Fact Sheet for State Waste Discharge Permit ST0045515

Edison Wastewater Treatment System – Edison Clean Water Subarea

January 28, 2013

Purpose of this fact sheet

This fact sheet explains and documents the decisions made by the Department of Ecology (Ecology) in drafting the proposed State Waste Discharge Permit for the Edison wastewater treatment system. The permit allows the discharge of treated wastewater to two adjacent drainfields, referred to as drainfield #1 and drainfield #2, and to an overflow trench. The Edison Clean Water Subarea (the Edison Subarea) manages and operates the treatment system. Skagit County established the Edison Subarea under the authority of the Washington State Shellfish Protection District Statutes (RCW 90.72.040).

State law requires any domestic wastewater facility to obtain a permit before discharging waste or chemicals to waters of the state, which includes groundwater.

Ecology makes the draft permit and fact sheet available for public review and comment at least thirty days before it issues the final permit to the facility operator. Copies of the fact sheet and draft permit for the Edison treatment system, State Waste Discharge Permit ST0045515, were available for public review and comment from December 12, 2012, until the close of business January 11, 2013. For more details on preparing and filing comments about these documents, please see *Appendix A – Public Involvement Information*.

The Edison Subarea, the Edison board members, Skagit County commissioners, and the Edison community reviewed the draft permit and fact sheet for factual accuracy. Ecology corrected any errors or omissions regarding the facility's location, history, or disposal fields prior to publishing this draft fact sheet for public notice. Ecology also made several significant changes to the permit in response to comments received by the community during the entity review. These changes are discussed in *Appendix F – Response to Comments*.

After the public comment period closes, Ecology will summarize any additional substantive comments and our responses to them. Ecology will include a summary and responses to comments in *Appendix F – Response to Comments*, and publish it when issuing the final State Waste Discharge Permit. Ecology will not revise the rest of the fact sheet, but the full document including all appendices will become part of the legal history contained in the facility's permit file.

Summary

The Town of Edison treats domestic wastewater using a septic tank effluent pumping (STEP) system, a recirculating gravel filter, UV disinfection, two drainfields, and one overflow infiltration trench. The facility is located just east of Edison Elementary and Middle School, on the south side of Edison Slough. The community constructed the recirculating gravel filter facility and original drainfield in 1996 to treat and dispose of domestic wastewater from the school and community that was previously creating health and environmental hazards in the Edison Slough and Samish Bay area. The community constructed the collection system, the pumping station, and installed the individual septic tanks in 1997 and early 1998. The community then constructed an emergency upflow trench in late 1998 and added a second drainfield in 2003 to improve infiltration.

The proposed permit will be the first state waste discharge permit issued for this facility. The permit places effluent limits for the conventional pollutants Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS), fecal coliform, and pH.

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I. Introduction

The legislature defined Ecology's authority and obligations for the Wastewater Discharge Permit Program in the Water Pollution Control law, Chapter 90.48 RCW (Revised Code of Washington).

Ecology adopted rules describing how it exercises its authority:

- State waste discharge program (Chapter 173-216 WAC).
- Water quality standards for groundwaters of the state of Washington (Chapter 173-200 WAC.)
- Discharge standards and effluent limits for domestic wastewater facilities (Chapter 173–221 WAC).
- Submission of plans and reports for construction of wastewater facilities (Chapter 173-240 WAC).

These rules require any domestic wastewater facility to obtain a State Waste Discharge Permit before discharging wastewater to state waters. They also define the basis for limits on each discharge and define performance requirements imposed by the permit.

Under the State Waste Discharge Permit Program and in response to a complete and accepted permit application, Ecology must prepare a draft permit and accompanying fact sheet, and make it available for public review before final issuance. Ecology must also publish an announcement (public notice) telling people where they can read the draft permit, and where to send their comments, during a period of thirty days. (See *Appendix A – Public Involvement Information* for more detail about the public notice and comment procedures). After the public comment period ends, Ecology may make changes to the draft State Waste Discharge Permit in response to comments. Ecology will summarize the responses to comments and any changes to the permit in *Appendix F*.

II. Background information

Table 1. General facility information

Facility Information	
Applicant	Edison Clean Water Subarea – Skagit County
Facility name and address	Edison Wastewater Treatment System 5801 Main Ave, Bow, WA 98232
Contact at facility	Ron Palmer 360-336-9410 x3406, 360-419-3406
Responsible official	Alison Mohns Environmental Health Specialist Planner III Planning and Development Services 1800 Continental Place, Mt Vernon, WA 98273 360-336-9410 x5578 FAX: 360-336-9416
Type of treatment	Septic tank effluent pumping (STEP) system, recirculating gravel filter with UV disinfection and drainfield disposal.
Facility location (NAD83/WGS84 reference datum)	Latitude: 48.5616 Longitude: -122.43566
Land application location	Outfall 01A: Drainfield #1, 48.5618°, -122.4343° Outfall 01B: Drainfield #2: 48.5600°, -122.4349° Outfall 01C: Infiltration Trench: 48.5622°, -122.4343°

Permit Status	
Issuance Date of Previous Permit	This will be the first permit issued by Ecology.
Permit Application Submittal Date	August, 25 2011
Date of Ecology Acceptance of Application	January 31, 2012

Figure 1. Facility location map

A. Facility description

History

Domestic waste in the Edison community historically received minimal treatment, if any at all. Prior to installation of the new sewerage system, many homes discharged wastewater to street drains that flowed to Edison Slough after minimal treatment in septic tanks. Many homes simply discharged raw sewage directly into Edison Slough. Some of the newer homes had functioning septic tanks but small lot sizes prevented adequate drainage and soil treatment, and some had questionable septic tanks that functioned properly only when the groundwater level was at its lowest.

Department of Health (DOH) shellfish monitoring results showed high fecal coliform levels in Samish Bay and Edison Slough. Fecal coliform levels in Samish Bay often exceeded the 14 fecal organisms/100 ml (geometric mean) standard for approved shellfish growing areas, and the sampling station near Edison often exceeded water quality standards. DOH restricted harvesting of shellfish in the Samish Bay.

The community of Edison was implicated as one of the sources of fecal contamination. A sanitary survey indicated a septic tank failure rate of 65%. The community applied for and received financial assistance from Ecology, the Community Development Block Grant, and the Rensselaerville Institute. Skagit County then formed the Skagit County Clean Water District-Edison Subarea. The community wanted a wastewater system that would retain the small town atmosphere and not be detrimental to the local shellfish industry. The community decided against an outfall discharge to surface water in order to protect commercial shell fishing operations in Samish Bay.

The Burlington-Edison school district (District) rebuilt the elementary school in 1995-1996, and originally proposed to build a sand filter/pressure-mound hybrid system as part of that rebuild to replace their existing septic system, for the exclusive use of the school. However, engineers for the school determined that the subsoil impermeability would result in a high probability of "breakout" along the mound edges. Faced with a possibility of failure and the cost of building a system for their sole use, the school district approached the Edison Board and asked to be included in the proposed community system. Edison subsequently decided to include the school flows in the proposed recirculating gravel filtration system, disinfection and subsurface drip disposal.

In 1996 the community completed construction of the treatment facility and drip disposal field, along with the school's septic tanks and conveyance to the treatment facility. The system operated well with the school as the sole contributor. In 1997 the community began connecting the residential and business community to the gravel filter. In late 1998 the community added the upflow infiltration trench as an additional disposal option because of the inability of the drip disposal field to accommodate flows from the now fully connected community. By 2001 the geotechnical engineers for District verified that the original drip system was located above a relatively impervious layer that prevented adequate infiltration for the quantity of water produced by the community. Therefore the community constructed a second drainfield in 2003.

Ecology and DOH visited the facility on May 24, 2011, to evaluate permitting alternatives. DOH concluded that this facility falls under Ecology's permitting purview since effluent discharges directly to groundwater at times and could potentially migrate to land surface or into surface water (WAC 246-272B-07450(4)(c)). This decision was based on the fact that vertical separation between the discharge chambers and groundwater is occasionally less than one foot when the water table is high. Under these conditions, effluent will receive little treatment in the soil before entering groundwater and pollutants could potentially find a relatively quick pathway to Edison Slough. In addition, under flood conditions, the infiltration trench could overflow and discharge treated effluent to the land surface. WAC 246-272B-07450(4)(c) states that DOH could require the facility to apply for a state waste discharge permit from Ecology instead of DOH under either of these scenarios.

Geography

Edison sits on the banks of Edison Slough, a tidewater slough, about 500 feet from Samish Bay. Samish Bay is a mud-bottom marine water body that supports hundreds of acres of commercial and recreational shellfish beds (manila clams, geoduck clams, and pacific oysters). The ground elevation in Edison is between 4 and 6 feet above mean seal level (MSL). The groundwater is often a foot below the ground surface in winter months. The area around the drainfields is relatively flat, with the northern section sloping gently northward towards the slough and the southern section sloping slightly towards the southwest.

Collection system status

Edison installed a small diameter combined gravity and pressure STEP collection system in 1997 to transport septic effluent from homes and restaurants to the treatment plant. The system serves approximately 72 connections that include seven food sites and one school (no cooking cafeteria); there are no industrial users. There are 9 stubs remaining for future connections. The District requires restaurants and the school to install grease traps; seven 1500-gallon grease traps have been installed. The system's only lift station pumps wastewater from the town through a force main to the recirculating gravel filter. Ecology expects the new collection system to have very little infiltration and inflow (I/I).

Wastewater treatment process

The treatment process includes individual septic tanks, a recirculating gravel filter, UV disinfection, and additional soils treatment after disposal to ground using two disposal fields. Most of the individual septic tanks are 1500-gallon fiber-reinforced-plastic tanks that provide primary sedimentation, floating solids removal, oil & grease removal, anaerobic decomposition of solids, physical filtration of non-settleable particles, and nominal one day storage for pipeline cleaning and recirculating tank sludge removal. Restaurant grease tanks receive only kitchen flow and are connected in parallel with the domestic wastewater tanks. The recirculating gravel filter further removes TSS, BOD, some FOG (fats, oils, and grease), and some nitrogen using physical, chemical, and biological processes. The filter has four zones and wastewater passes through the filter and re-collects in the recirculation tank on average five times before flowing from the gravel filter through the main settling tank, to a smaller secondary settling tank, and finally through the UV disinfection system and out to the disposal fields. The Trojan UV system sits in a stainless steel channel and consists of three modules in parallel with two lamps per module.

