

**Appendix A
of the March 2011
NPDES Annual Report**



**City of SeaTac
Stormwater Monitoring Plan
(NPDES Phase II Permit Requirement S8.C1.)
October 2010**

I. Background

The following stormwater monitoring plan has been created to meet the requirements of the Western Washington (NPDES) Phase II Municipal Stormwater Permit identified in section S8.C1 of the permit. Pursuant to this section, SeaTac is required to: 1) identify two sites for future long term stormwater monitoring – one commercial, the other high density residential; and 2) develop questions for effectiveness monitoring that directly address actions of the Stormwater Management Program (SWMP). Please note however that this document is a plan for future stormwater monitoring activities and as such is subject to change if monitoring elements prove infeasible or if more appropriate monitoring locations are found.

II. Sites for Future, Long Term Monitoring

A. Site Selection Criteria

Stormwater monitoring site selection criteria were based on the following factors:

- a. Existing water quality issues
- b. Basin characteristics (land use types)
- c. Site constraints (accessibility, suitability for flow-weighted monitoring, impeding variables)

B. Commercial Monitoring Location

The City of SeaTac has chosen a stormwater outfall to Des Moines Creek located south of South 188th Street and east of 28th Avenue South (adjacent to 2651 S. 192nd St.) as its commercial monitoring location. The Des Moines Creek Basin is the primary priority receiving water identified by the City of SeaTac and contains the largest portion of industrial and commercial land uses within the City. The outfall chosen: 1) drains the largest commercial area within the City (the businesses along International Blvd.); 2) has existing water quality issues that could benefit from water quality monitoring; and 3) is accessible and appears suitable for flow-weighted monitoring.

a. Existing Water Quality Issues

According to the Department of Ecology's Water Quality Assessment web site (www.ecy.wa.gov/programs/wq/303d/WQAssessmentCats.html) Des Moines Creek is listed as a Category 5 impaired waterbody for fecal coliform, dissolved oxygen, copper and zinc. These pollutants are common to commercial and urban settings and come from a variety of sources.

- i. Common sources of fecal coliform in commercial and urban environments are pet and animal waste, failed septic systems and illicit sewer connections.
- ii. Low dissolved oxygen levels result from a variety of factors including: water temperature, water circulation, the amount of suspended solids,

chemical and gases in the water column; nutrient levels and plant decay.

- iii. Sources of copper include brake pads, architectural copper (pipes and roofs) and some pesticides
- iv. Common sources of zinc are galvanized metal surfaces, motor oil and hydraulic fluid and tire dust.

b. Drainage Basin Characteristics

The Des Moines Creek Basin is composed of a variety of land uses ranging from residential to commercial and industrial land uses. The chosen monitoring site receives stormwater flows primarily from Bow Lake and International Blvd. The predominant land use type contributing to this outfall is commercial, encompassing approximately 52% of the sub-basin. Residential land uses compose approximately 30.9% of the sub basin and industrial and other uses composing the remaining 16.5% of the basin. The contributing basin for this outfall is 589.5 acres in size.

c. Site Constraints

The site is located on Port of Seattle property south of Sea-Tac International Airport. The Port has tentatively agreed to allow access to the site for the purposes of water quality monitoring. The two 36 inch stormwater outfalls discharge into a riparian area located between two parking lots. Flow rates and topography appear to be suitable for the installation of permanent flow-weighted monitoring equipment. The site is secluded and monitoring equipment will not be easily seen from the parking area due to topography and vegetative cover and therefore is a less likely target for vandalism.

C. High Density Residential Monitoring Location

The City of SeaTac has chosen a stormwater outfall to Angle Lake located along the northeast property line of the City owned Angle Lake Park as its high density residential monitoring location. Angle Lake is a priority receiving water identified by the City of SeaTac and contains predominantly high density residential land uses. Angle Lake has existing water quality issues that could benefit from water quality monitoring; and the outfall is accessible and appears suitable for flow-weighted monitoring.

a. Existing Water Quality Issues

According to the Department of Ecology's Water Quality Assessment web site (www.ecy.wa.gov/programs/wq/303d/WQAssessmentCats.html) Angle Lake is listed as Category 5 impaired waterbody for fecal coliform. This pollutant is common to residential and urban settings and can come from a variety of

sources including pet waste, waterfowl and other animal waste, failed septic systems and illicit sewer connections.

