

Siting Issues for Gravel Mines and Asphalt Plants

Subcommittee Report to the Thurston County Planning Commission

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Table of Contents

2	Introduction
2	Gravel Mines
2	Processes, Permitting and Regulations
2	Gravel Mines and the Natural Environment
4	Gravel Mines and Adjacent Land Uses
4	Reclamation Aspects
6	Asphalt Plants
6	Regulation and Permitting
6	Processing and Emission Control
7	Asphalt Plants and the Natural Environment
8	Asphalt Plants and Adjacent Land Uses
8	Odor Control Aspects of Asphalt Plants
9	Siting Standards for Gravel Mines and Asphalt Plants
11	Economic Aspects of Siting Criteria for Asphalt Plants
13	Literature Cited
14	Appendix 1

Introduction

The Growth Management Act (GMA) requires that each county designate and conserve mineral lands. In so doing, counties must ensure that land uses adjacent to mineral lands do not interfere with mining and best management practices of mining.

There is no GMA requirement that the county manage asphalt production. However, asphalt plants need gravel as a raw material, so the manufacturers prefer to locate asphalt plants on or near gravel mines.

Thurston County has approximately 20 existing gravel mines. Together they hold enough gravel to support over 20 years of projected Thurston County development.

Of those 20 mines, two have functioning asphalt plants. One of those plants, within Holroyd's gravel mine in the Nisqually Subarea, was opposed by the community, the County planning staff and the County Commissioners, because it was inconsistent with the Nisqually Subarea Plan. That plan had banned recycled asphalt as a permitted use, and that ban was upheld by the Hearing Examiner and the courts. However, because the plan had not specifically prohibited new asphalt plants, the new asphalt plant was permitted by the Hearing Examiner and the courts as an accessory use to a gravel mine.

The possible impacts, siting issues and regulatory oversight for gravel mines and asphalt plants are quite different. Therefore, this report describes them separately. We cover first the possible impacts of gravel mines and their related siting issues, and second, the possible impacts of hot mix asphalt plants and those related siting issues.

Gravel Mines

Processes and Regulations

Pit Mine Processes: There are two main forms of gravel mining – open pit mines which remove gravel from the land, and mining from rivers. This report covers only pit mines; river mines do not occur in Thurston County and none are likely to be proposed due to the extreme permitting problems of development in such a sensitive environment. Pit mines remove vegetation and topsoil, dig a hole, sift gravel from dirt, sort the gravel into various sizes using sieves, store it in piles. Then the material is shipped to where it is needed, usually by truck, but also by train or barge. Finally the site is reclaimed as required by a DNR reclamation plan.

Siting, Permitting and Regulatory Processes: With the passage of the 1993 Surface Mine Reclamation Act, responsibilities for regulation of gravel mining were divided as follows:

- County and city governments issue permits for location and daily operation;

- the Department of Ecology (Ecology) issues permits for water quality and water resources <http://apps.ecy.wa.gov/permithandbook/permitdetail.asp?id=111>;
- Ecology and local clean-air agencies regulate air quality;
- the Department of Natural Resources (DNR) issues reclamation permits; and
- the State Environmental Policy Act (SEPA) environmental review process analyzes the direct impacts of all proposed mining-related permits.

Gravel Mines and the Natural Environment

Possible Impacts on Land Quality: Surface gravel mines have potentially substantial impacts on topography and soils of the sites where they are located – removing plant cover and topsoil, digging deeply beneath the surface, removing gravel, and altering contours.

Gravel mines are generally expected to last a period of years to decades. However, eventually they are exhausted. During the permitting process prior to mine approval, the mining operators are required to file reclamation plans with DNR. These plans detail how the operators will return the site to some other useful condition when they have exhausted the mining capabilities, as detailed in the Reclamation section and Appendix 1.

Gravel mines affect adjacent lands through the dust and sand which accumulates around them. They can also affect surrounding land through modifications of ground water and stream flows, as detailed in the Water Resources section.

Land Relevant Siting Issues: It is important to site gravel mines away from areas where the land is unstable (such as steep or hazardous slopes, seismic zones, areas of subsidence, and other areas of soil instability).

Potential Impacts on Water Resources and Quality: Gravel mines can alter ground water flows. In the area of the mine itself, they tend to concentrate ground water, and because they remove vegetation, which absorbs and deflects rain, they may contribute to increased peak flows in nearby streams, which can destabilize stream channels, degrade aquatic habitat, and contribute to downstream flooding.

