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EEP 13-31

REPORT TO CORE AREA LIQUID WASTE MANAGEMENT COMMITTEE
MEETING OF WEDNESDAY, SEPTEMBER 11, 2013

SUBJECT **CORE AREA SEWAGE TREATMENT PROGRAM – EFFLUENT DISCHARGE, MONITORING AND MODELLING STAGE 2 ENVIRONMENTAL IMPACT STUDY RESULTS**

ISSUE

The BC Ministry of Environment requested an Environmental Impact Study (EIS) for the McLoughlin Point wastewater outfall to satisfy requirements under the BC Municipal Wastewater Regulation of the *Environmental Management Act*.

BACKGROUND

The provincial government requires an Environmental Impact Study, consisting of two investigative stages, for all proposed outfalls. In 2008, the Capital Regional District (CRD) retained Golder Associates Ltd. to undertake a Stage 1 EIS for the effluents discharged from the proposed Saanich East-North Oak Bay (Finnerty Cove) and Westshore wastewater treatment plant outfalls. This report, completed in March 2009, served as a preliminary evaluation of the potential effects of the proposed treated sewage discharges using existing data for the Finnerty Cove and Westshore areas.

In 2009, the CRD retained WorleyParsons Canada Ltd. to undertake pre-discharge marine monitoring to support the requirements of a Stage 2 EIS. In consultation with staff and the Stage 1 report, WorleyParsons implemented the pre-discharge marine monitoring to characterize site-specific conditions in terms of seasonal water quality, oceanography, sediment quality and benthic invertebrate communities over a period of approximately two years (2009 to 2011). The CRD's Marine Monitoring Advisory Group and Ministry of Environment staff also provided input into sampling design. Pre-discharge monitoring began at Finnerty Cove and the Westshore in the spring of 2009.

The proposed future treatment plant and outfall location changed to McLoughlin Point during the Core Area Wastewater Treatment Program process. As a result, in 2010, the monitoring effort shifted away from Finnerty Cove to Macaulay/McLoughlin. The program retained the monitoring effort at Westshore in anticipation of a potential future treatment facility in the Westshore. In addition, the CRD extended the sampling effort into 2012 to ensure sufficient data were collected at Macaulay/McLoughlin to meet the seasonal monitoring requirements of the EIS.

TERA Environmental Consultants (formerly Westland Resource Group) undertook the terrestrial components of the McLoughlin Point EIS separately and staff presented those results to the Core Area Liquid Waste Management Committee on June 23, 2010. Only the marine outfall components of the EIS, undertaken by WorleyParsons, are presented here. The Executive Summary of the Stage 2 EIS report is attached as Appendix A; the full report is available upon request. A summary of the Stage 2 EIS objective and scope is provided in Appendix B.

ALTERNATIVES

That the Core Area Liquid Waste Management Committee recommend to the Board that:

1. a) the McLoughlin Point Stage 2 Environmental Impact Study results be received for information; and
   b) staff be directed to forward the *CRD Core Area Wastewater Treatment Program Stage 2 Environmental Impact Study* by WorleyParsons to the Ministry of Environment.

2. the CRD Core Area Wastewater Treatment Program Stage 2 Environmental Impact Study not be forwarded to the Ministry of Environment and that staff be directed to provide additional information.

SOCIAL IMPLICATIONS

As part of the EIS process, staff engaged local First Nations to identify their areas of environmental concern, particularly with respect to shellfish resources in the region. This information was incorporated into the EIS to ensure shellfish resources would not be adversely affected by the McLoughlin Point outfall.

The EIS predicts that the future McLoughlin system should not impact First Nations shellfish resources during normal operation. However, computer oceanographic modelling predicts that the future system during a catastrophic failure, and the current Macaulay/Clover system during routine operating conditions, could both impact shellfish resources that are utilized by First Nations and others, but only under specific, limited environmental conditions. Staff are currently reviewing this information and, in cooperation with local First Nations, will identify ways that the existing shellfish risks can be confirmed, monitored and mitigated until the McLoughlin Point system is in operation and the risks are substantially reduced.