b. Drainage Basin Characteristics

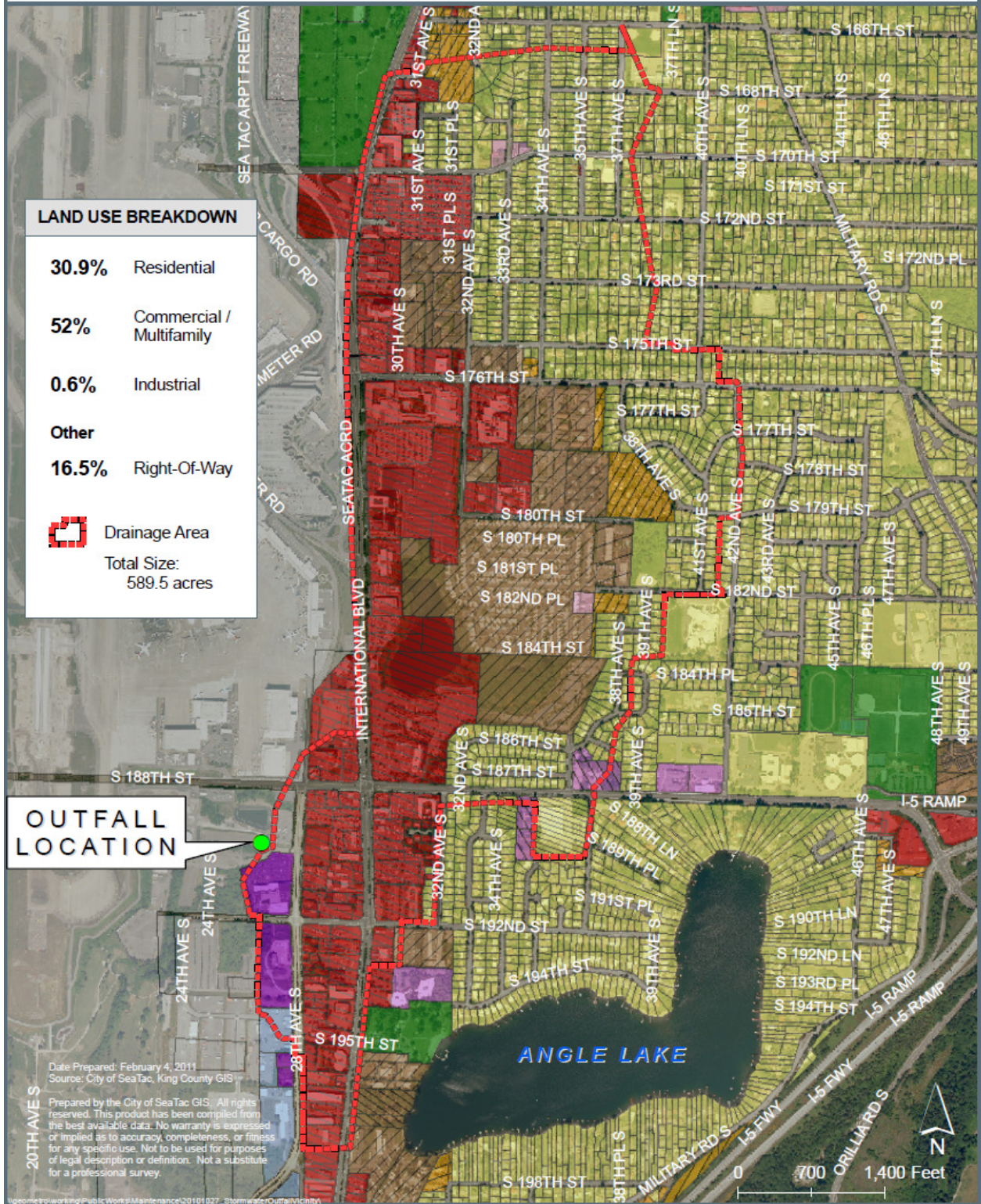
The proposed Angle Lake outfall subbasin is composed of a variety of land uses ranging from residential to commercial and parks/recreation. The predominant land use type contributing to this outfall is high density residential (4 dwelling units or greater), comprising approximately 69% of the subbasin. Parks, commercial and other uses compose the remaining 31% of the basin. The total contributing basin for this outfall is 22 acres in size.