Gravel mining increases both dissolved and suspended solids in the aquifer, and in the streams and rivers fed by those aquifers, because it typically leads to increased erosion. *“Mining activities typically begin by removal of the overburden to expose the desired material. Removing topsoil and disturbing the land surface has a number of consequences that increase the potential for adverse consequences to surface and ground water quality. Removing the vegetative cover and disturbing the soil makes the area more susceptible to erosion. Stormwater will readily suspend the exposed soil and carry it to nearby surface water. Sediment can be very harmful to the health of aquatic life and surface water bodies. Vegetation and soil also serve to protect ground water from pollutants. They provide filtration, chemical and physical reactions, and biological activity that often will remove pollutants before they can enter ground water.”*

Therefore mining activities which remove vegetation and topsoil will typically make underlying ground water more vulnerable to pollution.” (Ecology Fact Sheet, page 4)

Sand and gravel mines are required to adhere to conditions of a general water quality permit issued by Ecology. In order for the permit to be effective in protecting water quality, however, the operator must adhere to all conditions. In areas deemed critical or highly sensitive, Ecology recommends that sand and gravel mining not take place, since no process can be assumed to operate with complete adherence.

Don Mead, of Thurston County Environmental Health, carried out a 1995 review of Ecology files. He documented 20 hydrocarbon spills in or near gravel mines around the state between 1987 and 1992. Many of these appear to be associated with underground storage tanks or poor housekeeping practices within the plants. He concluded that *“excavating above the water table with no associated activities such as vehicle maintenance or asphalt batch plants causes a relatively low risk to ground water quality and quantity.”* However, he stated that mining below the water table, or in conjunction with an asphalt plant, causes greater risks.

King County, in their Best Available Science review for their critical area ordinance, documented the possible loss of ground water due to breach of an aquifer plug or site water consumption. In October 1993, mining activities at the High Rock gravel mine near Monroe Washington caused a loss of water supply due to a breach of the aquifer plug (Garland and Lyszak 1995).

Water Siting Issues: Ecology recommends not permitting gravel mining in critical areas such as flood plains or areas of coastal flooding, and locating mines away from wetlands, aquifer recharge areas, or groundwater wells providing water for domestic purposes. Buffer around streams and rivers.

Possible Impacts on Plant and Animal Habitats: Gravel mines can lead to sedimentation in nearby surface waters, which can be detrimental to fish spawning and rearing habitat.

Siting Issues to Consider: Streams and associated wildlife habitat (riparian habitat) should be protected by a buffer. Buffer critical or endangered species habitat, natural area preserves, or wildlife refuges.

Gravel Mines and Adjacent Land Uses

Possible Impacts: Truck traffic causes an increase in traffic, noise, and dust affecting residential and recreational uses, as well as placing stress on roadways, increasing maintenance/repair needs.

Siting Issues to Consider: Distance to residential areas, buffers to separate mining from other land uses. and from recreational use areas. Road impacts (heavy trucks). Consider similarities to other industrial uses.

Reclamation Aspects of Gravel Mining

There is a concern that undesirable environmental or economic consequences may arise when gravel mines reach the end of their useful life. Foreseeable consequences of pit abandonment include erosion; proliferation of undesirable vegetation; nuisance and hazard posed by the excavation, which may contain water; and abandonment of equipment and trash. Additional, unforeseeable adverse impacts could occur if the abandoned pit were not reclaimed to a condition consistent with other land uses in the area, chiefly, rural uses for grazing and/or forestry.

Brief Review of Facts

All mines are subject to the State Environmental Policy Act (SEPA).

Water quality, discharges, and withdrawal and hazardous waste management related to mining operations are regulated by the Ecology.

The DNR regulates the reclamation of non-coal surface mines in Washington. The Surface Mining Act requires a permit for each mine that: (1) results in more than 3 acres of mine-related disturbance, or (2) has a high-wall that is both higher than 30 feet and steeper than 45 degrees (chapter 78.44 Revised Code of Washington [RCW], chapter 332-18 Washington Administrative Code [WAC]). DNR is responsible for ensuring that reclamation follows completion of surface and underground mining. DNR has exclusive authority to regulate mine reclamation and approve reclamation plans.