ENVIRONMENTAL IMPLICATIONS

The results of the Stage 2 EIS indicate there are sufficient data to provide a baseline for comparison with conditions after the new McLoughlin Point outfall comes into operation. In addition, the proposed McLoughlin system is predicted to:

- significantly reduce risk to human health and shellfish resources relative to the existing Macaulay/Clover system.
- significantly reduce overall nutrient inputs into Juan de Fuca Strait relative to the existing Macaulay/Clover system.
- significantly reduce contaminant loadings of many chemicals of concern into Juan de Fuca Strait relative to the existing Macaulay/Clover system.

ECONOMIC IMPLICATIONS

The Stage 2 EIS contains a number of recommendations, particularly with respect to supplementary monitoring prior to construction of the McLoughlin outfall. A number of the recommendations will be implemented within existing Wastewater and Marine Environment Program core area monitoring budgets (i.e., northeast trunk [Clover] and northwest trunk [Macaulay] systems). In addition, staff will seek collaborative sampling opportunities with First Nations and others to further assess risks to current shellfish resources. No new funding is being requested at this time.

CONCLUSION

The Stage 2 EIS results indicate there are no predicted adverse effects to human health and the environment associated with the proposed discharge of secondary treated wastewater through a new McLoughlin Point marine outfall.

RECOMMENDATION

That the Core Area Liquid Waste Management Committee recommend to the Board:

1. That the McLoughlin Point Stage 2 Environmental Impact Study results be received for information; and

2. That staff be directed to forward the *CRD Core Area Wastewater Treatment Program Stage 2 Environmental Impact Study* by WorleyParsons to the Ministry of Environment.

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Attachments: 2

EXECUTIVE SUMMARY

Background

WorleyParsons was retained by the Capital Regional District (CRD) to complete the pre-discharge monitoring studies and marine component of a Stage 2 Environmental Impact Study (EIS) under the BC Municipal Wastewater Regulation (MWR) for the CRD Core Area Wastewater Treatment Program (CAWTP). The CAWTP will result in the cessation of screened wastewater effluent discharge from the Macaulay Point and Clover Point outfalls and the commencement of the discharge of secondary treated domestic wastewater from a new McLoughlin Point outfall. The proposed outfall will terminate approximately 150 m east of the existing Macaulay Point outfall diffuser. An EIS associated with the McLoughlin Point-Hartland facilities terrestrial environment was conducted separately from this report by Westland Resources Group in 2010.

In 2006 the British Columbia Ministry of the Environment (MOE) mandated that the CRD implement secondary wastewater treatment to comply with present day legislation and minimum standards for wastewater treatment. Since that time, the CRD outlined the proposed wastewater treatment program in the Core Area Liquid Waste Management Plan (LWMP). Their proposed program includes three main capital projects: a secondary treatment facility at McLoughlin Point, a biosolids and energy facility and a marine outfall. The capital projects are expected to be in operation by 2018.

To advance the CAWTP, the CRD commissioned a two-stage EIS for the proposed discharge. Stage 1 of the EIS was completed in 2009 by Golder Associates. Stage 1 described the receiving environment including water quality, receiving environment uses and ecological resources. The effluent was characterized including the proposed flow and quality and points of discharge. The effluent plume was modelled in the receiving environment and anticipated environmental impact was assessed.

This Stage 2 EIS refines the results of the Stage 1 study by using site specific receiving environment data and updated wastewater system design characteristics. The scope was based on the requirements of an expanded scope EIS for discharges to marine waters with maximum daily effluent flow greater than 10,000 m^3/d as outlined in the *Environmental Impact Study Guideline*.

The proposed CAWTP will implement secondary treatment for wastewater flows up to two times the average dry weather flow (ADWF) of 215.6 ML/day. Flows between 2 x ADWF and 3 x ADWF from the Clover Point catchment area and between 2 x ADWF and 4 x ADWF from the Macaulay Point catchment area will receive primary treatment from the new WWTP prior to discharge through the new McLoughlin Point outfall. Flows above 3 x ADWF from the Clover Point catchment area will be screened and discharged through the Clover Point outfall. Flows above 4 x ADWF from the Macaulay Point catchment area will be screened and discharged from the Macaulay Point outfall.