c. Site Constraints

The site is located in a City park and will be highly visible and easily accessible and therefore fencing may be necessary to protect monitoring equipment from vandalism once it is installed. The outfall is a 12 inch corrugated metal pipe outlet into the lake through a small concrete block. Flow rates and topography are a factor at this location depending upon winter high water levels of the lake. As such, the catch basin immediately upstream from the outfall, which is also located on park property, will be used as an alternate location for the monitoring site. Between these two locations we are confident we can determine a suitable location for the installation of permanent flow-weighted monitoring equipment.

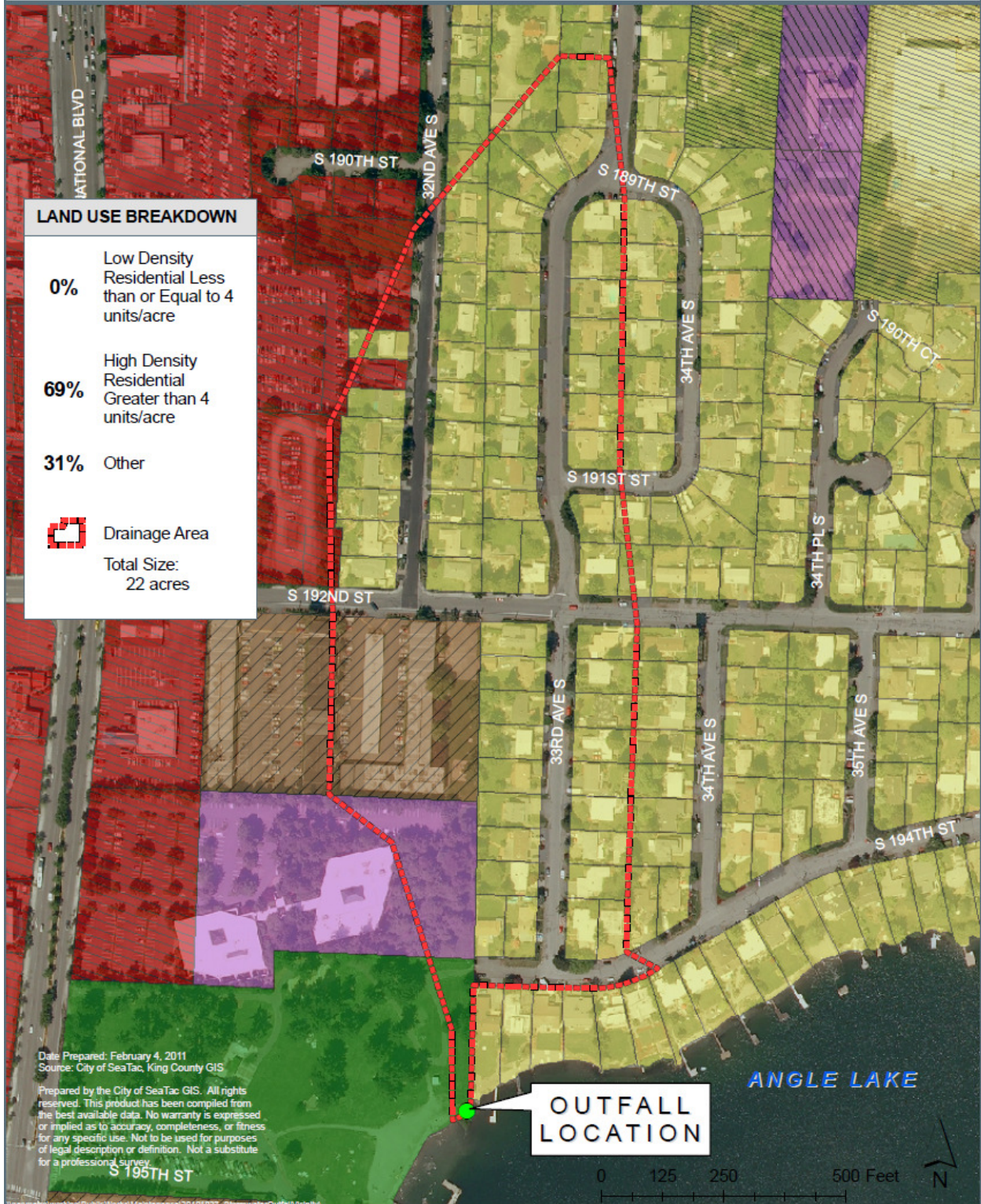
COMMERCIAL SUBBASIN OUTFALL

City of SeaTac



ANGLE LAKE RESIDENTIAL OUTFALL

City of SeaTac



III. SWMP Effectiveness Monitoring

Construction site run-off is a major contributing factor to stormwater pollution in our region. Section S5.C4.b requires a minimum of three erosion sedimentation control (ESC) inspections during the construction of a project, including, but not limited to an ESC Preconstruction Inspection and a Final ESC Inspection. The City of SeaTac has adopted procedures requiring a minimum of four ESC inspections during the construction of a project. These inspections are described in detail in the attached ESC Inspection Handout. Further, the City has provided a series of ESC trainings for its inspection and plan review staff.

Questions

The City of SeaTac proposes two questions to determine the effectiveness of our construction site erosion control inspections:

- 1) Is the number of ESC inspections (level of inspection oversight) being conducted by City staff sufficient to mitigate/minimize the impacts of construction site run-off?
- 2) Is the level of ESC best management practices (BMPs) being applied to construction sites sufficient to mitigate/minimize the impacts of construction site run-off?

Hypotheses

The specific hypotheses we propose to test are:

- 1) The frequency of ESC inspection provided by the City on construction sites is sufficient to mitigate the impacts of construction site run-off.
- 2) The level of ESC BMPs being required by the inspection staff is sufficient to mitigate the impacts of construction site run-off.

Hypothesis Testing

The City proposes the following program monitoring/evaluation to test the above hypothesis.

- 1) Random construction site audits.