A reclamation plan is required for each surface mine. Mandatory features of the plan include:

- what the topography, vegetation and drainage for the site will be following mining;
- a sequence of mining and reclamation that will avoid unnecessary earth-moving;
- the economic limit of mining for the site based on the area available for mining and the grade of the mineral deposit;
- how the mine permit-holder will achieve acceptable reclamation, the equipment necessary and how much it will cost;
- how environmental impacts will be mitigated;
- maps and cross sections must be included¹; and
- the surface mine operator must post a security bond based on the projected costs of reclamation.

¹ A typical reclamation plan includes maps showing: 1) pre-mining topography; 2) reclamation sequence map showing the direction, extent and mining boundaries as well as designated areas for setbacks, buffers and storage areas for topsoil and overburden; and 3) final reclamation map showing the final elevations, contours, drainage, slopes, roads and other features of the site following reclamation.

Reclamation of the mine site must meet or exceed the minimum reclamation standards required by the Surface Mining Act. A reclamation plan should be simple, practical and easy to implement. The final land surface will have natural contours that blend with the surrounding topography.

Local governments must formally approve mine sites and/or the subsequent use of the mine site (RCW 78.44.091) prior to issuance of a reclamation permit. This approval process generally makes local jurisdictions the lead agency according to State Environmental Policy Act (SEPA) rules (chapter 43.21C RCW).

DNR's surface mining reclamation program is fully set forth at:

<http://www.dnr.wa.gov/BusinessPermits/Topics/MiningEnergyResourceRegulation/Pages/smr.aspx>.

As of 2006, there were approximately 20 sand and gravel reclamation sites in Thurston County (map on the above web site). Mining regulations in Washington are detailed by Norman (2000). Those regulations were given a detailed review in 2006 (Surface Mine Reclamation Advisory Committee 2006), and the recommendations of the Committee reflect areas where local regulation may serve to strengthen the regulation of surface mining. Relevant recommendations of the Committee include:

- DNR should have authority to immediately stop any of the following four violations without first seeking judicial enforcement: a. Mining outside of any authorized permit boundary (whether mining without a permit, or permitted but mining outside of a permit boundary); b. Violations causing immediate danger to environment or to public's health, safety, or welfare; c. Unauthorized removal of topsoil from the permitted site; or d. Violation of a final DNR order.
- DNR should have statutory right of entry authority for: a. Reclamation when authorized under the Act, Rules, or Permit; and b. Compliance inspections.
- Judicial warrant authority should be granted where access is denied or probable cause for a violation exists.
- DNR should not delegate enforcement authority to local governments at this time. (The committee is not recommending that the legislature remove delegation authority from the Act.)
- Clarification of the roles and responsibilities of local government and DNR should be discussed and pursued.

It is noteworthy that these recommendations reflect a concern over the limitations on DNR enforcement authority under the Surface Mining Act. It appears that existing, recognized shortcomings in the Act contribute to the potential for violations that threaten the natural environment and public safety, and it is appropriate to enact local regulation that addresses these shortcomings.

Relevance of Facts to Siting Criteria

It appears that existing reclamation standards established under the Surface Mining Act, coupled with opportunities for local review and conditioning of individual permit applications provided under SEPA, are sufficient to assure high confidence that mines are planned and permitted in a manner that protects local jurisdictional concerns, specifically including concerns about environmental protection and safety in connection with the reclaimed mine facility. There remain concerns about enforcement of existing regulation, and collaboration between the County and DNR is appropriate in efforts to resolve those concerns.

Asphalt Plants

Regulation and Permitting Processes

Under the current law, responsibilities are divided as follows:

- County and city governments issue permits for location and daily operation;
- Ecology issues permits for water quality and water resources;
- Ecology and local clean-air agencies regulate air quality; and
- the State Environmental Policy Act (SEPA) environmental review process analyzes the cumulative impacts of all mining-related permits

Processing and Emission Control

“The asphalt drum mix process involves the grading and storing of various rocks and sands for mixing and conveying to a rotary kiln for heating and additional mixing. As the heated product leaves the kiln, it is combined with refined petroleum to form the finished product. This material is then conveyed to large overhead hopper bins for storage prior to being loaded into delivery trucks.

The most common toxic emissions from asphalt concrete plants are from acetaldehyde, acetone, benzene, ethyl benzene, formaldehyde, toluene, and xylene.

The most common emission control system at these plants is a baghouse and a wet scrubber. Exhaust gases from the process are manifolded through a wet scrubber to remove the particulates before being vented to the atmosphere from a circular or rectangular exhaust stack.”
(Washington State Dept of Ecology, 1998).

