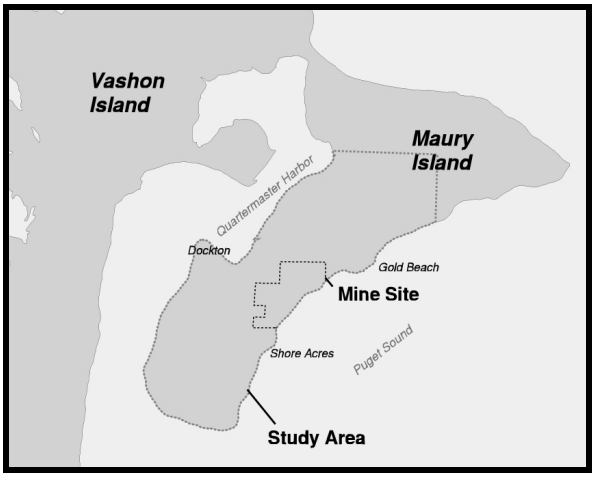
Maury Island Gravel Mining Impact Studies

Final Fact Sheet – June 2000

Background

Glacier Northwest (formerly Northwest Aggregates Company), a subsidiary of Lone Star Northwest, Inc., has applied to increase its rate of gravel extraction from 10,000 tons per year to as much as 7.5 million tons per year. The mine is located on the eastern shore of Maury Island. This proposed action is currently in review under the State Environmental Policy Act (SEPA) process. The Washington Department of Ecology has the responsibility to manage studies conducted by Pacific Groundwater Group and its subconsultants, Herrera Environmental Consultants and EVS Consultants. This Fact Sheet, the final in a series of three, summarizes the findings of these studies and presents the predicted impacts to groundwater, water quality, the nearshore environment, and soils.

Study Area for Maury Island Impact Studies



Summary of Impacts

Groundwater

Impacts to Maury Island's groundwater system are predicted to be limited primarily to the mine site and its immediate vicinity. The timing, rate, and possibly the distribution of recharge to the *Principal Aquifer* will change as a result of the proposed mining. An overall long-term decrease in recharge and a corresponding decline in groundwater levels is predicted. However, this decrease will not be significant, nor will it adversely affect nearby water-supply wells. Spring flows near Dockton Park are expected to decrease slightly, although impacts to springs located below the mine site will be greater.

Water Quality

Concentrations of arsenic and other metals are not expected to increase substantially in springs and surface water as a result of mining activities, although contaminants could be mobilized in the mine area if it rains during soil excavation and transport.

Nearshore Environment

Impacts to the nearshore environment may occur depending on the timing of the mining operations. Spawning herring may be affected by noise during pier reconstruction and barge operations. The nearshore vegetation and the benthic community could also be impacted if a large gravel spill occurs.

(Continued on next page.)

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Soils

Metals and arsenic in soils are not expected to threaten groundwater when contaminated sediments are disturbed and contained during mine expansion.

Discussion of Impacts

Groundwater

Aquifers are recharged as precipitation infiltrates from the ground surface and moves downward to the water table. Changes in the rate and timing of recharge to the *Principal Aquifer* were assessed because of their potential effect on the availability of groundwater. These changes were assessed using two mathematical models. The first model simulated recharge processes at the land surface. The second simulated the vertical movement of recharge between the root zone and the water table. Water-level data were also analyzed to estimate the lag time between seasonal recharge events and responses in the *Principal Aquifer*. The conceptual hydrogeologic model for the Maury Island study area was revised based on field data and used as a framework for the mathematical models.

The results of the recharge analysis indicate that recharge *in the mine area* will be impacted as follows if up to 350 feet of gravel and sand are removed as proposed:

- Recharge to the *Principal Aquifer* will increase in the wet season and decrease in the dry season.
- Annual recharge to the *Principal Aquifer* will decrease slightly because the vegetative cover will be modified during mine excavation and reclamation.
- The movement of recharge water may change in the *Principal Aquifer*.
- Recharge to the deep aquifer will decrease slightly.

A third mathematical model was developed to estimate impacts to the *Principal Aquifer* based on the revised conceptual model and the results of the recharge models. This groundwater flow model featured three layers representing the *Principal Aquifer*, an aquitard, and the deep aquifer. It also incorporated hydraulic boundaries along the coast and at near-site springs. To verify its accuracy, the model was calibrated using water levels measured in the field. It was then run for the preferred mine-expansion alternative, simulating conditions during the three phases of mine excavation and site reclamation. The model was reviewed by an independent expert to help ensure its suitability for predicting impacts.

The model predicts that because of the changes to recharge in the mine area, small impacts to the *Principal Aquifer* and to springs will occur in parts of the study area. The impacts discussed below are conservative estimates, reflecting worst-case conditions.