The facility has a backup diesel generator onsite that is capable of running the whole plant in the event of a power outage. This generator is owned, tested, and maintained by the school. The school tests the generator underload every week.

Land treatment and distribution system (drainfield)

The District originally installed a subsurface drip irrigation disposal field (drainfield #1) directly east of the recirculating gravel filter and approximately 200 feet south of Edison Slough. This drainfield contains two irrigation zones. Flow unable to be infiltrated in the drip irrigation disposal field was directed by a computer controlled motorized valve to an upflow infiltration ditch that also has two dosing zones. The trench is located 90 feet north of drainfield #1, between the drainfield and Edison Slough (approximately 100 feet south of the slough). Drainfield #1 operated satisfactorily with the school as the only contributor in the first year of operation. However, when the entire community came on-line the District noticed that the treated wastewater sent to the drainfield tended to surface and flow overland towards the Edison Slough. Additional investigation found that the area has poor infiltration due to an impervious layer of very fine material that lies just below the emitters. To solve this problem, in 2003 the District installed a second, chambered drainfield set on pea gravel (drainfield #2) below this impervious layer that consists of six distribution zones. The District now uses both drainfields, and sends approximately 1300 gallons/day to drainfield #1 and the remaining effluent to drainfield #2. The District reports that this combination works well and that the infiltration trench has only been used once (in 2012 when the Samish River flooded) since they installed the new drainfield in 2003.

Drinking water wells

No drinking water wells exist within a mile of the project site. The Blanchard Water Association supplies all drinking water in and around Edison.

Solid wastes

Individual septic tanks remove the majority of the solids in the Edison system. All residents have a septic capacity of at least 1500 gallons. The District inspects the tanks annually and notifies residents when pumping is required. Residents are responsible for arranging pumping and payment within a prescribed time period. The District estimates that pumping is required every 5 to 15 years depending on usage. Solids collected in the septic tank are transported by the tank pumper to another wastewater treatment facility, often the La Conner WWTP.

Solids also occasionally slough off of the recirculating gravel filter back into the recirculation tank and the operators occasionally remove incidental solids (rags, hygiene products, and other debris) as part of the routine maintenance of the equipment. When significant solids reach the plant, the O&M contractor investigates to determine which septic tank is operating without a filter. Operators dewater rags and dispose of them at the local landfill.

Staff

The District designed the facility to run with minimum maintenance and without a full time onsite operator. The District currently contracts with The Drain Doctor to provide the required preventive maintenance for the septic tanks, collection system, recirculating gravel filter, and disposal fields. At the writing of this fact sheet, the operators at the Edison facility are not certified as wastewater treatment plant operators by the State. One of the operators, however, is certified by Skagit County as an *Onsite Sewage System Maintenance Specialist* and another by WA State Department of Licensing as an *Onsite Inspector*. The subarea has had bad experience with contract operators in the past. Contract operators from outside the community had little vested interested in keeping the system running well and this showed in lack of maintenance and care for the facility. The facility has been operating noticeably better since the community and subarea have taken control of O&M. The local operators have a history with and in-depth knowledge of the facility.

DOH does not require large onsite sewage system (LOSS) operators to have *wastewater treatment* certification; instead they accept *onsite septic O&M* certification from the county level. Ecology requires all wastewater treatment plants to be operated by operators certified by the state according to WAC 173-230. Large onsite systems are not typically permitted by Ecology and therefore there are no classifications that adequately cover these types of plants. The closest classification is biofiltration, and WAC 173-230-140 classifies these facilities with design flows less than 1 MGD as Class II facilities. However, WAC 173-230-140 allows Ecology to classify a plant in an alternative group if it has characteristics that make operation less complex than other similar plants of the same flow range. Ecology believes a Group I operator could operate the Edison treatment system since it is not as complex as typical biofiltration facilities and the design flow is only 12,000 gpd. Since the operators at Edison are not currently certified under Ecology's certification, the proposed permit provides a 5-year compliance schedule for the District to train and certify an operator to the Group I level. Ecology will revisit this requirement when the permit is reissued in 5 years. Ecology anticipates that the DOH LOSS permitting program will be further developed at that time, and a decision on operator certification requirements for the Edison facility can take into consideration certification requirements of other similar LOSS facilities in the state.

B. Wastewater influent characterization

Ecology obtained influent wastewater data from water quality evaluations performed by Ecology and the Edison Subarea. Influent wastewater, or water that enters the recirculating gravel filter system, is characterized as shown in Table 2.

Table 2. Wastewater influent characterization

Parameter	Units	# of Samples	Average Value	Maximum Value
BOD_5	mg/L	11	151	250
BOD_5	lb/day	9	11	14
TSS	mg/L	8	34	45
TSS	lb/day	8	2	3

			Minimum Value	Maximum Value
pH	std units	2	7.2	7.3

C. Wastewater effluent characterization

The Edison Subarea reported effluent concentrations of pollutants in their 2011 permit application. Table 3 summarizes this data, which represents a single grab sample and a single 24-hour composite sample, taken after the UV system and prior to drip disposal on August 2-3, 2011. The subarea also has data from the 1 year certification process, but since this data is over 10 years old it was not included here.

Table 3. Wastewater effluent characterization

Parameter	# of Samples	Average Value	Maximum Value
BOD_5, mg/L	2	4.5	5
TSS, mg/L	2	8.5	9
pH, std units	2	6.13 (minimum)	6.7
Fecal Coliform, MPN/100 mL	12	19 (geometric mean)	1600 (UV light burned out)
Total Coliform, MPN/100 mL	1	-	240
Nitrate + Nitrite, mg/L as N	3	39	55
Total Kjeldahl Nitrogen, mg/L as N	2	4.03	4.16
Ammonia, mg/L as N	2	1.165	1.22
Ortho Phosphate, mg/L as P	2	8.54	8.56
Total Phosphate, mg/L as P	2	11.65	11.7
Chlorine, total residual, mg/L	2	<0.05	<0.05
Dissolved Oxygen, mg/L	1	-	2.76
TDS, mg/L	2	598	604
Conductivity, uS/cm	2	906	907
COD, mg/L	1	-	46
Oil & Grease, mg/L	2	3.65	4.8
Calcium, mg/L	2	30.95	31
Chloride, mg/L	2	56.5	57
Fluoride, mg/L	2	0.24	0.24

Parameter	# of Samples	Average Value	Maximum Value
Magnesium, mg/L	2	26.15	27.1
Potassium, mg/L	2	29.1	29.6
Sodium, mg/L	2	89.75	90.1
Sulfate, mg/L	2	41	41
Barium, mg/L	2	0.042	0.043
Cadmium, mg/L	2	<0.001	<0.001
Chromium, mg/L	2	0.001	0.001
Copper, mg/L	2	0.021	0.029
Iron, mg/L	2	0.064	0.078
Lead, mg/L	2	<0.001	<0.001
Manganese, mg/L	2	0.029	0.032
Mercury, mg/L	2	<0.0002	<0.0002
Selenium, mg/L	2	<0.005	<0.005
Silver, mg/L	2	<0.001	<0.001
Zinc, mg/L	2	0.0305	0.0310

nd = non-detect

D. Groundwater characterization

The Edison Subarea reported monitoring well data in its permit application. Three monitoring wells are located throughout drainfield #2, and one is located near the slough, as shown in Figure 2. Monitoring well P9 was recently removed and is no longer available.

Table 4 summarizes the available groundwater data. Nitrate levels are all within groundwater standards but surprisingly pH levels are extremely low. Ecology will further evaluate groundwater pH during the groundwater monitoring study.

Table 4. Groundwater monitoring well data

Well No.	P-8			P-9	P-10			P-11			P-slough
Date	8/16/11[a]	2/8/12	5/9/12	4/16/08	8/16/11[a]	2/8/12	5/9/12	8/16/11[a]	2/8/12	5/9/12	8/16/11[a]
Temperature,°C	25				26.4			24.5			24.5
Salinity[b], %	0.2				0.5			0.2			4.9
DO[b], mg/L	1.32	11.33		10.1	2.47	4.28		1.32	8.02		*19.9*
pH[b], std units	6.3	4.49		5.6	6.6	3.85		5.6	3.93		8.7
Nitrate + Nitrite, mg/L as N	ND (<0.01)		0.04	ND	7.1	10.3	0.066	ND	0.7	0.061	0.01
Turbidity, NTU	20+				20+			20+			27.9
TDS, mg/L	178			252	481			150			4810
Conductivity[b], us/cm	375	273		530	1002	566		366	165		8840
Top of casing, in		24.5				14.5			20		
Water Level, ft below grade lvl	5.31	3.27	5.83	4.13	3.4	2.54	5.75	6.1	3.64	5.81	surface

[a] Samples collected on 8/16/11 occurred during dry conditions, no appreciable rain in 27 days, and on an out-going tide.

[b] Hach field samples.

E. Surface water characterization

The Edison facility does not discharge to surface water. However, vertical separation between the drainfield effluent discharge chambers and groundwater is occasionally less than 1 foot during high rain and high water events. Pollutants in the effluent may therefore receive little soil treatment and could potentially find a relatively quick pathway to surface water with little treatment in the soil. Ecology's 2008 303(d) Category 5 list contains several of the surface water bodies near the Edison facility. These listings are summarized in Table 5. Pollutants of concern from this discharge include nitrogen and coliforms.

Calculations performed by Ecology using effluent data and a simple groundwater mixing model (model obtained from Ecology's *Permit Writer's Manual*, 2008 version, Section VIII) indicate that pollutants from the facility will not enter surface waters in significant concentrations (see Appendix D). Model results indicate that concentrations at the property boundary for nitrogen will be approximately 9 mg/L when effluent concentrations are 31 mg/L and wastewater flows are 19,400 gpd (worst case scenario). The model estimates that fecal coliform levels will be approximately 1/100 mL at the property boundary when the effluent concentration is 400/100 mL.

Figure 2. Groundwater monitoring well locations

Table 5. Surface water 303(d) category 5 listings in Edison vicinity

Location	2008 Category 5 Listings
Edison Slough, upstream of facility	DO, pH, fecal coliform
Unnamed Creek (agricultrure drainage ditch) along western edge of drainfield, trib to Samish River	DO, fecal coliform
Unnamed Creek (agricultrure drainage ditch) along southwestern edge of drainfield, trib to Samish River	DO, pH, fecal coliform
Samish Bay, downstream of facility at mouth of Edison Slough	Fecal coliform

To confirm that the discharge is not further degrading Category 5 surface waters, Ecology is planning to conduct a groundwater study in 2013 or 2014.