Asphalt Plants and the Natural Environment

Land Environmental Issues with Asphalt Plants: Hot mix asphalt plants can result in spills, leaks or emissions from chemicals used in the asphalt manufacturing process or absorbed through prior uses of recycled asphalt. Spills and leaks can occur which occur either through some sort of natural disaster, improper storage of materials, or human error in the manufacturing, transporting and storage processes. Emissions occur if the

equipment used to contain them does not function properly, which happens even in the best of plants. Recycled asphalt will contain unknown chemical contaminants through its prior uses.

Siting Issues: Reduce risk of natural disasters through avoiding land-defined critical areas – particularly steep and hazardous, slide-prone slopes, seismic zones, areas of subsidence, and other areas of soil instability.

Possible Impacts on Air Quality: During manufacturing, asphalt plants may emit significant levels of both particulate matter and gaseous volatile organic compounds (VOCS). These pollutants are considered detrimental to human health (some are suspected carcinogens). The most significant ducted source of emissions in an asphalt plant is the mixer. Storage piles and transport may also emit pollutants.

While these pollutants can be minimized by technology and proper emission control systems at the plant, and by requiring periodic inspection and reporting, such technology is by no means perfect. Where it fails, or human operators make errors, plumes of gases that are not fully cleaned are released, even from “state of the art” plants.

Siting Issues: Distance to vulnerable residents who would be harmed. Distance to residential areas is also relevant because of the odor which the plants can create.

Possible Impacts of Asphalt Plants on Water Quality: Asphalt plants can contaminate ground water through spills and leaks of chemicals. This contaminated ground water could then travel to other lakes and rivers.

The common co-location between gravel mines and asphalt plants adds to the possible ground water contamination. *“Batch plants are often located in conjunction with gravel mining operations. This increases the potential for pollutants to affect underlying ground water. Trucks, loaders and other equipment are common on site. Spills and leaks from associated equipment in the manufacturing and delivery process pose a significant potential to contaminate waters of the state. In addition to good housekeeping and best management practices to minimize spills and leaks, facilities often channel stormwater to avoid contamination or remove oil by skimming it off the surface or through use of oil/water separators.”* (Department of Ecology Fact Sheet, 2005, page 6)

Siting Issues: Do not site asphalt plants in flood plains. Locate away from areas that slide or that are subject to coastal flooding. Locate away from wetlands, and aquifer recharge areas. Site away from ground water intake for domestic purposes.

Possible Impacts of Asphalt Plants on Plant and Animal Habitat: Asphalt plants can contaminate habitat through spills and leakage of chemicals.

Siting Issues to Consider: Locate away from critical or endangered species habitats, state/federal natural area preserves, and state/federal wildlife refuges.

Asphalt Plants and Adjacent Land Uses

Possible Impacts: Odor. Air pollution. Added truck traffic if “recycled” asphalt is permitted.

Siting Issues to Consider: Distance to residential areas, “buffers” from other land uses through setbacks.

Odor Control Aspects of Asphalt Plants

The odor from asphalt plants has periodically become an emotional issue for Thurston County residents living, working, or recreating in the vicinity of these plants.

Therefore, the key issue is what should be the required minimum distance of the plants from residential communities and certain specified public facilities.

Brief Review of Facts: In past years asphalt plants have caused unacceptable odor conditions to nearby residents and individuals working or recreating in certain public facilities. Without question, new technologies and improved business practices are now capable of reducing the adverse impacts of odors. The Olympic Region Clean Air Agency (ORCAA) has set specific odor control standards and reviews all permits for new asphalt plants. However, no processes are perfect. Even the newest asphalt plant in Thurston County has released plumes of pollution and odor upon several occasions.

Relevance of Facts to Siting Criteria: Although the Thurston County request for information from ORCAA has yet to be received, existing odor control standards are in place. However, there are no specific offset distance standards set by ORCAA, and there will always be fumes associated with asphalt production. Weather inversions and wind conditions are of course not predictable, but it appears that some of the offset distances recommended by the Asphalt Advisory Task Force are not adequate to protect residents from air pollution or odor.

Siting Standards for Gravel Mines and Asphalt Plants

The table below summarizes siting standards suggested or codified in several documents, including:

- the mineral mining designations of nearby counties (King, Pierce, Snohomish and Kitsap). Generally these ordinances do not cover asphalt plants explicitly.
- Our Thurston County draft critical areas ordinances for both gravel and asphalt plants. These are incomplete, because at some point in drafting the critical areas ordinances, we decided to suspend review of mining issues until we had heard from the task forces.