Receiving Water

The receiving water off southern Victoria is used for recreation and has important marine fisheries resources. The Juan de Fuca Strait supports a number of ecologically, economically and culturally important invertebrates. Crab, shrimp, prawn, octopus, squid, red sea urchin and shellfish (swimming scallops, geoduck, cockles, mussels, and oysters) are documented in the marine project area. Some of the significant fish species known to occur in the McLoughlin Point discharge area include all five Pacific salmon species (Coho, chum, Chinook, sockeye and pink), cutthroat and steelhead trout, Pacific herring, lingcod, dogfish, flatfish (sole and halibut), rockfish and Pollock. Potential rockfish habitat has been documented in the vicinity of Albert Head. Marine mammal presence in the area includes harbour seal, California sea lion and steller sea lion, Dall's porpoise, harbour porpoise and killer whale. Migratory gray whale, humpback whale and minke whale may also be present in the summer.

A variety of recreational activities occur in the marine waters near the proposed McLoughlin Point outfall. Primary contact activities tend to be conducted along the shore and near shore areas. Activities such as swimming, wading, diving, skim boarding and paddle boarding are conducted near shore, while kayaking, outrigger canoeing, kite surfing, and wind surfing may occur further offshore.

Pre-Discharge / Baseline Sampling

An inventory of baseline sediment chemistry, sediment toxicity, sediment benthic community and seasonal water quality and water column profiles was collected as part of this EIS. The results of the field investigations provide a foundation for dilution modelling of the proposed discharge, the environmental impact assessment and post-discharge receiving environment monitoring program.

Water Quality

Quarterly water quality and water column profile data was collected under the pre-discharge monitoring program (PDMP) from July 2010 to June 2012. This program included the collection of the following site specific microbiological, chemical and physical characteristics: water quality, water column profiles and current profiles. Pre-discharge monitoring was conducted off Albert Head, McLoughlin Point and one reference location, Finnerty Cove. Water column profiles measured temperature, salinity, pH, dissolved oxygen (DO) and turbidity. Temperature and salinity profiles provide ambient density characteristics used in the dilution modelling of the effluent plume. The measured turbidity of the receiving environment was low (clear water) during all sampling events.

Oxygen concentrations did not meet either of the BC water quality guidelines for DO (30-day means of 8 mg/L and instantaneous minimum of 5 mg/L) at all stations including the reference station FC-7. For cases where natural DO concentrations do not meet water quality guidelines, a statistically significant reduction below natural levels is not permitted.

Given that wastewater discharges occur within the vicinity of the baseline monitoring program, with the exception of the reference station (FC-7), where low DO concentrations were also measured, the low DO conditions could be natural or result from anthropogenic influences. However, given that low DO

concentrations (< 5 mg/L) at depth were observed, DO concentrations in the receiving environment should continue to be monitored.

Water quality sampling was conducted for a wide range of parameters including microbiological indicators, conventional properties (physical, nutrients, anions), metals, organics and hormones and sterols. The analysis of microbiological indicators (fecal coliforms and *Enterococci*) found levels above either or both of the shellfish harvesting and recreational guidelines occurred at all stations except the reference station (FC-7). Concentrations of both indicators were within guidelines at the reference station FC-7.

Median and 90th percentile microbiological shellfish harvesting guideline exceedances were measured at every station, except for the reference (FC-7). Mean primary contact recreational guidelines exceedances were measured at MP-4 and MP-5, while maximum primary contact recreational guideline exceedances were measured at AH-2, MP-4 and MP-5. Mean secondary contact recreational guideline exceedances were measured at MP-4.

Conventional parameters were within applicable guidelines with the exception of fluoride which was measured at the guideline limit on several occasions. Trace metal concentrations were analyzed at three stations during all sampling events. When compared against BC and CCME water quality guidelines the measured concentrations were below applicable guidelines for the protection of marine aquatic life, with the following exceptions:

- Copper: a single exceedance of maximum allowable concentration was measured at AH-2 mid water sample during the winter 2012; and,
- Zinc: the maximum allowable concentration was exceeded in the AH-2 mid water sample during the winter 2012 sampling event and in the reference station FC-7 surface sample in the fall 2010.

The source of the copper and zinc exceedances is unknown. These infrequent elevated concentrations may be natural anomalies or potentially introduced through field sampling (e.g. the exterior of the sampling equipment is equipped with some brass (alloy of zinc and copper) components.

Organic constituents (Group 1 and 2) and analysis of hormones and sterols were measured in bottom samples at three stations, during the winter and summer sampling event. The vast majority of the results were below the method detection limit and all were below the applicable water quality guidelines.

