



**November 2006
(Updated April 2007)**

**GENERAL USE LEVEL DESIGNATION FOR BASIC (TSS), ENHANCED, &
PHOSPHORUS TREATMENT**

For

Washington State Department of Transportation's Ecology Embankment

Ecology's Decision:

Based on the Washington State Department of Transportation (WSDOT) application submissions and recommendations by the Technical Review Committee (TRC), Ecology hereby issues the following use level designations for the WSDOT Ecology Embankment:

- 1. A General Use Level Designation for Basic (TSS) Treatment.**
- 2. A General Use Level Designation for Enhanced Treatment.**
- 3. A General Use Level Designation for Phosphorus Treatment.**

These General Use Level Designations have no expiration date but may be revoked or amended by Ecology, and are subject to the conditions specified below.

Ecology's Conditions of Use:

Ecology Embankments shall be designed, installed, and maintained to comply with these conditions:

- 1. Each EE facility shall be designed as per RT.07 of the WSDOT 2006 Highway Runoff Manual (HRM). This can be found by clicking on the following link:**



WSDOT RT.07

- 2. The EE Ecology Mix shall consist of and be constructed per RT.07 of the WSDOT 2006 Highway Runoff Manual which can be found by clicking on the link above.**
- 3. The EE facility shall be constructed as per RT.07 of the WSDOT 2006 Highway Runoff Manual.**
- 4. The EE facility shall be maintained per the following maintenance guidelines:**



Ecology Embankment
Maintenance Guidelin

5. **Any post publication updates to the HRM must be followed and can be found at the WSDOT HRM website:**
<http://www.wsdot.wa.gov/Environment/WaterQuality/Runoff/HighwayRunoffManual.htm#postpublication>
6. **WSDOT shall maintain readily available those documents that are deemed public information and make this information available upon request and in a timely manner.**
7. **Discharges from the EE shall not cause or contribute to water quality standards violations in receiving waters.**

Applicant: Washington State Department of Transportation (WSDOT)

Applicant's Address: Environmental Affairs Office
PO Box 47332
Olympia, WA 98504-7332

Application Documents:

- Technology Evaluation and Engineering Report : WSDOT Ecology Embankment; Prepared for Washington State Department of Transportation (Herrera Environmental Consultants, July 2006)

Applicant's Use Level Request:

General Level Use Designation for Basic, Enhanced, Phosphorus Treatment, and Oil Treatment in accordance with Ecology's 2005 stormwater manual.

Applicant's Performance Claims:

The Ecology Embankment removes suspended solids, phosphorus, and metals from highway runoff through physical straining, ion exchange, carbonate precipitation, and biofiltration. The combination of treatment processes is expected to achieve Ecology's treatment goals for basic, enhanced, and phosphorus treatment.

Technical Review Committee Recommendations:

The Technical Review Committee finds:

- Ecology Embankment, when sized according to WSDOT RT.07 is expected to provide effective stormwater treatment achieving Ecology's basic, enhanced, and phosphorus

performance goals as demonstrated by field testing performed in accordance with the TAPE protocol; and the Ecology Embankment is deemed satisfactory with respect to factors other than treatment performance.

Findings of Fact:

1. Water quality monitoring was conducted at the Ecology Embankment test site over a five-year period from 2001 to 2005.
2. A total of 25 sample events were collected in three phases.
3. For the 12 storms with influent TSS concentrations less than 100 mg/L, the median influent was 59 mg/L and the median effluent was 3.9 mg/L. For the 13 storms with influent concentrations greater than 100 mg/L, the median percent removal was 96.0%.
4. For all storm events, the median percent removal of total phosphorus was 85.7% with a median influent of 0.234 mg/L
5. For all storm events, the median percent removal of dissolved zinc was 80.8% with a median influent of 120 µg/L.
6. For all storm events, the median percent removal of dissolved copper was 40.8% with a median influent of 16 µg/L.
7. A water budget was performed on the Ecology Embankment to determine if losses were occurring within the system due to infiltration, bypass, and/or evaporation. The percentage of influent that was accounted for in the effluent ranged from 0 to 120 percent with a median of 38 percent. Water losses were not likely caused by bypassing the system because bypass was only observed on one occasion.

Technology Description:

The Ecology Embankment is a flow-through water quality treatment device developed for use where available right-of-way is limited and longitudinal gradients are less than 5%. The Ecology Embankment, which can be sited on both highway side slopes and medians, uses infiltration through a pervious, alkalinity-generating media, called the Ecology Mix, that was designed to remove suspended solids and soluble metals from highway runoff through physical straining, ion exchange, carbonate precipitation, and biofiltration. For illustrations, design specifications and maintenance criteria open the following files:



Remaining Issues or Concerns about the EE Technology:

1. Maintenance and replacement. How do pollutant removal efficiency and hydraulic capacity decrease over time, and at what point is maintenance or replacement required? This can be accomplished by periodic water quality testing at the SR 167 test site.

2. If possible, a different EE facility should be tested in the future. The location should be selected to verify slope or soil-related siting limitations. The testing should attempt to carefully monitor water balance.

Contact Information:

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Applicant's Website: <http://www.wsdot.wa.gov/Environment/waterquality/>

Highway Runoff Manual Website:
<http://www.wsdot.wa.gov/Environment/WaterQuality/Runoff/HighwayRunoffManual.htm>

Ecology web link: <http://www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html>

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