- For asphalt plants, we have included, in addition to our draft critical area ordinances, siting criteria from Washington State Administrative Code (WAC 173-303-282) for incinerating waste management facilities, which like asphalt plants can impact groundwater, air quality and the land itself, and which, like asphalt plants, can be mitigated but not perfected by good management. The WAC does not apply directly to asphalt plants, but it does apply to incinerated waste management plans, which have similar management and siting issues.

The rows in the table specify land uses in which mining or asphalt plant operations are to be permitted, or not permitted, either on the site or adjacent to it. If the cell is blank, that means that particular land use was not addressed in the gravel mining ordinances from those counties. If it says “yes”, it was included. If it says “no”, the land uses were found incompatible.

The county ordinances vary in their approaches to the designation/permitting process. Some ordinances handle most environmental or hazard issues at the permitting stage, through the SEPA and other processes. If those issues were cited in the ordinance, they are listed as “handled during permitting.” Others counties remove certain kinds of areas – for example, urban uses or historic sites, or flood plains -- at the beginning stages of the designation, by removing certain types of overlay land uses from the beginning mineral overlay map.

Most counties are adding notification of the fact that the new mineral overlay district is a “mining district” or “mineral” district on plats and titles. Notification is required within 500 feet of a resource parcel (RCW 36.70A.060 (1) (b)). This would of course have an impact on land values, at least for residential land uses. For example:

“This property lies within an area of land designated Mineral Resource Lands by Pierce County. A variety of mineral resource extraction activities occurs in the area that may be inconvenient or cause discomfort to area residents. This may arise from the use of chemicals and extractions of minerals which occasionally generates dust, smoke, noise and odor. Pierce County has established Mineral Resource Lands, and residents of adjacent property should be prepared to accept such inconveniences or discomfort from normal, necessary mineral extraction lands. An application might be made for mining-related activities, including mining, extraction, washing, crushing, stockpiling, blasting, transporting and recycling of minerals.” (Pierce County Ordinance).

Table 1: Siting Standards

	Open Pit Gravel Mines					Asphalt Plants	
Land Use or Siting Issue	King	Pierce	Snohomish	Kitsap	Draft CAO Mining	Draft CAO Asphalt	WAC 173-303-282 "incineration"
Land Use Compatibilities (okay in these districts or adjacent)							
Forest Districts	yes		yes				
Open Space	yes		Yes				
Natural Areas							500 feet
Rural Industrial	Yes		yes				
Other Mining	yes						
Subarea plans that specify no mining	no						
Agricultural Land Uses							
PrimeAg Soils, Ag districts	no	no	no				500 feet
Commercial Farmland	no		No - but yes for adjacent				
Land Stability Impact Issues							
Hazardous or steep slope			Addressed during permitting	no	no		no
Marine bluff			Addressed during permitting		no		no
Erosion and subsidence					yes		no
Volcanic seismic areas					yes		500 feet from a fault
Water Impact Issues							
Shorelines	no	no	no		no	no	500 feet
100 yr Flood Plain	no		no		no	no	no
500 yr flood plain							no
Acquifer Recharge Areas	Addressed during permitting		Addressed during permitting		No in 1, 5 & 10 year	No in 1 yes in 5 and 10	Not over sole source aquifer, 500 feet from groundwater protection areas
Rivers, lakes, ponds, streams	Addressed during permitting		Addressed during permitting		no	no	500 feet from perennial water bodies
Channel Migration Zone					no	no	no
High Ground Water Hazard			Addressed during permitting		no	no	no

	Open Pit Gravel Mines					Asphalt Plants	
Land Use or Siting Issue	King	Pierce	Snohomish	Kitsap	Draft CAO Mining	Draft CAO Asphalt	WAC 173-303-282 "incineration"
Coastal flooding areas					no	no	no
Wetlands	Addressed during permitting		Addressed during permitting				500 feet
Wildlife Habitat Protection							
Wildlife Habitat protection areas	Addressed during permitting		Not within 300 feet of Chinook/trout corridors. Others addressed during permitting				500 feet from critical wildlife habitat, natural areas and wildlife refuges
Urban Land Uses, Residential Densities, Public Facilities, Historical Sites and Traffic Safety and Roads							
Residential Densities			10-20 houses per acre ok.				
Urban Area	no		No or UGAs				
Public facilities e.g. cemeteries, schools, libraries, parks, trails, hospitals			no				¼ mile from public gathering places
Historic or archeological		no					no
Size of setback within the site, distance from residences.							½ mile from actual residences. 200 feet from own property line,
Roadway adequacy and safety	Addressed during permitting		Addressed during permitting				