F. Summary of compliance with previous permit

There are no previous permits for the Edison facility; the proposed permit will be the first State Waste Discharge Permit for this facility.

G. Decision on permit type

Permit writers must decide if the discharge of pollutants into the ground near surface water is subject to an NPDES Permit or State Waste Discharge Permit. Ecology believes the best guidance on this issue comes from the United States District Court Eastern District of Washington (*Washington Wilderness Coalition v. Hecla Mining*, 870 F. Supp 983, 990). The court held that since the goal of the Clean Water Act (CWA) is to protect the quality of surface waters, any pollutant, which enters such waters, whether directly or through groundwater, is subject to regulation by NPDES permit. The court went on to hold, "it is not sufficient to allege groundwater pollution, and then to assert a general hydrological connection between all waters. Rather, pollutants must be traced from their source to surface waters, in order to come within the purview of the CWA." The decision on hydraulic continuity depends upon the pollutant type and mobility in soils, pollutant loading, soils at the site, and hydrology of the site.

Ecology decided to issue a State Waste Discharge Permit and not an NPDES permit for this site because there is no evidence that a pollutant from the drainfield reaches surface water. Ecology may revisit this decision if data shows a pollutant from the drainfield reaches surface water.

H. State environmental policy act (SEPA) compliance

To meet the intent of SEPA, an existing, unpermitted discharge must undergo SEPA review during the design or permitting process. The facility filed a SEPA checklist with Skagit County as the lead agency with an open commit period that included state, federal, and local agencies and tribal review. Skagit County issued a mitigated determination of non-significance for the project on April 2, 1996.

III. Proposed permit limits

State regulations require that Ecology base limits in a State Waste Discharge Permit on the:

- Technology and treatment methods available to treat specific pollutants (technology-based). Dischargers must treat wastewater using all known, available, reasonable methods of prevention, control, and treatment (AKART). Ecology and DOH have adopted technology-based (AKART) criteria for domestic wastewater systems that discharge to ground (DOH, 1994).
- Operations and best management practices necessary to meet applicable water quality standards to preserve or protect beneficial uses for groundwaters.
- Groundwater quality standards (Ecology, 1996).
- Applicable requirements of other local, state and federal laws.

Ecology applies the most stringent of technology and water quality-based limits to each parameter of concern and further describes the proposed limits below.

The limits in this permit reflect information received in the application and from supporting reports (engineering, hydrogeology, monitoring). Ecology evaluated the permit application and determined the limits needed to comply with the rules adopted by the state of Washington. Ecology does not develop effluent limits for all reported pollutants. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, and are not listed in regulation.

Ecology does not usually develop permit limits for pollutants not reported in the permit application but may be present in the discharge. The permit does not authorize the discharge of the non-reported pollutants. During the five-year permit term, the facility's effluent discharge conditions may change from those conditions reported in the permit application. The facility must notify Ecology if significant changes occur in any constituent.

A. Design criteria

Under WAC 173-216-110 (4), flows and waste loadings must not exceed approved design criteria. Ecology approved design criteria for the wastewater treatment facility and drainfields in the engineering reports listed in Table 6. Table 7 lists the specific report each design criteria was pulled from.

Table 6. Approved engineering documents with design criteria

Facility	Document
Recirculating Gravel Filter and UV Disinfection System	*Engineering Report / Facility Plan for Wastewater Collection, Treatment, and Disposal for Edison Washington*, Wilson Engineering, February 1996, revised April 1996. *Plans & Specifications*, *Edison Subarea Phase I Sewer Improvements,* Wilson Engineering, April 1996. *O&M Manual, Volume 2: Gravel Filter, Treatment, and Disinfection, and Disposal System*, Gray & Osborne, Inc., October 2003.
Disposal Field #1 & Infiltration Trench	Plans & Specifications, *Skagit County Clean Water District, Edison Subarea Phase I Sewer Improvements*, Wilson Engineering, April 1996. *Hydrogeological Evaluation – Edison Wastewater Treatment Facility Drainfield*, HWA GeoSciences, Inc., Project #2001-023, September 10, 2002.
Disposal Field #2	Plans & Specifications, *Edison Subarea Wastewater Disposal Field Improvements,* Gray & Osborne, Inc., March 2003. *O&M Manual, Volume 2: Gravel Filter, Treatment, and Disinfection, and Disposal System*, Gray & Osborne, Inc., October 2003.

Drainfield capacity limits the amount of wastewater the Edison facility can receive and treat.

Drainfield #1 – Wilson Engineering originally designed drainfield #1 to receive a peak daily flow of 24,000 gpd, according to the 1996 plans & specifications. In the 2003 O&M Manual, Gray & Osborne listed the drainfield as having a capacity of 1,065 gpd. Since 2004, the subarea has consistently disposed of approximately 1,400 gallons of treated wastewater each day in drainfield #1 without any ponding or overflowing. However, it is possible that drainfield #1 can accept higher volumes of wastewater without ponding and without causing an exceedance of water quality standards. From 1996 to 2003 the subarea sent approximately 10,000 gpd to drainfield #1 (see plot in Appendix E) and ponding only occurred during large storm events. While this indicates the drainfield can hydraulically accept larger volumes of wastewater, it is not clear that the wastewater is adequately treated in the soils before reaching the slough (drainfield #1 sits much closer to the slough than drainfield #2). The proposed permit therefore allows a performance-based maximum daily flow limit of 2,000 gpd for drainfield #1. If the subarea is interested in increasing this limit, they must perform a capacity analysis on drainfield #1 after the groundwater study is complete and additional effluent and groundwater data is available.

Table 7. Design criteria

Parameter	Recirculating Gravel Filter and UV Disinfection	Drainfield #1	Drainfield #2	Drainfields #1 & #2 Combined
Peak daily flow	24,000 gpd	1,065 gpd (2,000 gpd, performance-based)	18,000 gpd	20,000 gpd
Monthly average flow (maximum month)			12,000 gpd (2,000 each zone)	
BOD_5 loading for maximum day	56 lb/day	--	--	--
TSS loading for maximum day	56 lb/day	--	--	--
Application rate	--	0.04 gpd/ft^2	--	--
Drip disposal field area	--	26,667 ft^2	--	--
Number of dosing zones	--	2	6	8
Total trench length	--	--	1,500 ft	--
Documentation	*1996 P&S, Edison Phase I Sewer Improvements, Wilson Engineering*	*2003 O&M Manual, Volume 2, Gray & Osborne*	*2003 P&S – Edison Wastewater Disposal Field Improvements, Gray & Osborne*	--

Drainfield #2 – Gray & Osborne consultants originally designed drainfield #2 with a maximum daily capacity of 18,000 gpd (3,000 gpd to each zone). Operators indicate that the drainfield can adequately infiltrate this quantity of water as long as they distribute the wastewater appropriately, with discharge chambers at higher elevations receiving a larger portion of the flow. Figure 3 shows how flows were distributed to each of the six zones from 2009–2011.

The combined maximum day hydraulic capacity of drainfields #1 and #2 is 20,000 gpd, which limits the total capacity of the system. Ecology listed these flows as the facility's permitted capacity in the proposed permit. The mechanical portion of the treatment process can treat up to 24,000 gpd maximum day flow. Therefore, if Edison were to find an additional disposal option, such as irrigation or an additional drainfield, or if drainfield #1 is re-rated at a higher capacity, Ecology would consider increasing the permitted facility capacity.

As shown in Figure 4, flows entering the recirculating gravel filter experience higher spikes than flows entering the drainfields. This is likely due to the buffering capacity of the recirculating gravel filter, but it could also be an artifact of the data collection. Either way, since flows to the drainfields limit the capacity of the facility, the compliance point for flow will be as measured to the drainfields, not the influent flow.

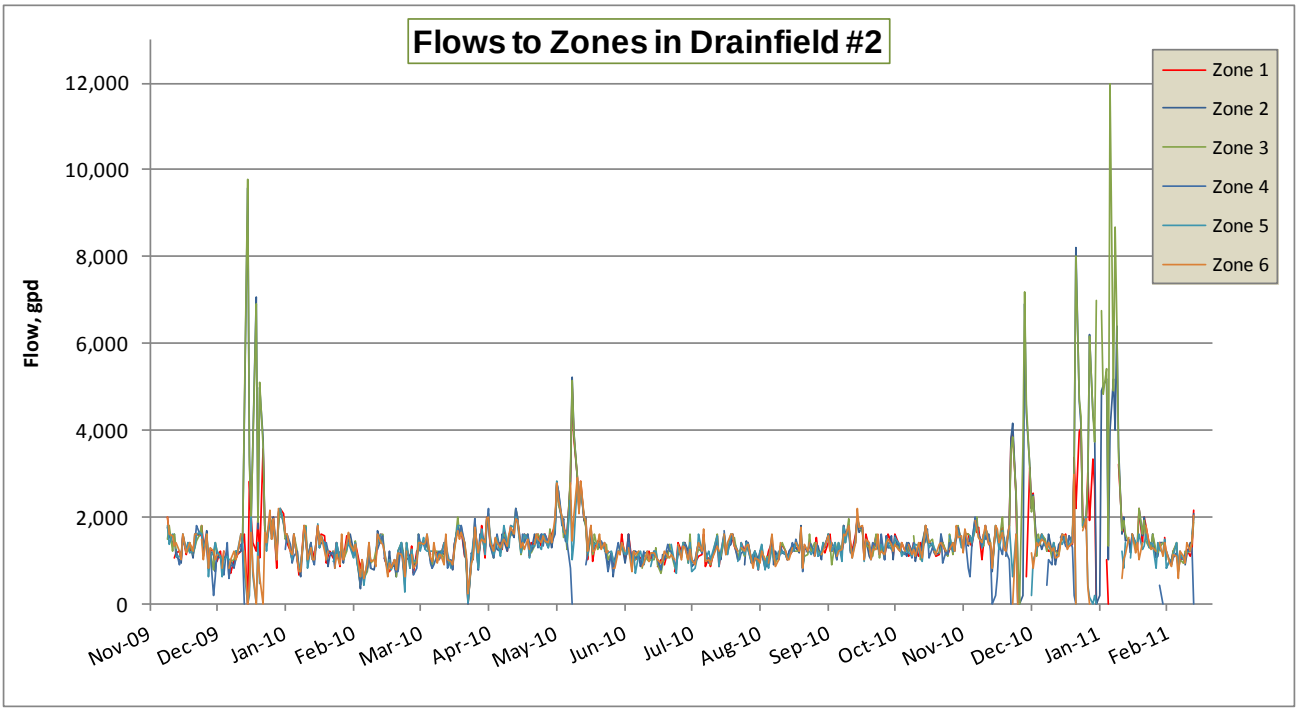


Figure 3. Flows to zones in drainfield #2.

