-Action Alternative. Weyerhaeuser has determined that none of the available options would meet or approximate the objectives of the Proposal as set forth in Section I.A.1 of the EIS.

c. Mitigation

The Proposal and on-site alternatives would benefit the Cowlitz County solid waste system, so no mitigation is proposed.

d. Significant Unavoidable Adverse Impacts

The Proposal and on-site alternatives would have no significant unavoidable adverse impacts on the county solid waste system. Under the No-Action Alternative, Weyerhaeuser has indicated it would dispose of its industrial solid waste at the Cowlitz County Landfill unless the County took action to limit or prohibit disposal of such waste at that facility. This would significantly reduce the life of the landfill, requiring the County to develop other options for solid waste disposal sooner than expected.

Section III

Distribution List

Headquarters Camp
Solid Waste Disposal Facility

Distribution List

The following were sent a copy of the EIS or a Notice of Availability.

FEDERAL AGENCIES
- Federal Railroad Administration
- Mt. St. Helen's National Monument
- National Marine Fisheries Service
- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Soil Conservation Service

STATE AGENCIES
- Washington State Department of Health
- Washington State Department of Labor and Industries
- Washington State Department of Ecology
- Washington State Department of Natural Resources
- Washington State Department of Transportation
- Washington State Department of Wildlife
- Washington State Department of Fisheries
- Washington State Office of Archaeology and Historic Preservation
- Washington State Parks and Recreation Commission
- Washington State Utilities and Transportation Commission

TRIBES
- Chehalis Confederated Tribes
- Cowlitz Tribe

COUNTY DEPARTMENTS
- Board of County Commissioners
- Cowlitz County Department of Community Development
- Cowlitz County Public Works
- Cowlitz County Sheriff's Department
- Cowlitz-Wahkiakum Governmental Conference

CITY DEPARTMENTS
- City of Castle Rock, Mayor
- City of Kelso, City Manager
- City of Longview, Assistant City Manager
- City of Longview, City Manager
- City of Longview, Planning/Building Department

OTHER GOVERNMENT AGENCIES AND DISTRICTS
- Consolidated Diking Improvement District No. 1
- Cowlitz County PUD
- Fire District No. 2

Kelso School District
Longview School District
Northwest Power Planning Council
Silver Lake Flood Control District
SW Air Pollution Control Authority
Toutle School District

PUBLIC OFFICIALS
Representative Jolene Unsoeld

ORGANIZATIONS
Cowlitz County Solid Waste Advisory Committee
Cowlitz Economic Development Council
Cowlitz Game and Anglers
Friends of Silver Lake
Friends of the Earth
Friends of the Cowlitz
Greenpeace
League of Women Voters
Longview and Kelso Chambers of Commerce
North Cowlitz Environmental Council
Northwest Environmental Advocates
Northwest Steelheaders
Silver Lake Grange
Toutle Valley Community Council
Washington Environmental Council
Washington State Job Service Employers Committee
Willapa Hills Audubon Society

LIBRARIES and NEWSPAPERS
Castle Rock Public Library
Cowlitz County Advocate News
Kalama Public Library
Kelso Public Library
Longview Daily News
Longview Public Library
Woodland Public Library

PUBLIC
Patricia Season Bach
J.B. Baichtal
Grant Bailey, URS Consultants, Inc.
Judy Bake
Bob Beamer
Dan and Lee Belding
Don and Martha Belding
Sharon Bergman, Wayron
M. E. Berkley

James Bopst, Pacific Fibre Products
Butch Brenaman
Patricia Bristar
Harry M. Browne
Louie Buck
Kathleen Buker
Zack Burkhardt
Russell Carnahan, Etux
Doris Cellarius
Bernita Chapman
Max and Debra Cody
Marvin L. Cole
Jerry Collison
Don Corkrum
Pat Cornis
Allen Cox
Roy Crayne
Larry Crosby
Stan Dahlquist, Waldon's Island Home Owners' Association
Randy E. Dec, Lakeside Industries
Jim Doherty
John Dzwilewski
Gene Eaton
Karen and Robert Elwood
Dale Erdelbrook
Clark and Marya Evans
Dan Evans, J. H. Kelly, Inc.
Virginia Evitt
Lloyd Fawver
James French
J. Frieberg
Dr. William Funk, Water Research Center at the Washington State University
Jan Gano
Robert Ghart, Western Bass Club
Roy Gorans
Robert Guier
Jim Hatch
Gary Healea, Weyerhaeuser paper company
Ken Henderson
J. M. Hirko, Jr.
Charles Hogarty, Etux
Donna Holmes
Ted Hutchinson, Lone Star Northwest
Kim Johnson
Oscar Johnson
Ron Junker
Rodney Kangas
Mike Kanoski