Economic Impacts of Siting Criteria for Asphalt Plants

Personal use: The average Washington resident uses 12-14 tons of aggregate, 1.3 cubic yards of concrete, and 1.25 tons of asphalt per year. The average 2,000 square foot home in Western Washington uses almost 210 tons of aggregate in driveways, foundations, sidewalks, base materials, and streets. A mile of county road will contain about 4,600 tons of aggregate. (<http://www.washingtonconcrete.org/14/fun-facts.html>). Thus the residents of Thurston County have a clear need for the materials provided by gravel mines and asphalt plants for private and public uses, such as buildings, roads, trails, and others.

Moving an Asphalt Plant: One of the recommendations of the Asphalt Advisory Task Force (<http://www.co.thurston.wa.us/permitting/asphalt-advisory-task-force/docs/AATF-final-report-of-recommendations.pdf>) is to only allow asphalt plants to import gravel from a “nearby” mine. (nearby is ½-1 mile) This would require major investments to be made to move mines. The cost of moving a plant would be about one million dollars; this would not include other costs.

Other costs may be

- Permits – federal, state, and local
- Site Prep – electricity, propane/gas, grading
- Upgrades – improvements to actual plant
- Legal Expenses – to get permits, fight opposition

The purchase price of a new asphalt plant is about \$3.5 million, plus about \$500,000 to set up the plant (Source, personal communication, _____).

Recycled Asphalt Product (RAP)

Cost of hauling used product: Many projects require the removal of old asphalt. If asphalt is to be hauled from the jobsite to the plant, those trucks can be used hauling material both ways. If a plant is not allowed to use the recycled asphalt, that material must be hauled to a different site (usually a landfill). This would most likely require trucks hauling old material away from the jobsite while other trucks haul the new material in. This adds overall truck traffic to our roads, and requires the trucks to run one way empty, reducing efficiency. (Note, however, that recycled asphalt leads to more truck traffic around the asphalt plant itself).

Cost of hauling excess product: Asphalt plants that can’t recycle asphalt must move excess product off site.

Cost of covering RAP: Covering a limited supply of RAP is economically feasible and sensible. Dry RAP requires less heat to mix, since not as much heat would be used to dry the product.

Covering all RAP on site in a roofed building would be costly, as the size of the structure would be cost prohibitive. Buildings with an eave of up to 16’ are conventional size and cost is based mostly on total square footage. As the height of the eaves goes above 16’ the cost rises much faster. Also a 30’ to 40’ building without walls would do little to protect the RAP from rain when the wind is blowing.

As the RAP is required to be in an area that will contain runoff, the industry has suggested using a tarp or small building to contain enough material for the short term could provide the same benefit as a larger more expensive building. However, such covering would not protect against the environmental impacts of recycled asphalt, which include the leaching of pollutants from the asphalt pile into the ground water and then into nearby streams.

Citations

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WAC 173-303-282. Siting Criteria for Dangerous Waste Management Facilities.

APPENDIX 1: Article from Division of Geology and Earth Resources Newsletter on Regulation and Mining

Website: <http://www.dnr.wa.gov/geology/> Vol. 4, No. 2, Summer 2007

Surface mines in Washington – Who Regulates What?

The world as we know it couldn't exist without mines. There would be no roads and high-rise buildings. There would be no pots and pans. No cars and computers.

As necessary as mines are, they face a major obstacle: nobody wants a mine in their backyard, especially an open gravel pit accompanied by dust, industrial clamor, busy truck traffic, and a gaping hole in the landscape.

The resulting regulation of this complicated economic and environmental issue has created frequent confusion, not only with the miners, but also with the government agencies that monitor them. The Washington Department of Natural Resources (DNR) plays a significant role in regulation of Washington's 1100 mines.

Under the state's 1971 Surface Mining Act, the DNR was responsible for regulating all mining operations and subsequent reclamation efforts. But under the more comprehensive 1993 Surface Mine Reclamation Act and the Metal Mining and Milling Act, DNR's role narrowed to issuing permits and regulating reclamation. DGER's role in the regulation of surface mines is explained at <http://www.dnr.wa.gov/geology/minerecl.htm>.