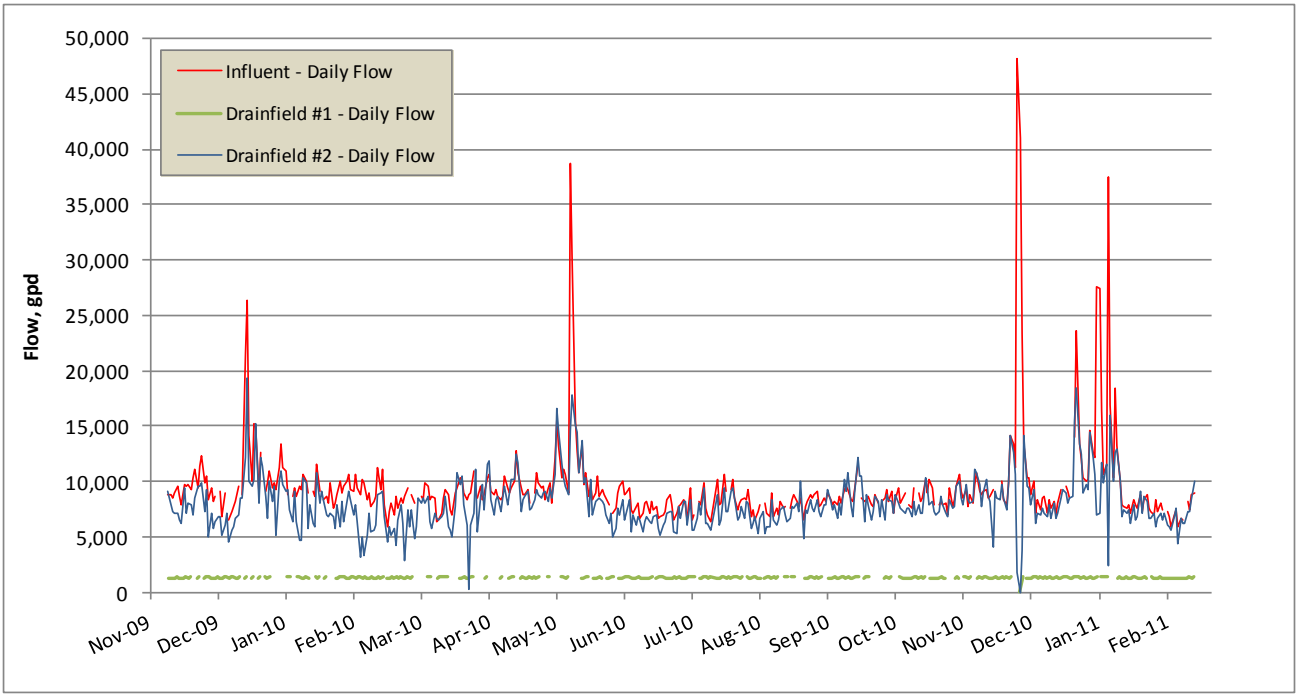


Figure 4. Flows to facility and drainfields.

B. Technology-based effluent limits

Waste discharge permits issued by Ecology specify conditions requiring the facility to use AKART before discharging to waters of the state (RCW 90.48). Ecology defines AKART for domestic wastewater facilities in Chapter 173-221 WAC, *Discharge Standards and Effluent Limits for Domestic Wastewater Facilities* and in the Department of Health's *Design Criteria for Municipal Wastewater Land Treatment Systems for Public Health Protection* (1994).

Ecology approved the engineering reports listed in Table 6. Ecology evaluated the reports using the:

- Discharge standards and effluent limits for domestic wastewater facilities
- *Guidance on Land Treatment of Nutrients in Wastewater, with Emphasis on Nitrogen, Ecology*, November 1994 (http://www.ecy.wa.gov/biblio/0410081.html).
- *Criteria for Sewage Works Design*, Ecology, 2006).

Ecology determined that the facility meets the minimum requirements demonstrating compliance with the AKART standard if the Permittee operates the treatment and disposal systems as described in the approved engineering reports, plans and specifications, and any subsequent Ecology-approved reports.

40 CFR 133.102 requires domestic wastewater treatment facilities to reduce influent BOD_5 and TSS concentrations by 85%. Influent concentrations are difficult to ascertain for the Edison system because treatment begins in septic tanks at individual homes. Wastewater strength entering the recirculating gravel filter is therefore quite low and it would be inappropriate for Ecology to require 85% removal from the recirculating gravel filter alone. The permit states that Ecology will assume the overall 85% removal requirements are achieved as long as the monthly average effluent limits are met for both BOD_5 and TSS.

Wastewater treatment (prior to land treatment) requirements

Ecology based the technology-based effluent limits shown in Table 8 on Chapter 173-221 WAC. Weekly limits were not included in the permit since Ecology is proposing monitoring one/month.

Table 8. Technology-based limits

Parameter	Average Monthly Limit	Average Weekly Limit
BOD_5	30 mg/L	45 mg/L
TSS	30 mg/L	45 mg/L

Parameter	Monthly Geometric Mean Limit	Weekly Geometric Mean Limit
Fecal Coliform Bacteria	200 organisms/100 mL	400 organisms/100 mL

Parameter	Daily minimum	Daily Maximum
pH	6.0 standard units	9.0 standard units

Land treatment requirement

To satisfy the land treatment requirement for AKART, the Permittee must operate the system to protect the existing and future beneficial uses of the groundwater and not cause a violation of the groundwater standards.

C. Groundwater quality-based effluent limits

In order to protect existing water quality and preserve the designated beneficial uses of Washington's groundwaters including the protection of human health, WAC 173-200-100 states that waste discharge permits shall be conditioned in such a manner as to authorize only activities that will not cause violations of the groundwater quality standards. The goal of the groundwater quality standards is to maintain the highest quality of the State's groundwaters and to protect existing and future beneficial uses of the groundwater through the reduction or elimination of the discharge of contaminants to groundwater [WAC 173-200-010(4)]. Ecology achieves this goal by:

- Applying AKART to any discharge.
- Applying the antidegradation policy of the groundwater standards.
- Establishing numeric and narrative criteria for the protection of human health and the environment in the groundwater quality standards.

Antidegradation Policy

The state of Washington's groundwater quality standards (GWQS) require preservation of existing and future beneficial uses of groundwater through the antidegradation policy, which includes the two concepts of antidegradation and non-degradation.

Antidegradation

Antidegradation is not the same as non-degradation (see below). Antidegradation applies to the calculation of permit limits in groundwater when background contaminant concentrations are less than the criteria in the GWQS. Ecology has discretion to allow the concentrations of contaminants at the point of compliance to exceed background concentrations but not exceed criteria in the GWQS. Ecology grants discretion through an approved AKART engineering

analysis of treatment alternatives. If the preferred treatment alternative predicts that discharges to groundwater will result in contaminant concentrations that fall between background concentrations and the criteria, then the preferred treatment alternative should protect beneficial uses and meet the antidegradation policy. In this case, the predicted concentrations become the permit limits. If the preferred alternative will meet background contaminant concentrations, background concentrations become the permit limits. Permit limits must protect groundwater quality by preventing degradation beyond the GWQS criteria. If discharges will result in exceedance of the criteria, facilities must apply additional treatment before Ecology can permit the discharge.

Non-degradation

Non-degradation applies to permit limits in groundwater when background contaminant concentrations exceed criteria in the GWQS. Non-degradation means that discharges to groundwater must not further degrade existing water quality. In this case, Ecology considers the background concentrations as the water quality criteria and imposes the criteria as permit limits. To meet the antidegradation policy, the facility must prepare an AKART engineering analysis that demonstrates that discharges to groundwater will not result in increasing background concentrations. Ecology must review and approve the AKART engineering analysis.

You can obtain more information on antidegradation and non-degradation by referring to the *Implementation Guidance for the Groundwater Quality Standards (Implementation Guidance)*, Ecology Publication #96-02 (available at http://www.ecy.wa.gov/biblio/9602.html).

Background Water Quality

Background water quality is determined by a statistical calculation of contaminant concentrations without the impacts of the proposed activity. The calculation requires an adequate amount of groundwater quality data and determining the mean and standard deviation of the data, as described in the *Implementation Guidance*. Following the procedure in the *Implementation Guidance*, Ecology then defines background water quality for most contaminants as the 95 percent upper tolerance limit. This means that Ecology is 95 percent confident that 95 percent of future measurements will be less than the upper tolerance limit. There are a few exceptions to the use of the upper tolerance limit. For pH, Ecology will calculate both an upper and a lower tolerance limit resulting in an upper and lower bound to the background water quality. If dissolved oxygen is of interest, Ecology will calculate a lower tolerance limit without an upper tolerance limit.

Groundwater standards

Table 9 lists the pollutants of concern for this discharge along with the groundwater criteria as defined by Chapter 173-200 WAC and in RCW 90.48.520.

Table 9. Groundwater quality criteria

Parameter	Groundwater Criteria	Background Value
Total Coliform	1/ 100 mL	unknown
Nitrate	10 mg/L as N	unknown

Ecology reviewed existing records for the facility's land treatment site and is unable to determine background groundwater quality. Ecology plans to establish the upgradient (background) quality of the groundwater for nitrates and total coliform by conducting a groundwater study in 2014. Until Ecology establishes background water quality, the facility must operate within the approved design parameters and comply with all conditions in the permit.

Point of compliance with groundwater standards

Ecology's *Groundwater Implementation Guidance* describes how WAC 173-200-060(2) allows alternative compliance points if continued contaminant degradation or treatment will occur in groundwater and can be demonstrated, if the contaminants discharged to the subsurface will be in compliance with the groundwater quality standards at the property boundary. Nitrate and coliform concentrations in the proposed discharge exceed groundwater quality standards with technology-based controls, which Ecology has determined to be AKART.