Sediment Quality

Pre-discharge sediment samples were collected in the vicinity of Albert Head in 2010. In 2011, sediment samples were collected off of Macaulay and McLoughlin Points, with reference stations at Parry Bay and Finnerty Cove. The sediment component of the PDMP included collection of the following site specific biological, chemical and physical characteristics: sediment chemistry, benthic toxicity and benthic bioaccumulation.

Results were compared to applicable provincial contaminated sites criteria and national CCME marine sediment quality guidelines where available. Marine sediment guidelines and/or criteria exist for total

metals, PAHs, organochlorinated pesticides, a pentachlorophenol and PCBs. The remaining analytes have no relevant provincial sediment quality criteria or federal sediment quality guidelines.

Four total metals and 14 PAHs exceeded sediment quality guidelines and/or criteria at stations east of the existing Macaulay Point outfall. There were no sediment quality guideline and criteria exceedances measured at the reference stations at Finnerty Cove and Parry Bay. Total metal concentrations of chromium, lead and zinc were within sediment quality provincial criteria and federal guidelines. Total metal criteria and guidelines were exceeded for arsenic, cadmium, copper and mercury. Cadmium concentrations exceeded the BC MOE contaminated sites criteria (sensitive) at two stations in the vicinity of the proposed outfall and the CCME PEL guideline at a single station in the vicinity of the proposed outfall. Concentrations of arsenic, copper and mercury were measured above the CCME ISQG, but below the less stringent CCME PEL and both the BC MOE contaminated sites criteria.

PAH criteria and guideline exceedances were measured at all of the stations within the vicinity of the proposed outfall. Measured PCBs with sediment quality criteria and/or guidelines (aroclor 1254 and total PCBs) were less than their detection limits and within the sediment quality limits at all stations. Organochlorinated pesticides were measured below sediment quality criteria and/or guidelines or below the method detection limits. Pentachlorophenol concentrations were within sediment quality criteria.

Toxicity and bioaccumulation tests were completed on samples collected from eight sampling stations. Results found a statistically significant decrease in mean survival for the *Eohaustorius estuaries* 10-day survival test as compared to the laboratory control, in sediment samples from the three stations within 800 m of the Macaulay point outfall. No statistically significant difference in mean survival between the test sediments and the laboratory controls were observed in a *Neanthes arenaceodentata* 20-day growth and survival test. However, statistically significant decreases in individual dry weights and mean growth rates were measured between the laboratory control test sediments from five stations within the vicinity of the proposed outfall.

The bioaccumulation test determines the bioaccumulation potential of contaminants in polychaete *Nereis virens*. Concentrations of arsenic and copper (in the polychaetes) were lower than the T=0 concentrations at all stations. Concentrations of cadmium were higher at stations M1E and the reference station PB1 in comparison to T=0, while all other cadmium concentrations were either lower or showed no statistical difference between the T=0 and the 28 day result. Mercury concentrations were below the detection limit of the analysis for all REM stations, and no statistical differences in the Mercury concentrations were measured as compared to T=0. Concentrations of cadmium were slightly higher in the M1E, M2E, M8E and the reference station PB1 test results in comparison to the T=0 results.

Benthic Infauna

Benthic infaunal samples were collected and analyzed for all of the sediment sample locations. Summary biotic factors calculated for the 2010 Albert Head and 2011 stations included abundance of all size groups, abundance of major taxonomic groups, number of taxa, organic biomass, production and mean organism size, sampling precision, the Shannon-Weiner (H'), Simpson's (1-D) and the Swartz Dominance Index (SDI). In addition, comparisons were made of summary abundance; biomass and taxa number overall for the 2010 Albert Head data, 2011 pre-discharge data and historical Macaulay Point monitoring stations (M1E, M2E, M8E and PB1). Production/biomass estimates for each sample location were calculated and compared with predicted ranges for similar habitats, as well as 95th percentile values for 30-90 m depth the Strait of Georgia/Juan de Fuca background database were compared with values for the 2010 and the 2011 stations. Cluster analyses using Bray-Curtis similarity, along with significance and power testing of cluster groups were applied to total abundance composition, total organic biomass composition, proportional trophic composition and proportional size class composition for all samples, as well as for abundance composition of the 4 historical Macaulay Point monitoring stations from 2003-2011.