 - a. Evaluate installation, maintenance and effectiveness of ESC BMPS on site.
 - b. Review inspection card to determine if ESC inspections are being completed.
 - c. Check perimeter of site and stormwater outlets for evidence of off-site impacts.
 - d. Conduct turbidity monitoring at construction site outfall to MS4.

Media - Turbidity Testing of Stormwater

- 1) Staff will quantify inspection frequency results (via audits) to determine the percent of sites which are in compliance with the 80% standard set in section S5.C4.b.v. of the permit.
- 2) Using NPDES Construction Permit turbidity reporting thresholds as defacto standards, City staff would conduct turbidity monitoring of randomly selected active construction sites.
 - a. NPDES Construction Permit Turbidity Thresholds

- i. 0 to 25 NTUs = Acceptable.
- ii. 26 to 249 NTUs = Requires ESC re-assessment and corrective actions till turbidity falls below 25 NTU.
- iii. 250 NTU or greater = ESC measures are grossly inadequate. DOE notification is required for site > 1 acre of disturbed area.

Intended Outcomes

The goal of these monitoring efforts is to confirm the adequacy of SeaTac's construction site runoff inspection program.

- 1) Inspection audits demonstrating 80% or greater compliance is acceptable. Audits demonstrating less than
- 2) Turbidity readings of 0 to 25 NTUs or readings of 26 to 249 NTUs which are corrected and lowered to 0 to 25 NTUs will be considered confirmation that the program is effective in mitigating impacts from construction site runoff.
- 3) Turbidity readings of 26 to 249 NTUs which go uncorrected or readings of 250 NTUs or greater may require modifications of the program.

Potential Modifications of Management/Program Actions

Depending on the results of these inspection program audits (including turbidity monitoring), one or more of the following program modifications may be implemented:

- 1) No Action
- 2) Increase/expand field training of ESC inspection staff
- 3) Increase level or frequency of oversight of ESC inspections staff
- 4) Conduct interviews with inspection staff to evaluate reasons for ESC inspection gaps (i.e. staff time limitations, training, willingness, etc), then modify program to fill these gaps.

Implications of Inspection Program Monitoring

SeaTac's ESC inspection program evaluation may provide broad ranging implications to other MS4s inspection programs, in terms of program effectiveness, oversight and implementation gaps.

Attachments: ESC Inspection Handout