SULTAN CITY COUNCIL

AGENDA ITEM COVER SHEET

ITEM NO: **A - 9**

DATE: June 28, 2007

SUBJECT: City of Sultan Effluent Mixing Study Contract
Cosmopolitan Engineering Group

CONTACT PERSON: Public Works Director Dunn

ISSUE:

The issue before the Council is a contract amendment with Cosmopolitan Engineering Group to conduct ambient water quality sampling in the Skykomish River to satisfy Sultan's NPDES permit requirement S 10. The current City of Sultan NPDES Permit requires Sampling and Analysis Plan (SAP) per Ecology Publication 91-16, low flow modeling, sampling for 10 priority pollutant metals (total and dissolved) in the Skykomish River a minimum of four times. This will support the S 9 section of the NPDES permit as well as wastewater facility planning.

SUMMARY:

The City of Sultan and Brown and Caldwell are currently conducting wastewater facility planning to expand the capacity of the WWTP. An updated effluent mixing study is required in support of the facility planning. In addition, the City's NPDES Permit requires an effluent mixing study to determine the degree of mixing and water quality impacts that occur within the mixing zone as required in S 9 of the NPDES Permit and S 10 ambient sampling for 10 priority pollutant metals.

Cosmopolitan Engineering Group completed an effluent mixing study for the City of Sultan WWTP in 1994 recommending the outfall improvements that were completed in 1995. Cosmopolitan is also a sub contractor of Brown and Caldwell for Sultan's WWTP Upgrade. This would be an amendment to the sub contract with the City paying Cosmopolitan Engineering Group directly.

Results of the study will be presented in a report format that may be submitted to Ecology for approval under the NPDES permit condition S 10, as well as an appendix to the Facility Plan and Mixing Zone Study. The ambient data will be used directly in the Mixing Zone Study, which will be updated based on the results of the sampling.

FISCAL IMPACT:
$13,000 including SAP, field sampling laboratory analysis, report and update the Mixing Zone Study.

STAFF RECOMMENTATION:
Cosmopolitan Engineering Group produced the Mixing Zone Study in 1994, has the modeling information from that study, has completed the 2002 modeling update. Cosmopolitan is well known and respected by Department of Ecology which combined with the knowledge of Sultan. Staff is recommending Council approval of the scope of work and cost proposal to complete the requirements for NPDES Permit S 9 and S 10 for $13,300.

RECOMMENDED ACTION/MOTION:
Council authorize an amendment to Cosmopolitan Engineering Group contract to conduct and complete a Sampling and Analysis Plan (SAP), field sampling, laboratory analysis, report and update of the Mixing Zone Study. For the cost not to exceed $13,300 paid directly by the City of Sultan.

COUNCIL ACTION:

DATE: June 28, 2007

ATTACHMENTS:
1) Memorandum from Cosmopolitan Engineering Group which presents a scope of work and cost proposal to conduct Sultan NPDES Permit S-9 and S-10 requirements.
2) Plan of Study City of Sultan Effluent Mixing Study, authored by Cosmopolitan Engineering Group

Memorandum

ENGINEERING GROUP

117 South 8th Street Phone (253) 265-2958
Tacoma, WA 98402 Fax (253) 265-6041
BFox@cosmopolitaneng.com

DATE: April 2, 2007

TO: Tadd Giesbrecht, Brown & Caldwell

FROM: Bill Fox, Cosmopolitan Engineering Group

RE: City of Sultan Ambient Metals Sampling

FILE: B&C002

The purpose of this memorandum is to present a scope of work and cost proposal to conduct ambient water quality sampling in the Skykomish River to satisfy Sultan's NPDES permit requirement S10. This work is also required to support the mixing zone study specified in section S9 of the NPDES permit, as well as wastewater facility planning.

Sampling and Analysis Plan

The permit requires a Sampling and Analysis Plan (SAP) per Ecology Publication 91-16. We will prepare draft and final SAPs for the required effluent and receiving water sampling for approval by Ecology. The NPDES permit requires the SAP to be submitted 180 days prior to the sampling. However, we will propose a schedule to Ecology to allow sampling to be conducted in summer 2007.

Receiving Water Sampling for Metals

Permit Condition S10 requires sampling for 10 priority pollutant metals (total and dissolved) in Skykomish River a minimum of four times. Ancillary parameters will include hardness, temperature and pH. The QA/QC protocol and clean sampling requirements for metals sampling are very stringent, with which we have extensive experience. Therefore, we propose to lead this sampling, from a small boat and field assistant provided by the City. Laboratory analysis will be by Columbia Analytical in Kelso, and will include total, dissolved and blanks.

Results of the study will be presented in a report format that may be submitted to Ecology for approval under NPDES permit condition S10, as well as an appendix to the Facility Plan and Mixing Zone Study. The ambient data will be used directly in the Mixing Zone Study, which will be updated based on the results of the sampling.

Cost

$13,300 including SAP, field sampling, laboratory analysis, report and update of the Mixing Zone Study.

A-9

ENGINEERING
GROUP

P.O. Box 1678
Tacoma, WA 98401-1678
Phone (253) 272-7220
Fax (253) 272-7250

March 27, 2007

PLAN OF STUDY
CITY OF SULTAN EFFLUENT MIXING STUDY

BACKGROUND

Cosmopolitan Engineering Group completed an effluent mixing study for the City of Sultan WWTP in 1994. At that time effluent from the Sultan WWTP was discharged to the middle of an eddy that formed at the confluence of the Sultan and Skykomish Rivers. Fluorescent dye was injected into the effluent, confirming the presence of the eddy. Dye concentration measurements demonstrated that high concentrations of effluent were trapped in the eddy during late-summer low flow conditions, and that water quality and fish habitat at that location were degraded by the presence of the effluent discharge.