Comparison of the Albert Head 2010 and Macaulay/McLoughlin Point 2011 data showed that fauna were not significantly distinct between stations within each survey area, but were clearly distinct between the two survey areas. In addition, based on the existing sampling methodologies, it could be concluded that faunal composition has not changed significantly in the four historical CRD stations since 2003. The 2011 faunal composition, abundance, biomass, taxa number, and contribution from the smallest and largest fauna were different from that of the Albert Head 2010 samples. As a result, most of the 2011 samples were below 95th percentile thresholds for biomass and production. These differences are likely due to variations in sampling methodology between the two studies rather than solely attributable to the outfall discharge.

The benthic faunal patterns and composition were not predictable by either natural habitat conditions, or by sediment metals. Most of the stations had metal contaminant levels within expected background ranges, except for the two 2011 stations closest to the Macaulay Point outfall (M1E and M2E). Results suggest that other than potential biotic effects related to deposition from the Macaulay outfall, infaunal structure in the overall region appear to be relatively homogeneous, given consistent sampling methodology.

Proposed McLoughlin Point Outfall Configuration

The proposed McLoughlin Point outfall will extend offshore approximately 2 km with a 200 m long multi-port diffuser in approximately 61 m water depth. The diffuser concept consists of 33 vertical 200 mm diameter ports.

Dilution Modelling and Impact Assessment

Dilution modelling of the proposed discharge was completed for summer and winter conditions under WWTP normal operation and failure scenarios. The summer condition considers an ADWF and storm

event, which is within 2 x ADWF. The winter condition considers a wet weather flow and storm event, which is above 2 x ADWF.

Key results from the dilution modelling exercise determined:

- the effluent will be discharged to a well flushed marine environment which is not considered embayed as defined by the MWR;
- the minimum dilution at the edge of the Initial Dilution Zone (IDZ) (throughout the water column) to be 108:1, which would occur under summer conditions; and,
- the minimum dilution at the surface is predicted to be 292:1, which would occur under winter conditions;

Modelling of microbiological indicators predicts that recreational water quality guidelines will be achieved throughout influenced recreational waters. Occasional, short duration, low magnitude exceedances are predicted primarily at offshore areas near the outfall diffuser where primary contact would not be expected to occur.

The recreational water quality guideline of 200 cfu/100 mL would be exceeded under summer conditions at the surface within about 300 m of the outfall diffuser approximately 2% of the time. Under winter conditions, fecal coliform concentrations above 200 cfu/100 mL (up to 1,400 cfu /100 mL) at the surface were predicted to occur within approximately 500 m of the McLoughlin outfall diffuser up to 10 % of the time. In addition, concentrations around 200 cfu / 100 mL at the surface were predicted occasionally near Trial Island and east toward Chatham and Discovery Island under winter conditions.

A “slight episodic” risk of shellfish contamination at Chatham and Discovery Islands was predicted for both summer and winter conditions. The maximum concentration on the west shore of Discovery Island in Plumper Passage was predicted to be approximately 40 cfu /100 mL. This exceeds the median water quality guideline of 14 cfu /100 mL but not the 90th percentile guideline of 43 cfu /100 mL. Fecal coliform concentrations greater than 14 cfu /100 mL were predicted following a storm event and a potential overflow from the Macaulay Point and Clover Point outfalls. For this reason, it is recommended that receiving environment monitoring include water quality monitoring stations at Chatham and Discovery Islands.

The proposed system design is expected to provide adequate protection of human health and shellfish resources. Disinfection should not be required, but may need to be implemented in the future based on receiving environment monitoring results if it is determined that water quality guidelines are not being achieved at receptor sites (e.g. commonly used recreational waters and harvestable shellfish areas).

The project will reduce overall nutrient inputs as compared to existing conditions. Primary production is light-limited in Juan de Fuca Strait, therefore nutrient loading is not predicted to stimulate algal production. Advanced treatment for nutrient removal is not expected to be required to achieve acceptable water quality.

There will be adequate protection of aquatic marine resources as relevant water quality guidelines for the protection of aquatic life will be achieved at the boundary of the IDZ. Potential cumulative effects of

discharging CRD Core Area wastewater to the marine environment will be mitigated by a significant reduction in contaminant loadings to the receiving environment. For the predicted 2030 ADWF, the proposed treatment program is anticipated to reduce the net loadings of contaminants by the following amounts, in comparison to screened effluent:

- biochemical oxygen demand by 6,217 tonnes/year;
- total suspended solids by 7,441 tonnes/year;
- copper by 2,676 kg/year;
- mercury by 3 kg/year;
- benzo(a)pyrene by 3 kg/year;
- pyrene by 4 kg/year; and,
- phenol by 529 kg/year.