John S. Karpinski
Russ Kastbeil
Leon Keasler
John Keatley and Dan Lee
Gary Kessler
Lee Kimbro
Jim King
Gene Koppert
John Leber
Mike Lebtich
Don Lemmons, Interstate Wood Products
Don Leubchow
Leonard A. Lindquist, Etux
Ronald and Susan Lindsey
Brian Loster
Andy Macs
Diane Matson
John McKenzie, Valley Rentals, Inc.
Pete McVey
John Megarrity, Valve Management Corp.
Ray Mooney
Raymond Morris
Kay Mosebar
Patsy Myers
Richard and Kathleen Nelson
Chris Ness
Samuel Noel
Douglas O'Connor
James and Francine Olds
Douglas D. Orcutt, L. K. Comstock & Company, Inc.
F. W. (Ted) Palin
Bill and Jenny Palock
S. K. Peterson
Vernon Pickett and Karen Jones, Lower Columbia College
Le Roy Pinard, Etux
Michael and Kathy Pinard
Larry Pointer
George Raiter
Tony Reda
James A. Repman, Lone Star Northwest
Charles Reynolds, Etux
Charley and Marie Reynolds
Robert Rice
Richard and Kim Rismoen
Milton Roberts
Sid Roberts
Bob Robinson
John Robinson, Pacific Properties Services, Inc.

Ted and Nancy Rodgers
Ted Rogers
Sue Rutherford
Joli Sandoz
Robert Schreiner
Tom Scott, Interox Corporation
Don Shatz
Clarke Sheetan
Gary Shelton
Hal J. Smith, Etux
Gary Springer
Rick Thiel, Emcon Northwest
Sheri Jean Tonn, PhD
Verna M. Troxel
Glen Truluck, Etux
John Walkush, NORPAC
Sue Weber
David Welty, Etux
Bruce Wick
Pat Wilkins
Stephen Willing
Joe Willis
Craig Wills
Jeff Wilson, Cowlitz Clean Sweep, Inc.
P. R. Worth
G. E. Yarno
Lief Zerby

OTHERS

Cascade Natural Gas
Columbia/Cowlitz Railway
Drew's Grocery
Hall of Justice, Communication Center
IP Timberlands Operating Co., Ltd
Longview Christian School
Longview Fibre Company
Longview Free Methodist Church
Mt. St. Helen's Visitor's Center
N.W. Indian Fisheries
Seaquest State Park
Shriner's Hospital for Crippled Children
Silver Lake Motel and Resort
Stan's Sanitary Service
Weyerhaeuser Company

Section IV

References

Headquarters Camp
Solid Waste Disposal Facility

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Section V

Glossary

Headquarters Camp
Solid Waste Disposal Facility

Glossary

alluvium—sedimentary material deposited by the action of rivers; includes deposits in river beds, flood plains, lakes, and fans at the base of mountain slopes and estuaries.

ambient air—the atmosphere external to manmade enclosures to which the public has access.

aquifer—a saturated layer of permeable materials large enough to store and transmit groundwater.

association (soil)—a group of defined and named taxonomic soil types occurring together in an individual and characteristic pattern over a geographic region.

basalt—a fine-grained igneous rock composed of dark-colored minerals.

base flow—that portion of stream flow that emanates from the discharge of groundwater or slow drainage from soils. Base flow is normally thought to be the sole component of stream flow between storm or snowmelt periods.

base liner—a composite lining system below the landfill to prevent leachate migration into underlying soils and to facilitate leachate collection and removal. The base liner for this project is a composite liner consisting of 2 feet of compacted soil with a maximum hydraulic conductivity of 1×10^{-6} cm/s, overlaid by a 60-mil high-density polyethylene geomembrane.