Outfall improvements were completed in 1995 to extend the discharge beyond the eddy, into the free-flowing portion of the Skykomish River just downstream of the confluence. Dye injections during the following dry season and subsequent mixing zone study confirmed that the new outfall location was located beyond the eddy, and there was no corresponding return and accumulation of effluent to this area.

The City of Sultan and Brown and Caldwell are currently conducting wastewater facility planning to expand the capacity of the WWTP. An updated effluent mixing study is required in support of the facility planning. In addition, the City's NPDES Permit requires an effluent mixing study to determine the degree of mixing and water quality impacts that occur within the mixing zone as authorized in the permit.

PURPOSE

The NPDES Permit Condition S9 requires the City to submit a Plan of Study to Ecology for approval prior to commencement of the study. The study may be conducted using actual measurements of effluent concentration in the mixing zone during critical receiving water conditions and/or with the use of dilution models. Critical ambient conditions occur in or near September when the river discharge is seasonally low. However, the wastewater facilities planning is proceeding and can not wait for late summer to conduct such studies. In addition, appropriate field measurements were obtained in the 1994 and 1995 effluent mixing studies. Therefore, this Plan of Study outlines the data, models and other protocol to complete the Effluent Mixing Study that will satisfy both the facility planning and NPDES permit requirements.

A-9
ATTACH #2

DESIGN CRITERIA

Critical conditions for the Effluent Mixing Study shall be as established in the Department of Ecology's *Permit Writer's Manual* and *Guidance for Conducting Mixing Zone Analyses*. The following design criteria will be established for the Effluent Mixing Study according to these protocols:

- Required effluent flows for water quality protection are maximum month and maximum day. These flows will be developed by Brown and Caldwell for current conditions and 20-year projections as part of the facility planning.

- Ambient water quality data will be obtained from Ecology's STORET website and by sampling and analysis as provided in permit condition S10. RECEIVING WATER STUDY.

- Critical ambient discharge for the Effluent Mixing Study is defined as the 7-day low river flow with a recurrence frequency of 10 years (7Q10). The 1995 mixing zone study established the 7Q10 low flow as 678 cfs. The Sultan River discharge is regulated by Snohomish County PUD's Jackson Hydroelectric Project and the City of Everett's Spada Lake Reservoir. Low flow statistics for the Skykomish River and legal low flow requirements for the Sultan River will be evaluated, and a new 7Q10 will be established for this project.

- Physical ambient conditions including river cross-section at the outfall, water depth and velocity during 7Q10 conditions will be taken from the 1994 and 1995 measurements unless the 7Q10 flow evaluated above has changed.

- No dye injections shall be conducted as part of this effluent mixing study.

- Mixing zone criteria shall be as defined in the Water Quality Standards WAC 173-201A:

    - The mixing zone for conventional parameters and chronic toxicants shall not exceed 300 feet downstream or 100 feet upstream, shall not utilize greater than 25 percent of the 7Q10 low river flow at critical condition, nor occupy greater than 25 percent of the river width.
    - The mixing zone for acute toxicants shall not extend beyond 10 percent of the distance to the downstream mixing zone boundary, nor utilize greater than 2.5 percent of the river flow.

DILUTION MODELING

Dilution factors at the acute and chronic mixing zone boundaries will be determined for the current and Year 2029 effluent design flows and critical ambient conditions as described above. Acute and chronic dilution factors will be determined with the model UM3, which is embedded within the EPA Visual Plumes model. UM3 is the same model used in the 1994 study for Sultan, and is approved by Ecology in the *Permit Writers Manual*.

In 1995, the UM3 model was embedded in a different model interface named PLUMES. The UM3 model in Visual Plumes has been re-run for the same conditions presented in the 1995 report, as a test of the new model's consistency with the older model interface. The results of this analysis are attached to this plan of study, and demonstrate that the Visual Plumes model adequately replicates the PLUMES results.

Dilution factors will also be calculated as the ratio of the allowable percentages of 7Q10 flow to critical effluent flows as described above. The dilution factors that shall be selected as final values will be the lesser of the modeled dilution factors and the dilution calculated as a percentage of flow, for both acute and chronic conditions.

REASONABLE POTENTIAL ANALYSIS

The reasonable potential (RP) to exceed water quality standards will be determined per Ecology and EPA protocol and permit conditions. The parameters may include whole effluent toxicity, ammonia, temperature and metals (cadmium, chromium, copper, lead, nickel, zinc, mercury, silver), based on effluent data from the existing WWTP and testing. Projected effluent quality data based on future treatment regimes will be used in combination with existing effluent data, since the proposed membrane treatment effluent combined with the oxidation ditch effluent is anticipated to produce a higher quality effluent than the oxidation ditch effluent alone.

WATER QUALITY-BASED EFFLUENT LIMITS

Water quality parameters that exhibit a reasonable potential to exceed water quality standards will have effluent limits calculated with the same methods that the Ecology NPDES permit writer would use, following protocol in Ecology's *Permit Writer's Manual* and EPA's *Technical Support Document for Water Quality-based Toxics Control.*