Nitrates – Ecology's *Guidance on Land Treatment of Nutrients in Wastewater* discusses the importance of evaluating total nitrogen concentrations from a discharge when evaluating compliance with nitrate groundwater standards. Nitrate is the most chemically stable form of the nitrogen species, and other forms of nitrogen (ammonia and organic nitrogen) readily convert to nitrate in the environment. Ecology cannot evaluate compliance with groundwater standards at the property boundaries due to limited groundwater data. Results from a groundwater model indicate that the nitrate criteria will be met at the property boundary as a result of dilution with groundwater and precipitation and some natural attenuation in the soil (see Appendix D). However, the *Groundwater Implementation Guidance* suggests that, in order to meet antidegradation requirements, a facility must not increase groundwater nitrate concentrations by more than 2 mg/L as N. Ecology plans to conduct a groundwater study with up- and down-gradient groundwater monitoring to confirm groundwater standards are met at the property boundary and to reassess performance with regard to antidegradation. Ecology will address any additional groundwater concerns in the subsequent permit.

Coliform – This facility was designed to meet technology-based limits for fecal coliform (monthly geometric mean of 200 org/100mL and a weekly geometric mean of 400 org/100mL). Washington's groundwater standards include limits for total coliform, but not for fecal coliform. The proposed permit requires compliance with the technology-based fecal coliform limits at the exit of the UV disinfection system. The permit does not require compliance with the groundwater total coliform criteria (1 org/100mL) at the property boundary. Due to significant agriculture acreage surrounding the Edison drainfield, and because water fowl and migrating bird frequent the area, it would be difficult to definitively determine the source of any coliform presence in the ambient environment. Additionally, Ecology's groundwater model indicates that total coliform concentrations of 400 org/100mL can be reduced to 1 org/100mL at the property boundary as a result of dilution with groundwater and precipitation and as a result of significant destruction in the soil and groundwater environments. This conclusion is further supported by a study performed on septic coliform fate in coastal plain soils under perched groundwater conditions (Reneau, 1977). The Department of Health (DOH), however, is not confident that pathogen destruction is as rapid as assumed in the model. An onsite sewage system specialist with DOH expressed the importance of local geology and groundwater conditions on pathogen destruction rate.

To evaluate the fate of pathogens in the groundwater Ecology will conduct a groundwater study to evaluate up- and down-gradient groundwater coliform levels at the property boundaries. In addition, the Permittee will record depth to groundwater each month to assess when treatment in the soils may be compromised due to high water levels. Ecology will address any additional groundwater concerns in the next permit.

Phyto-remediation - additional treatment of nitrates and coliform

Recent research shows that phyto-remediation is capable of removing significant quantities of nitrogen, pathogens, and other pollutants from soils and groundwater. Most research has been performed on fast growing vegetation such as willow and poplar trees. Data show that nitrogen and pathogen removal occurs even during winter months when the vegetation is dormant; this is because much of the breakdown occurs as a result of bacteria in the soil. Additional pollutant uptake occurs during the growing seasons.

The Town of Edison is considering installing a buffer of vegetation at the facility property boundary, along the Edison Slough, to help remove any trace nitrogen and coliforms that may exist in the groundwater. This phyto-remediation, in addition to the treatment in the recirculating gravel filter, UV system, and soils can help ensure groundwater protection at the property boundary.

E. Comparison of effluent limits with the previous permit

The proposed permit will be the first State Waste Discharge Permit for this facility.

IV. Monitoring requirements

Ecology requires monitoring, recording, and reporting (WAC 173-216-110) to verify that the treatment process functions correctly, the discharge meets groundwater criteria and that the discharge complies with the permit's effluent limits.

A. Lab accreditation

Ecology requires facilities to use a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories*, to prepare all monitoring data (with the exception of certain parameters). The Permittee does not have an accredited lab onsite and will send the following to an accredited lab for analysis: BOD_5, TSS, fecal coliform, total coliform, nitrogen species, and phosphorus species. The Permittee will analyze pH and DO in-house.

B. Wastewater monitoring

Ecology details the proposed monitoring schedule under Permit Special Condition S2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, significance of pollutants, and cost of monitoring. The permit proposes monthly monitoring for several parameters of concern until the effluent is better characterized. The permit allows for a reduction in monitoring frequency when Ecology has sufficient data to analyze compliance with water quality standards.

C. Disposal field monitoring

Ecology details the proposed disposal field monitoring schedule under Permit Special Condition S2. Depth to groundwater monitoring is required to better assess how much additional treatment the wastewater is receiving in the soils. It is anticipated that some level of soils treatment is occurring throughout the majority of the year.

V. Other permit conditions

A. Reporting and record keeping

Ecology based Special Condition S3 on its authority to specify any appropriate reporting and record keeping requirements to prevent and control waste discharges (WAC 173-216-110).

B. Prevention of facility overloading

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-216-110 require the Edison Subarea to:

- Take the actions detailed in proposed permit Special Condition S4.
- Plan expansions or modifications before the treatment plant exceeds existing capacity.
- Report and correct conditions that could result in new or increased discharges of pollutants.

Special Condition S4 restricts the amount of flow to the facility. If the District intends to apply for Ecology-administered funding for the design or construction of a facility project, the plan must meet the standard of a "Facility Plan", as defined in WAC 173-98-030. A complete "Facility Plan" will include all elements of an "Engineering Report" along with State Environmental Review Process (SERP) documentation to demonstrate compliance with 40 CFR 35.3140 and 40 CFR 35.3145, and a cost effectiveness analysis as required by WAC 173-98-730. The Permittee should contact Ecology's northwest regional office as early as practical before planning a project that may include Ecology-administered funding.

C. Operations and maintenance

Ecology requires dischargers to take all reasonable steps to properly operate and maintain their wastewater treatment system in accordance with state regulations (WAC 173-240-080 and WAC 173-216-110). The facility has prepared an operation and maintenance (O&M) manual for the wastewater facility.

Implementation of the procedures in the operation and maintenance manual ensures the facility's compliance with the terms and limits in the permit and ensures the facility provides AKART to the waste stream.

D. Pretreatment

Duty to enforce discharge prohibitions

This provision prohibits the Edison Subarea from authorizing or permitting dischargers to discharge certain types of waste into the sanitary sewer.

- The first section of the pretreatment requirements prohibits the Edison Subarea from accepting pollutants that cause *pass-through* or *interference*. This general prohibition is from 40 CFR §403.5(a). Appendix C of this fact sheet defines these terms.
- The second section reinforces a number of specific state and federal pretreatment prohibitions found in WAC 173-216-060 and 40 CFR §403.5(b). These reinforce that the Edison Subarea may not accept certain wastes.
- The third section of pretreatment conditions reflects state prohibitions on the Edison Subarea accepting certain types of discharges unless the discharge has received prior written authorization from Ecology. These discharges include:
  a. Cooling water in significant volumes.
  b. Stormwater and other direct inflow sources.
  c. Wastewaters significantly affecting system hydraulic loading, which do not require treatment.

E. Solid wastes

To prevent water quality problems the facility is required in Special Condition S7 to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and state water quality standards.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under 40 CFR 503, and by Ecology under Chapter 70.95J RCW, Chapter 173-308 WAC *Biosolids Management*, and Chapter 173-350 WAC *Solid Waste Handling Standards*. The disposal of other solid waste is under the jurisdiction of the Skagit County Health Department.

Requirements for monitoring sewage sludge and record keeping are included in this permit. Ecology will use this information, required under 40 CFR 503, to develop or update local limits.

F. General conditions

Ecology bases the standardized general conditions on state law and regulations. They are included in all state waste discharge permits issued by Ecology.

VI. Permit issuance procedures

A. Permit modifications

Ecology may modify this permit to impose numerical limits, if necessary to comply with water quality standards for groundwaters, based on new information from sources such as inspections, effluent monitoring, and groundwater monitoring.

Ecology may also modify this permit to comply with new or amended state regulations.

B. Proposed permit issuance

This proposed permit meets all statutory requirements for Ecology to authorize a wastewater discharge. The permit includes limits and conditions to protect human health and aquatic life, and the beneficial uses of waters of the state of Washington. Ecology proposes to issue this permit for a term of 5 years.

VII. References for text and appendices

Avinash M. Kadam.

Pathogen Removal from Municipal Wastewater in Constructed Soil Filter. Avinash M. Kadam, Goldie H. Oza, Pravin D. Nemade, Hariharan S. Shankar, Ecological Engineering 33 (2008) 37–44, 2008.

Reneau, R.B.

Distribution of Total and Fecal Coliform Organisms from Septic Effluent in Selected Coastal Plain Soils, R. B. Reneau, et al., Public Health Reports, May-June 1977, Vol 92, No. 3. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1432000/pdf/pubhealthrep00148-0057.pdf

Washington State Department of Ecology.

1993. *Guidelines for Preparation of Engineering Reports for Industrial Wastewater Land Application Systems*, Ecology Publication Number 93-36. 20 pp. http://www.ecy.wa.gov/pubs/9336.pdf

Laws and Regulations (http://www.ecy.wa.gov/laws-rules/index.html)

Permit and Wastewater Related Information (http://www.ecy.wa.gov/programs/wq/wastewater/index.html)

Revised October 2005. *Implementation Guidance for the Groundwater Quality Standards, Ecology Publication* Number 96-02. http://www.ecy.wa.gov/biblio/9602.html

Revised August 2008. *Criteria for Sewage Works Design*. Publication Number 98-37. http://www.ecy.wa.gov/biblio/9837.html

November 2010. *Permit Writer's Manual*. Publication Number 92-109 (http://www.ecy.wa.gov/biblio/92109.html)

November 2004. *Guidance on Land Treatment of Nutrients in Wastewater, with Emphasis on Nitrogen, Ecology Publication* Number 04-10-081; http://www.ecy.wa.gov/biblio/0410081.html

Washington State Department of Health.

February 1994. *Design Criteria for Municipal Wastewater Land Treatment Systems for Public Health Protection.* http://www.ecy.wa.gov/programs/wq/wastewater/municipal_land_treatment_design_criteria.pdf

Appendix A--Public involvement information

Ecology proposes to issue a permit to the Edison Subarea wastewater treatment facility. The permit includes wastewater discharge limits and other conditions. This fact sheet describes the facility and Ecology's reasons for requiring permit conditions.

Ecology placed a Public Notice of Application on February 9, 2012, and February 16, 2012, in the *Skagit Valley Herald* to inform the public about the submitted application and to invite comment on the issuance) of this permit.