bench drain—drainage ditch on a slope bench running subparallel to the slope contours that collects surface stormwater runoff from the slope and directs it to a down drain or other discharge point.

biofiltration—the process of percolating storm drainage through a vegetated swale.

boiler ash—ash resulting from burning of fuel (consisting primarily of wood chips) in boilers used to generate steam or electricity.

borrow area—any place from which earth is taken for use elsewhere.

buffer—chemically, the ability to resist a change in pH (or hydrogen ion activity).

buffer zone—width of land or vegetated strip that serves as a divider between two features to lessen the impact on one or both of the features. For example, a forested buffer may separate managed timberland and a wildlife-use area.

clarifier solids—a mixture of solids removed in the primary and secondary clarifiers. These clarifiers are part of the process effluent treatment system. Primary solids consist of fiber, sand, lime mud, hog fuel, boiler ash, wood particles, and any other material that settles in the primary clarifier. Secondary solids are waste activated biological solids, mainly bacteria, that settle in the secondary clarifier. The primary and secondary solids are mixed and dewatered to 35 to 45 percent total solids.

clay—a soil consisting of particles <2 µm in diameter.

cover type—a vegetative community with specific age and structural characteristics.

demolition waste—non-recyclable solid waste resulting from demolition of buildings, roads, and other manmade structures.

down drain—a drainage channel or pipe that collects stormwater discharge, such as from a bench drain, and conveys it down a slope to a discharge point at or near the slope toe.

emergent wetland—wetland habitat characterized by erect, rooted, herbaceous vegetation as the uppermost vegetative strata (e.g., sedge-dominated meadow, cattail marsh).

enhancement—actions performed to improve the condition of existing degraded habitats so that the habitat functions provided are of a higher quality.

erosion—1) the wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep; 2) detachment and movement of soil or rock by water, wind, ice, or gravity.

rill erosion—an erosion process in which numerous small channels of only several inches in depth are formed.

Fact Sheet—the first section of the EIS; it includes specific project information as required by SEPA.

forested wetland—wetland habitat characterized by woody vegetation greater than 20 feet in height (e.g., Sitka spruce swamp, Oregon ash).

geomembrane—an essentially impermeable plastic membrane used as a liquid or vapor barrier between the soil and the landfill waste products.

groundwater—water that fills all the unblocked pores of underlying material below the water table, which is the upper limit of saturation.

groundwater discharge—discharge that occurs when groundwater flows to the surface and enters the surface water system.

groundwater flow—the movement of groundwater, the direction of flow is determined by mapping measured water-level elevations and connecting points of equal groundwater elevation to define contour lines. Groundwater flows perpendicular to these lines of equal groundwater elevation, from high to low potentiometric elevations.

groundwater recharge—the replenishment of groundwater in an aquifer through infiltration of precipitation, which can occur distant from the aquifer. Discharge occurs when groundwater flows to the surface and enters the surface water system.

habitat—the sum total of environmental conditions where a plant or animal species or population of a species lives.

hog fuel—bark and waste wood that has been hogged (broken up). This material is generally burned in boilers to produce steam. Dirty hog is sent to the landfill or sometimes mixed with lime waste and then sent to the landfill.

holding pond—interim storage pond for leachate that is automatically pumped from the landfill sumps. Leachate is to be removed regularly from the pond and transported to the Longview mill for treatment in the wastewater treatment system.

hummock—a slight, small area rise in the landscape above the elevation of the surrounding habitat.

hydraulic conductivity—a measure of a material's ability to transmit water.

hydrogeology—the study of the occurrence and movement of groundwater in the subsurface geologic rocks and sediments.

landfill capacity—volume within a landfill footprint (see below) available for waste materials, estimated as the airspace minus the volumes required for the base liner, final cover, and intermediate cover.

landfill footprint—area within which solid waste disposal occurs.

leachate—all liquids that come into contact with the waste. Typically these liquids are collected at the bottom of the landfill through the leachate collection and removal system. The source of the liquids is either from precipitation percolation through the waste or the excess water squeezed out of the waste as it consolidates.

level of service (LOS)—rating system describing the number of vehicles for a specified time period at a specified location.