Network of Agencies Responsible With the passage of the 1993 mining law, the state legislature faced the growing conflict, with the state's booming population stretching to rural areas where gravel pits once operated in seclusion. DNR, the Department of Ecology (DOE), county governments, and some cities regulate mines. Other agencies can be involved in peripheral aspects of mine operation, such as the Department of Labor and Industries' oversight of mine safety.

Under the current mining law, the responsibilities are divided as follows:

- County and city governments issue permits for location and daily operation
- DOE issues permits for water quality and water resources
- DOE and local clean-air agencies regulate air quality
- Department of Natural Resources issues reclamation permits
- The State Environmental Policy Act (SEPA) environmental review process analyzes the cumulative impacts of all mining-related permits

If residents miss the opportunity to register concerns over proposed mining permits during earlier city/county, DOE, and DNR hearings, they can always comment during the SEPA review process. For more detailed information on mining regulations, see <http://www.dnr.wa.gov/geology/pdf/ofr00-3.pdf> and <http://www.ora.wa.gov/permithelp/default.asp>.

Even though many of DNR's responsibilities were shifted to DOE and local governments, DNR's workload did not diminish. Under the law, DNR examines the permits of every mine in the state to assure that adequate plans are made for reclamation. (The law defines 'mines' as larger than 3 acres of disturbed ground and/or a high wall higher than 30 feet and steeper than 45°.)

Mining Still a Contentious Issue Mining remains a contentious issue as the public and mine operators try to navigate through the network of government agencies and the current requirements. "Most miners are conscientious business people who want a viable business with a good reputation," said mine inspector Chris Johnson.

There is confusion over which agency is regulating which requirement. Who makes determinations? Who should hear the complaints or answer questions?

"Local governments regulate mine operations – including blasting, grading, noise, and traffic. DOE monitors water quality and water resources and, in some counties without a clean-air agency, air quality. DNR inspects mines to make sure they are following their reclamation plan," Chris said.

In another common misunderstanding of government roles, buyers of new homes are upset over the close proximity of their housing development to an established mine with 100- to 200-foot cliffs.

"Mines are long-term operations," Chris said. "One quarry in Clark County has been operating for more than 100 years. Mines are expected to last at least 50 years."

The Growth Management Act encourages local governments to preserve these much-needed resources by locating housing developments far enough away from active mines, through proper zoning and setbacks, that they may peacefully coexist until the mine is exhausted.

Material for Infrastructure

Washington's most common mines are gravel surface mines that yield gravel, sand, and rock – not coal mines, which are regulated by the federal government.

“Washington has outstripped itself. The state needs to build infrastructure, such as roads and buildings,” Chris said. “It needs rock. So the delicate balance is to allow surface mines near enough to urban areas to keep down the hauling costs.”

Another little-known fact is that the state’s own Department of Transportation operates more mines – for building roads – than any other mining operation. “Whenever possible, DNR’s inspectors work with officials of other agencies to provide seamless monitoring and regulation,” Chris said.

What Constitutes Reclamation?

A surface mine drastically and permanently alters a landscape’s soil and topography. Mine owners are not required to ‘fill in’ a completed mine, which would be economically prohibitive. “The word ‘reclamation’ doesn’t imply ‘restoration,’” said Chris. “You could never return an area back to its natural and original condition. In nearly all cases, a large hole is left. Our job is to make sure that it has stable slopes, and the land is returned to a beneficial second use.”

Plans may call for a golf course (Fig. 1) or a business park. Old mining sites have been converted to excellent fishing lakes, which can be used for recreation or wildlife habitat. But gravel pits are not merely filled with water to make a lake. They are modified with variable depths and meandering shorelines to approximate the terrain of natural lakes to maximize habitat.

To ease public tensions over a mine operation, many operators ‘segment’ their mines into multiple phases of excavation and reclaiming (Fig. 2). Each section is treated like a separate mine: mined and reclaimed before another section begins. This keeps mined areas small with reclamation ongoing at the same time, rather than sustaining a large pit.

Living with Surface Mines

Chris believes that many gravel pit problems can be solved through county zoning ordinances. DNR can help with this process by providing mapping and GIS data. “Counties need accurate maps which locate mineral resources and show where they need to dig for minerals. Proper zoning will help protect other resources and home buyers from the problems of living near a quarry.”