Ecology placed a Public Notice of Draft on December 12, 2012, in the *Skagit Valley Herald* to inform the public and to invite comment on the proposed draft State Waste Discharge permit and fact sheet.

The notice:

- Told where copies of the draft permit and fact sheet were available for public evaluation (a local public library, the closest regional or field office, posted on our website).
- Offered to provide the documents in an alternate format to accommodate special needs.
- Urged people to submit their comments, in writing, before the end of the Comment Period.
- Told how to request a public hearing of comments about the proposed state waste discharge permit.
- Explained the next step(s) in the permitting process.

Ecology has published a document entitled *Frequently Asked Questions about Effective Public Commenting*, which is available on our website at http://www.ecy.wa.gov/biblio/0307023.html.

You may obtain further information from Ecology by telephone, 425-649-7201, or by writing to the address listed below.

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

The primary author of this permit and fact sheet is Alison Evans.

Appendix B--Your right to appeal

You have a right to appeal this permit to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of the final permit. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2) (see glossary).

To appeal you must do the following within 30 days of the date of receipt of this permit:

- File your appeal and a copy of this permit with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this permit on Ecology in paper form - by mail or in person (see addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

ADDRESS AND LOCATION INFORMATION

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503 **Pollution Control Hearings Board** 1111 Israel RD SW STE 301 Tumwater, WA 98501	**Department of Ecology** Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608 **Pollution Control Hearings Board** PO Box 40903 Olympia, WA 98504-0903

Appendix C--Glossary

AKART -- The acronym for "all known, available, and reasonable methods of prevention, control and treatment." AKART is a technology-based approach to limiting pollutants from wastewater discharges, which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with RCW 90.48.010 and 520, WAC 173-200-030(2)(c)(ii), and WAC 173-216-110(1)(a).

Alternate point of compliance -- An alternative location in the groundwater from the point of compliance where compliance with the groundwater standards is measured. It may be established in the groundwater at locations some distance from the discharge source, up to, but not exceeding the property boundary and is determined on a site-specific basis following an AKART analysis. An "early warning value" must be used when an alternate point is established. An alternate point of compliance must be determined and approved in accordance with WAC 173-200-060(2).

Ambient water quality -- The existing environmental condition of the water in a receiving water body.

Ammonia -- Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Average monthly discharge limit -- The average of the measured values obtained over a calendar month's time.

Background water quality -- The concentrations of chemical, physical, biological or radiological constituents or other characteristics in or of groundwater at a particular point in time upgradient of an activity that has not been affected by that activity, [WAC 173-200-020(3)]. Background water quality for any parameter is statistically defined as the 95% upper tolerance interval with a 95% confidence based on at least eight hydraulically upgradient water quality samples. The eight samples are collected over a period of at least one year, with no more than one sample collected during any month in a single calendar year.

Best management practices (BMPs) -- Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5 -- Determining the five-day Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in receiving waters after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD_5 is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass -- The intentional diversion of waste streams from any portion of a treatment facility.

Clean water act (CWA -- The federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Compliance inspection-without sampling -- A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance inspection-with sampling -- A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations. In addition it includes as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Ecology may conduct additional sampling.

Continuous monitoring -- Uninterrupted, unless otherwise noted in the permit.

Critical condition -- The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Date of receipt -- This is defined in RCW 43.21B.001(2) as five business days after the date of mailing; or the date of actual receipt, when the actual receipt date can be proven by a preponderance of the evidence. The recipient's sworn affidavit or declaration indicating the date of receipt, which is unchallenged by the agency, constitutes sufficient evidence of actual receipt. The date of actual receipt, however, may not exceed forty-five days from the date of mailing.

Distribution uniformity -- The uniformity of infiltration (or application in the case of sprinkle or trickle irrigation) throughout the field expressed as a percent relating to the average depth infiltrated in the lowest one-quarter of the area to the average depth of water infiltrated.

Enforcement limit -- The concentration assigned to a contaminant in the groundwater at the point of compliance for the purpose of regulation, [WAC 173-200-020(11)]. This limit assures that a groundwater criterion will not be exceeded and that background water quality will be protected.

Engineering report -- A document that thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report must contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal coliform bacteria -- Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab sample -- A single sample or measurement taken at a specific time or over as short a period of time as is feasible.

Groundwater -- Water in a saturated zone or stratum beneath the surface of land or below a surface water body.

Industrial user -- A discharger of wastewater to the sanitary sewer that is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

Industrial wastewater -- Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business; from the development of any natural resource; or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Interference -- A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

- Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and
- Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Maximum daily discharge limit -- The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Maximum day design flow (MDDF) -- The largest volume of flow anticipated to occur during a one-day period, expressed as a daily average.

Maximum month design flow (MMDF) -- The largest volume of flow anticipated to occur during a continuous 30-day period, expressed as a daily average.

pH -- The pH of a liquid measures its acidity or alkalinity. It is the negative logarithm of the hydrogen ion concentration. A pH of 7 is defined as neutral and large variations above or below this value are considered harmful to most aquatic life.

Pass-through -- A discharge which exits the POTW into waters of the State in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of State water quality standards.

Point of compliance -- The location in the groundwater where the enforcement limit must not be exceeded and a facility must comply with the Groundwater Quality Standards. Ecology determines this limit on a site-specific basis. Ecology locates the point of compliance in the groundwater as near and directly downgradient from the pollutant source as technically, hydrogeologically, and geographically feasible, unless it approves an alternative point of compliance.

Reasonable potential -- A reasonable potential to cause a water quality violation, or loss of sensitive and/or important habitat.

Responsible corporate officer -- A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or have gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22).

Significant industrial user (SIU) --

1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N; and

2) Any other industrial user that discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement [in accordance with 40 CFR 403.8(f)(6)].

   Upon finding that the industrial user meeting the criteria in paragraph 2, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

   *The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

Slug discharge -- Any discharge of a non-routine, episodic nature, including but not limited to an accidental spill or a non-customary batch discharge to the POTW. This may include any pollutant released at a flow rate that may cause interference or pass through with the POTW or in any way violate the permit conditions or the POTW's regulations and local limits.

Solid waste -- All putrescible and non-putrescible solid and semisolid wastes including, but not limited to, garbage, rubbish, ashes, industrial wastes, swill, sewage sludge, demolition and construction wastes, abandoned vehicles or parts thereof, contaminated soils and contaminated dredged material, and recyclable materials.

Soluble BOD_5 -- Determining the soluble fraction of Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of soluble organic material present in an effluent that is utilized by bacteria. Although the soluble BOD_5 test is not specifically described in Standard Methods, filtering the raw sample through at least a 1.2 um filter prior to running the standard BOD_5 test is sufficient to remove the particulate organic fraction.

State waters -- Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater -- That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based effluent limit -- A permit limit based on the ability of a treatment method to reduce the pollutant.

Total coliform bacteria -- A microbiological test, which detects and enumerates the total coliform group of bacteria in water samples.

Total suspended solids (TSS) -- Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills

and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset -- An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water quality-based effluent limit -- A limit imposed on the concentration of an effluent parameter to prevent the concentration of that parameter from exceeding its water quality criterion after discharge into receiving waters.

Appendix D--Technical calculations

Edison WWTP Groundwater Mixing Model* - Nitrogen

		Drainfield #1	Drainfield #2	Both Drainfields
Input				
Drainfield Area, ft2	A_D	53,280	600,000	653,280
Volume of recharge, in/yr	R	31.7	31.7	31.7
Nitrate concentration in precipitation, mg/L	N_R	0.24	0.24	0.24
Volume of wastewater, gpd (Peak Day flow, worst case scenario)	V_W	1,400	18,000	19,400
Total nitrogen concentration in wastewater, mg/L	N_W	31	31	31
Denitrification rate in subsurface, %	d	10	10	10
Hydraulic conductivity of aquifer, ft/day (used horizontal b/c most likey dominant)	K	0.45	10.08	9.29
Hydraulic gradient, ft/ft	i	0.0275	0.008	0.0096
Depth of mixing in aquifer, ft	b	20	20	20
Width of aquifer, ft	W_A	463	1000	1000
Nitrate concentration of upgradient gw, mg/L	N_B	5	5	5
Calculations				
Precipitation Volume, gpd	$V_R = A_D R\ (0.00170788)$	2,885	32,484	35,368
Nitrogen Loading to aquifer from effluent and precipitation, mg/L	$N_I = \frac{(V_R N_R + V_W N_W(1-d))}{(V_R + V_W)}$	9	10	10
Infiltration volume, gpd	$V_I = V_R + V_W$	4,285	50,484	54,768
Groundwater volume, gpd	$Q = KibW_A\ (7.48052)$	863	12,065	13,336
Results				
Nitrogen Conc at property boundary (well mixed w/ gw), mg/L	$N_{GW} = (Q N_B + V_I N_I) / (Q + V_I)$	**9**	**9**	**9**

*Model source: *Ecology's Permit Writer's Manual* , 2008 version, Section VIII.