- Water levels are predicted to decline over the long term by less than 1 foot at the mine site and less than 0.5 immediately adjacent to the site. These impacts, which are small compared to natural water-level fluctuations, should not adversely affect nearby water-supply wells.
- Regional groundwater flow directions are not expected to change appreciably.
- Average annual flows in springs near Dockton Park are expected to decrease slightly—by up to 0.5 gpm—by the end of reclamation. Seasonal flow variations at these springs are expected to increase by less than 2 percent of their current flow. Impacts to flows from Spring E, located along the beach face below the mine site, will be greater.

Water Quality

Concentrations of arsenic and other metals are not expected to increase substantially in springs and groundwater as a result of mining activities via soil leaching, surface water runoff, or stormwater infiltration. Since contaminated soils will be transported and stored in a lined containment cell, the possibility of leaching will be further reduced. However, contaminants could be mobilized if it rains during excavation or transport of soil to the containment cell and appropriate mitigation measures are not taken. Contaminants could also be mobilized if the containment system fails.

Nearshore Environment

Some impacts to the nearshore environment are expected to occur because of mine expansion, as presented in the table below. The most notable impacts will be to herring, which will be affected by noise during pier reconstruction and barge operations, particularly during their pre- and post-spawning stages when they are most sensitive. The degree of the impacts will depend on several factors:

- The location of the spawning grounds
- The timing of pier reconstruction
- The travel route and destination of barges

If the pier is not reconstructed during the spawning season (January through April), impacts due to pier reconstruction are expected to be negligible. Impacts to spawning herring due to barge operations could range from negligible to substantial.

Other impacts could occur to the vegetation and benthic community because of barge operations. A large gravel spill could smother the benthos and vegetation, particularly eelgrass, although the benthic community would recolonize. In addition, the shading of lighted nearshore areas is expected to moderately impact eelgrass and macroalgae within the barge loading areas.

Potential Impacts to Aquatic Resources

	Benthic Community		Vegetation		Salmonids (threatened/ endangered)		Herring (candidate species)		Rockfish (candidate species)		Cod-like Fish (candidate species)		Other Fish Species		Marine Mammals	
Activity/Stressor	**Info**	**Impact**	**Info**	**Impact**	**Info**	**Impact**	**Info**	**Impact**	**Info**	**Impact**	**Info**	**Impact**	**Info**	**Impact**	**Info**	**Impact**
Pier Reconstruction																
Noise	—	—	—	—	◉	△	◉	△–▲	◉	△	◉	△	○	△	◉	△
Turbidity	●	△	◉	△	●	△	●	△	●	△	●	△	●	△	◉	△
Habitat Loss	●	△	●	△	●	△	●	△	●	△	●	△	●	△	●	△
Barge Operations																
Noise	—	—	—	—	◉	△	◉	△–▲	◉	△	◉	△	◉	△	◉	△
Chemicals-chronic	◉	△	—	—	◉	△	◉	△	◉	△	◉	△	◉	△	◉	△
Propeller wash	◉	△	○	△	◉	△	◉	△	◉	△	◉	△	◉	△	●	△
Light shading	—	—	◉	▲	○	△	○	△	○	△	○	△	○	△	○	△
Gravel spills	●	▲	●	▲	◉	△	◉	△	◉	△	◉	△	◉	△	◉	△
Night lighting	—	—	—	—	○	△	○	△	○	△	○	△	○	△	—	—

Information available to support decision:

- ○ limited information
- ◉ moderate information
- ● sufficient information

Estimated population impact:

- △ negligible impact (no long-term measurable changes in viability of population)
- ▲ moderate impact (measurable changes to abundance or distribution of aquatic resource)
- ▲ substantial impact (measurable changes that could threaten the viability of the aquatic resource)

— out of scope

Contaminated Soils Containment

Concentrations of metals such as arsenic in soils vary throughout the study area and are highest at the mine site. Based on the results of leachability tests and other water-quality analyses, metals are not expected to present a risk to groundwater when contaminated soils are disturbed during mine expansion.

The most likely mechanism for releasing soil contaminants would be a failure of the cell cover system. Design improvements are recommended to reduce the risk of cell failure.

If you need this information in an alternative format, please call Dave Garland at (425) 649-7031 (Voice) or (425) 649-4259 (TDD)

Final Public Meeting

A Final Public Meeting will be held to discuss the results of the Maury Island Studies.

When: Thursday June 22, from 7:00 to 9:15 p.m.

Where: Multi-purpose room of McMurray Middle School, 9329 SW Cemetery Road, Vashon, Washington, 98070.

Project Contact

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