The proposed discharge of secondary treated wastewater from a new McLoughlin Point marine outfall is not predicted to result in significant adverse effects to human health or the receiving environment.

Recommendations

A receiving environment monitoring program was recently developed jointly between the MOE and the CRD for the existing Macaulay and Clover Point outfalls. It is recommended that the monitoring program for the existing Macaulay Point discharge be adopted for the proposed McLoughlin Point outfall with some modifications.

Water quality monitoring stations should be re-aligned to be centered over the as-constructed terminus of the proposed outfall. Additional water quality monitoring stations should be added near Trial Island and Chatham and Discovery Islands, where the potential to exceed recreational and/or shellfish guidelines was predicted.

- recommended modifications to the proposed benthic infaunal surveys include:
- refinement of schedule and timing;
- sediment sampling stations should primarily include existing Macaulay Point outfall sampling stations with the addition of some pre-discharge monitoring stations;
- stable carbon and nitrogen isotope analyses should be conducted;
- bivalve *Axinopsida serricata* with and without a rusty deposit on their shells recorded;
- detailed field sampling and laboratory methods should be compiled in a written manual; and,
- additional benthic invertebrate community data endpoints should be incorporated into program.

It is recommended that one additional year of the finalized sediment portion of the post- discharge receiving environment monitoring program should be executed prior to commissioning the discharge. The pre-discharge water quality data should be supplemented with one year of water quality monitoring at potential receptor locations at Trial, Chatham and Discovery Islands.

MCLOUGHLIN POINT
STAGE 2 ENVIRONMENTAL IMPACT STUDY

OBJECTIVE AND SCOPE

The overall objective of the Environmental Impact Study (EIS) is to determine if the proposed treated wastewater discharge will achieve environmental objectives and regulatory criteria.

The scope of the EIS included:

1. identification of maximum daily and average annual effluent flow, including possible seasonal-only discharge

2. identification of influent and effluent sewage quality: 5-day carbonaceous biochemical oxygen demand, total suspended solids, total phosphorus, ammonia, fecal coliforms, and other parameters of concern identified in the Stage 1 EIS

3. identification of source control measures

4. identification of any existing or proposed nearby discharges, including their quantity and quality

5. an inventory of receiving water uses, fisheries resources, commercial and shellfish leases, recreational and other uses; these will be illustrated on the marine chart or topographical map

6. identification of applicable water quality guidelines at areas of concern

7. identification of the physical meteorological and physical oceanographic setting as it relates to the discharge and dispersion of the effluent plume. This will include:

    (a) accessing and summarizing meteorological data available from Environment Canada
    (b) a historical review of applicable oceanographic data collected in the area of the proposed discharges
    (c) summary of current meter readings and an assessment of the calibration of the dilution/current model used in relation to the measured currents
    (d) summary of conductivity/temperature/depth profiles measured (including temperature, salinity, turbidity, pH, and dissolved oxygen) and their relation to the dispersion of the effluent plume

8. summary and comparison to applicable guidelines of baseline water quality data collected during the Pre-Discharge Monitoring Program (PDMP)

9. summary and comparison to applicable guidelines of baseline sediment quality data collected during the PDMP

10. summary of baseline benthic invertebrate community structure data collected during the PDMP

11. determination of the outfall depth/distance requirement in the Municipal Wastewater Regulation (MSR) by modelling the discharge

12. recommendation of setting an outfall terminus location based on the physical and biological oceanographic

13. estimates of the behaviour of the plume, utilizing computer models, including the initial dilution and subsequent "far field" dilution, and the diffusion and dispersion that will occur from the outfall diffuser during “worst case” conditions

14. estimates of receiving water quality, based on modelling results, at the edge of the initial dilution zone and at any areas of concern (shellfish areas, beaches, spawning and rearing habitat areas, etc.) for the two times average dry weather flow secondary treatment requirement set out in Schedule 3 of the MSR. The predicted water quality will be compared with the applicable water quality guidelines

15. determination of whether secondary treatment requirements will adequately protect human health and the environment, based on study results; otherwise, recommendation for additional treatment or measures; and

16. recommendations for post-discharge effluent and environmental monitoring programs.