Edison WWTP Groundwater Mixing Model[1] - Coliform

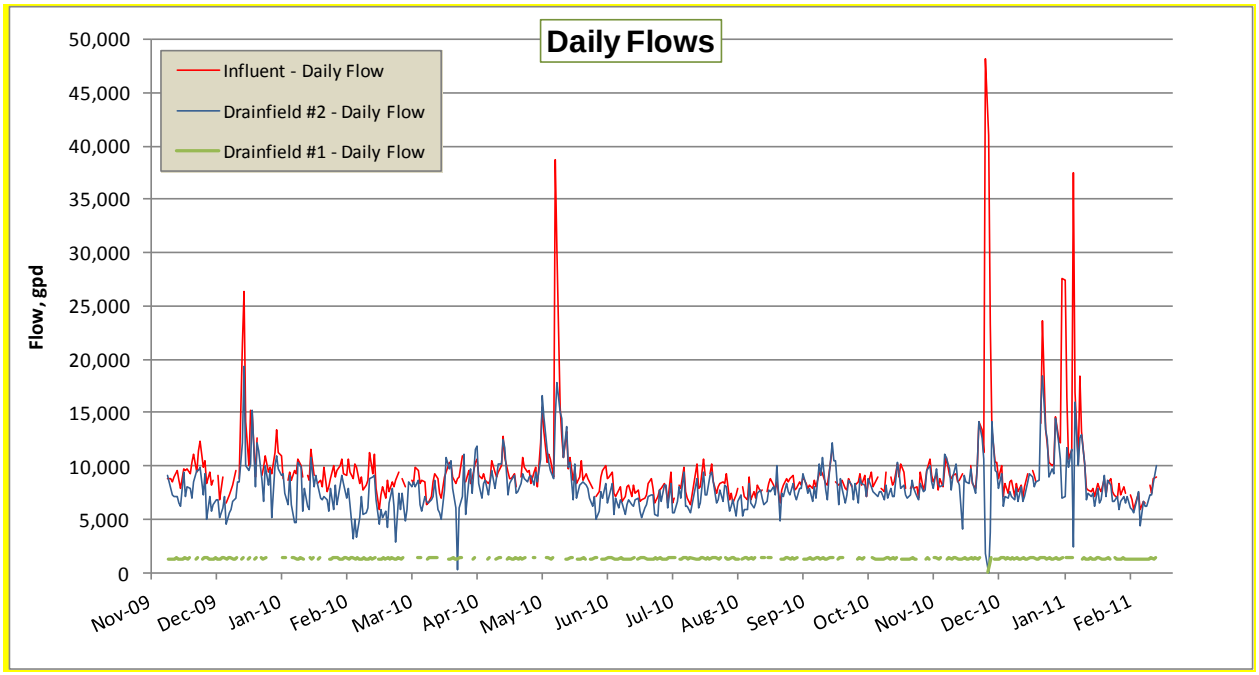
		Old Drainfield	New Drainfield	Both Drainfields
Input				
Drainfield Area, ft2	A_D	53,280	600,000	653,280
Volume of recharge, in/yr	R	31.7	31.7	31.7
Coliform concentration in precipitation, mg/L	N_R	0	0	0
Volume of wastewater, gpd (Peak Day flow, worst case scenario)	V_W	1,400	18,000	19,400
Total fecal concentration in wastewater, mg/L	N_W	400	400	400
Destruction rate in subsurface[2], %	d	99	99	99
Hydraulic conductivity of aquifer, ft/day (used horizontal b/c most likey dominant)	K	0.45	10.08	9.29
Hydraulic gradient, ft/ft	i	0.0275	0.008	0.0096
Depth of mixing in aquifer, ft	b	20	20	20
Width of aquifer, ft	W_A	463	1000	1463
Coliform concentration of upgradient gw, mg/L	N_B	0	0	0
Calculations				
Precipitation Volume, gpd	$V_R = A_D R\ (0.00170788)$	2,885	32,484	35,368
Coliform Loading to aquifer from effluent and precipitation, mg/L	$N_I = (V_R N_R + V_W N_W(1\text{-}d)) / (V_R + V_W)$	1	1	1
Infiltration volume, gpd	$V_I = V_R + V_W$	4,285	50,484	54,768
Groundwater volume, gpd	$Q = KibW_A\ (7.48052)$	863	12,065	19,505
Results				
Coliform Conc at property boundary (well mixed w/ gw), mg/L	$N_{GW}=(Q N_B + V_I N_I) / (Q + V_I)$	**1**	**1**	**1**

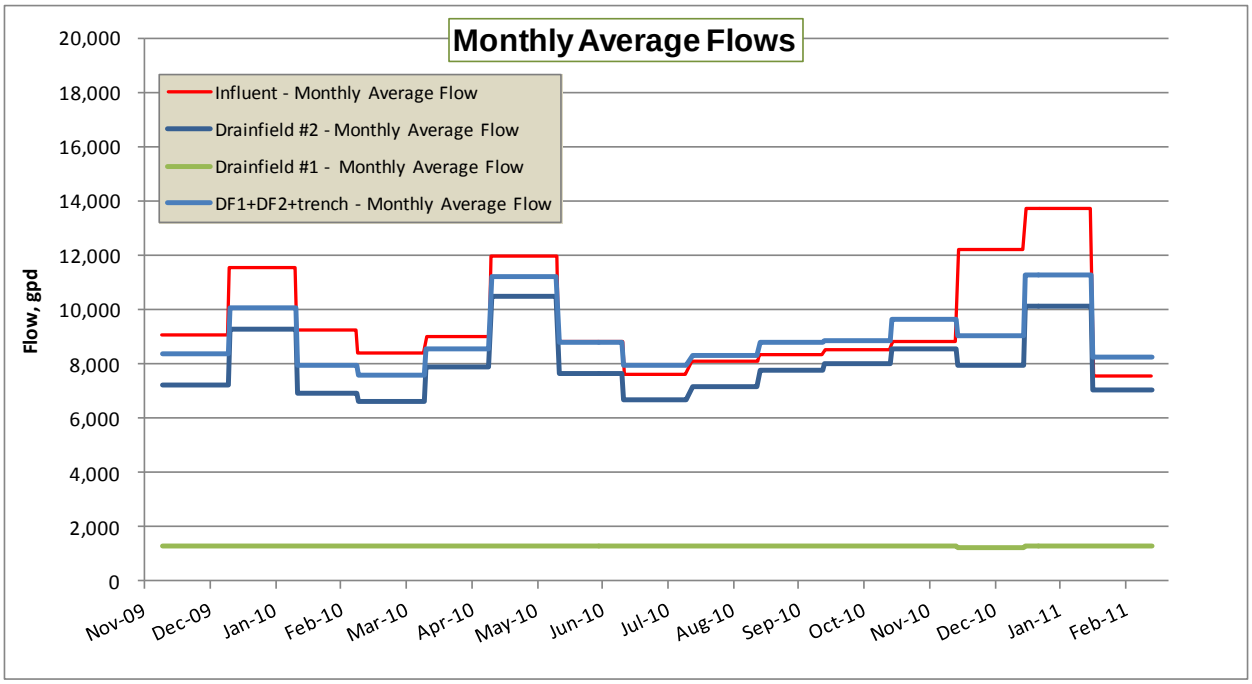
[1] Model source: *Ecology's Permit Writer's Manual* , 2008 version, Section VIII.

[2] Destruction rate based on 2007 Study: *Pathogen removal from municipal wastewater in Constructed Soil Filter,* Kadam et al. *(http://www.wastewatertreatment.co.in/pdf/Pathogen_removal_from_municipal_wastewater_in_Constructed_Soil_Filter.pdf)*

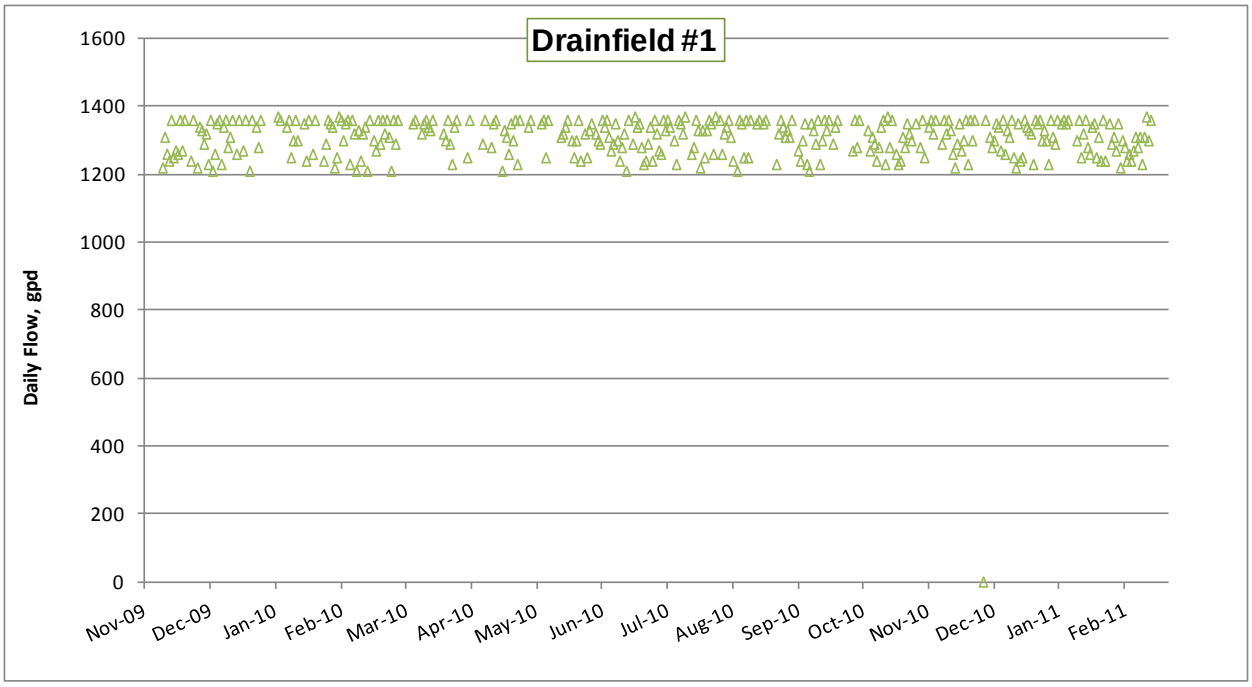
Appendix E--Receiving water and facility data