lime waste—grits, dregs, and lime mud. Grits are unreacted material ($CaCO_3$) and inerts from the slaker. The slaker is the reactor where lime (CaO) and green liquor (a solution of Na_2CO_3 and Na_2S) are mixed. Dregs are unburned carbon particles and other inerts that are removed from the green liquor during clarification. Lime mud is calcium carbonate ($CaCO_3$). These materials are generally very caustic and are mixed with wood-based waste to control the pH.

lithic tuff—a fine-grained rock composed of volcanic ash with inclusions of rock fragments of pumice, basalt, andesite, and scoria. Pyroclastic flow blast deposits, mudflows, lahars, and lapilli tuff breccias are grouped into this rock type.

lower explosive limit (LEL)—lowest level concentrations at which an element will combust in air given an ignition source.

macroinvertebrate—all invertebrates (generally greater than 500 microns) found in aquatic habitats, including crustaceans, molluscs, arachnids, insects, and worms.

mitigation—avoidance, minimization, or compensation for adverse environmental impacts.

mulch—material such as straw, sawdust, or leaves that is spread upon the surface of the soil to protect the soil and plant roots from the effects of raindrops, soil crusting, freezing, or evaporation.

native species—species indigenous to the local area.

nutrients—a chemical element essential for the growth and development of an organism.

off-site—areas outside of the proposed landfill and project facility boundaries.

on-site—areas within the proposed landfill and project facility boundaries.

permeability—a measure of the ease of water movement through earth materials. Low permeability materials (such as clay, silts, or volcanic flows) transmit water very slowly. High-permeability materials (such as loose sand and gravel deposits) transmit water rapidly.

photoionization—process whereby a substance is dissociated into ions or electrically charged in a gaseous medium as a result of radiation.

ppm (parts per million)—weight units of any given substance per one million equivalent weight units.

restoration—actions performed to reestablish habitat function characteristics and processes that have been lost within an area.

rill—small linear rectangular channels that have eroded into a slope surface.

riparian—of, adjacent to, or on the bank of a lake, pond, river, stream, or other open water source.

runoff—the portion of the precipitation on an area that is discharged from the area through the natural surface drainage system.

scarification—the process of roughening the surface of compacted soil without overturning to aid in establishment of vegetative cover, reduce runoff velocity, and increase filtration.

scrub-shrub wetland—wetland habitat dominated by woody vegetation less than 20 feet tall (e.g., salmonberry, red osier dogwood).

sediment loading—the addition of sediment into a stream, or the amount of sediment being transported within a stream over time.

sensitive species—a plant or animal species that is vulnerable or declining and could become threatened or endangered if current resource management practices continue or threats to the species survival are not removed.

silt fence—a sediment barrier consisting of synthetic fabric hoisted upright on vertical posts.

Southern Tributary—a stream in the Headquarters watershed (also called Central Drainage).

spill event—a release of waste (solids or leachate) into the environment.

stand—a plant community, particularly trees, that is sufficiently uniform in composition, age, or condition to be distinguishable from adjacent communities.

stream down-cutting—the action of creating a deeper stream channel through erosion.

survey, geologic—a survey or investigation of the character and structure of the earth, of the physical changes that the earth's crust has undergone or is undergoing, and of the causes producing those changes.

swale—a hollow depression or low area of land.

tuff—a volcanic rock, usually stratified, formed by compaction of volcanic fragment, typically smaller than 4 mm (e.g., ash dust).

Type 3 stream—the third of five decreasing levels of relative stream quality based on the relative size, use, and function of the stream; designations by the State of Washington (see WAC 222-16-030).

Type 4 stream—the fourth of five decreasing levels of relative stream quality based on the relative size, use, and function of the stream; designations by the State of Washington (see WAC 222-16-030).

viewshed—the area encompassing all points from which a given object can be viewed.

volatile organic compound—organic compounds that have a high enough vapor pressure so that at normal atmospheric pressure and temperature, a significant fraction of their total molecules present are in the gaseous state (e.g., paint, gasoline).

wetland—an area with a predominance of hydric soil that is inundated or saturated by surface or groundwater at a frequency and duration sufficient to support prevalence of vegetation typically adapted for life in saturated soil conditions (e.g., swamps, marshes, bogs, mud flats).