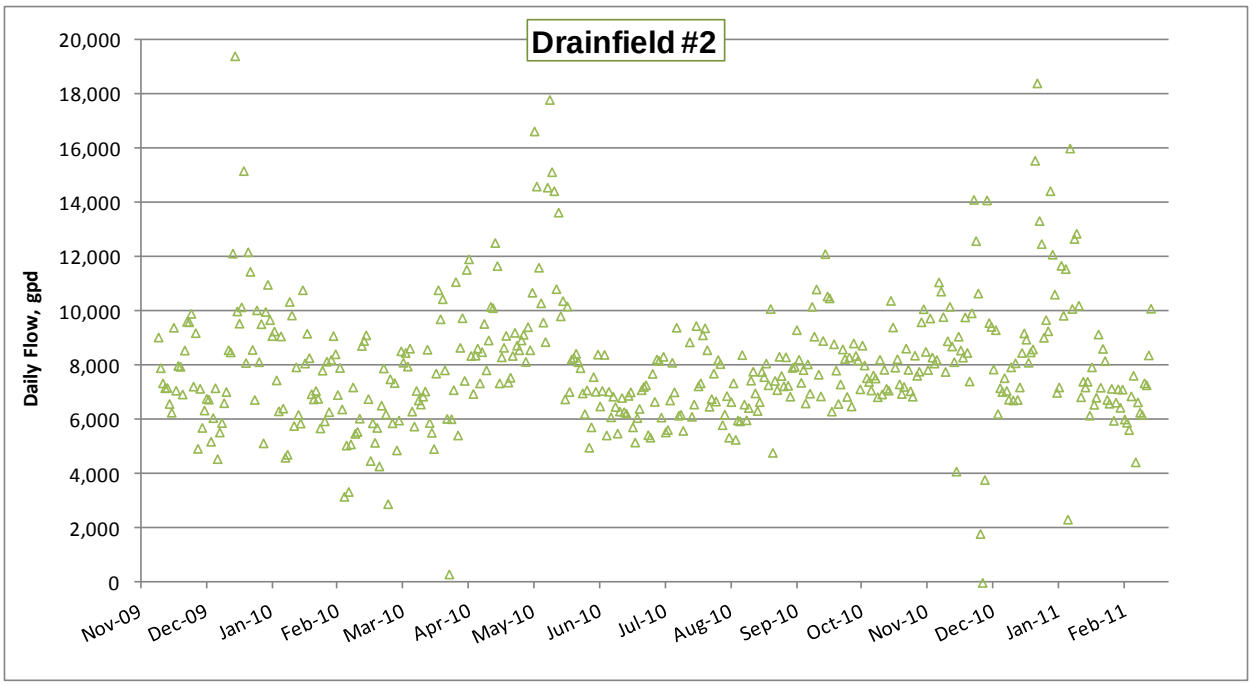
Facility Flow Data

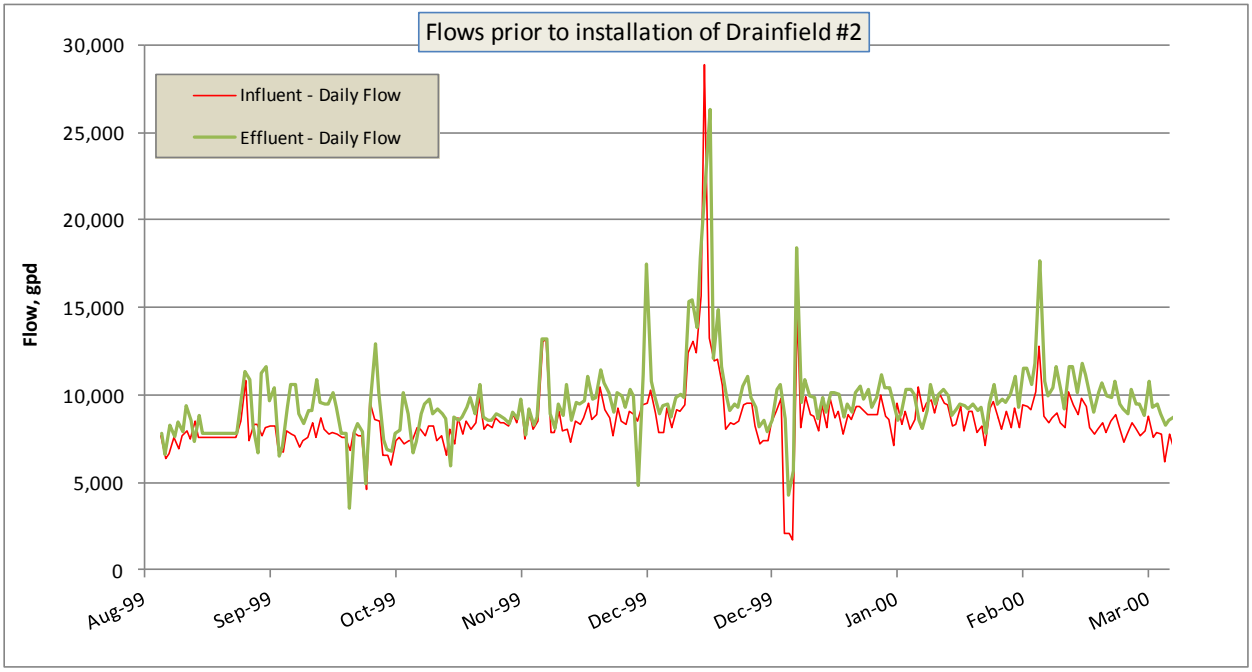




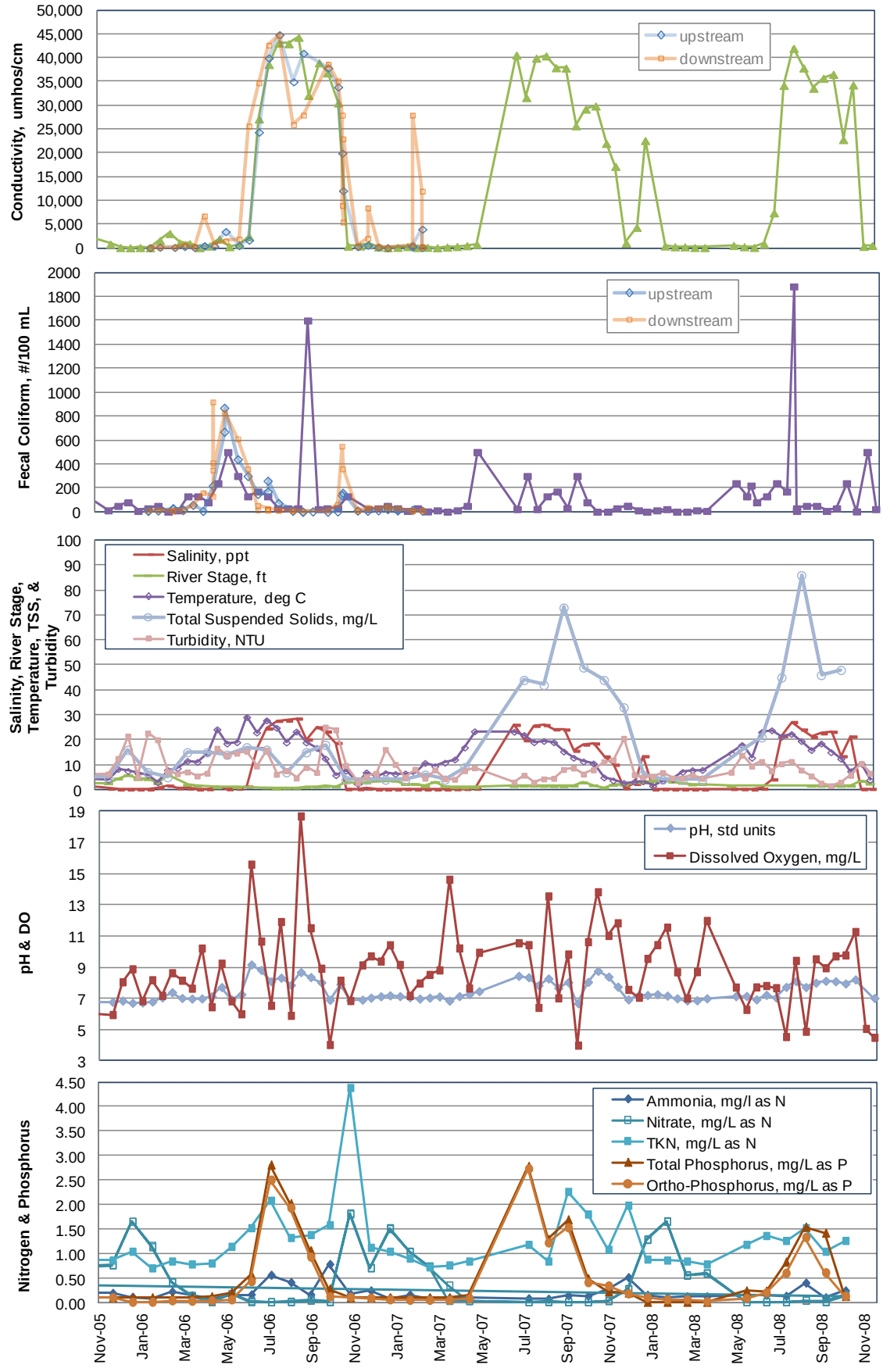
Drainfield Flow Data






Flows prior to installation of Drainfield #2
Influent - Daily Flow
Effluent - Daily Flow
Flow, gpd
30,000
25,000
20,000
15,000
10,000
5,000
0
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
Dec-99
Jan-00
Feb-00
Mar-00

Edison Slough Water Quality - ESSC1.5, adjacent to Edison drainfields



Appendix F--Response to comments

Response to Comments Received During Entity Review

Ecology received many comments from the Edison Subarea, the Edison board, consultants, and the community during the *entity* review comment period. The additional cost of implementing the proposed permit requirements was by far the biggest concern. The Edison community is small and consists of several retired and limited income households. Ecology considered financial burden when making the following changes to the permit:

1. *Table 2 Wastewater Monitoring Schedule* – Ecology changed the sample type for influent and effluent TSS and BOD_5 from 24-hour composite to grab. Ecology decided the added expense cannot be justified because:
   a) Facility loading is not an eminent concern for the recirculating gravel filter because the facility's capacity is currently hydraulically limited by the drainfields.
   b) Percent removal is not pertinent since a significant portion of TSS and BOD removal occurs upstream in the septic systems. Therefore accurate influent concentrations are not a necessity.
   c) The effluent should be well-mixed and of a fairly consistent composition since the wastewater recirculates on average 5 times through gravel filter. Grab samples should provide a sufficiently representative analysis of the effluent.
2. Ecology reduced influent sampling frequency from 1/month to 4/year. Ecology feels this is justified because the recirculating gravel filter capacity is not the limiting design constraint of the facility. The hydraulic capacities of the drainfields limit the quantity of wastewater the facility can receive. The facility currently operates at approximately half the hydraulic capacity of the gravel filter. BOD and TSS loadings are approximately 20% and 4% of design capacity, respectively. Due to local GMA requirements the service area will not expand anytime soon. Ecology confidently concludes that facility loading will not approach capacity of the recirculating gravel filter in the next five years. Therefore, in this instance involving a community with limited financial resources, Ecology agrees that influent monitoring frequency can be relaxed.
3. Ecology removed the ammonia monitoring requirement. TKN monitoring is still required and will provide the necessary information.
4. Ecology reduced DO monitoring from 1/month to 4/year during characterization period, and removed it completely from long term monitoring. It is highly unlikely that effluent from the recirculating gravel filter will have DO levels that would degrade groundwater quality.
5. Ecology removed the requirement to calibrate flow meters annually. However, the Permittee must still calibrate according to manufacturers recommendations.

Ecology also corrected and updated factual information in the fact sheet in response to comments from the entity.

Response to Comments Received during the 30-day Public Review

The Department of Ecology received no comments during the public comment period.