



7.0 SITE MONITORING AND REPORTING PROGRAMS

An effective monitoring program provides results to indicate that the facility is working as expected, that mitigation measures are effective, and that unforeseen problems are identified and addressed in a timely manner. The proposed monitoring programs for groundwater, leachate, surface water and geotechnical and related trigger mechanisms during operations are described in detail in the Geology, Hydrogeology & Geotechnical Report accompanying this report. A brief summary of the various components is provided in the following subsections together with a discussion on the proposed monitoring programs related to noise and biology. Facility specific operational monitoring is discussed in the appropriate Appendix.

7.1 Groundwater and Leachate Monitoring

The proposed groundwater monitoring program for the Site has been split into the monitoring program for the processing and treatment facilities north of the Simpson Drain and a monitoring program for the landfill south of the Simpson Drain. The proposed groundwater monitoring program includes maintaining some of the existing monitoring wells, and adding some additional monitoring well locations and LDSCS manholes to supplement the monitoring program. The existing and proposed monitoring locations are shown on Figure 10. In addition to on-Site groundwater monitoring wells, water wells within 500 metres of the Site will be sampled, with consent from the owner, one time prior to starting operations at the facility.

Leachate sampling is proposed at the connection to the leachate pre-treatment facility and from three monitoring wells that will be completed within the leachate collection system. Leachate levels will be measured during each leachate sampling event in each leachate sump and leachate monitoring well in the landfill (as they are constructed in conjunction with the landfill development phasing plan). The leachate monitoring well locations are shown on shown on Figure 10.

The groundwater and leachate monitoring will generally occur three times per year, commencing a year prior to the start of operation, in the spring, summer and fall using the comprehensive list of parameters one time (plus hardness and a full VOC scan, including 1,4-dioxane) and the reduced list (plus manganese, TKN, potassium and hardness) the other two times as outlined in O.Reg. 232/98 (MOE, 1998a). The monitoring wells located along the downgradient side of the LDSCS will be sampled only during the spring and fall sessions.

Water levels in the LDSCS manholes will be checked quarterly. This information will used to gain an understanding of the rate of groundwater inflow to the system, and to determine an appropriate frequency of water level monitoring, sampling and pumping in subsequent years.

7.2 Surface Water Monitoring

Run-off from completed Site areas flow to stormwater management ponds, which is then directed to on-Site ditches or the Simpson Drain. There are three discharge points from the Site at the eastern property boundary. The surface water sampling stations are located at each of these discharge points as well as from the Simpson Drain as it enters the Site at the western property boundary. The sampling locations are shown on Figure 10. Surface water monitoring will include an estimate of flow, where appropriate, and the collection and analysis of surface water samples. The frequency of sampling is proposed to coincide with the groundwater monitoring program in the spring, summer and fall, with one additional sampling session to occur after a heavy rainfall event. Collected samples will be analyzed for the comprehensive list of parameters one time and the reduced list on the other two times as outlined in O.Reg. 232/98 (MOE, 1998a). Surface water monitoring will begin in



2014 to increase baseline data. Monitoring locations BSW10 and BSW11 will be removed from the program once the landfill becomes operational.

7.3 Biological Monitoring

Alteration of the surface water regime has the potential to affect streamflow in downstream sections of aquatic systems associated with watercourses and ditches with the Site. Changes in flow downstream could affect fish habitat by reducing the amount of habitat, increasing the deposition of fines and decreasing the amount of in-stream vegetation for cover. Although it is expected that these changes in flow will be minimal and not ecologically important, a surface water monitoring program should be implemented to confirm the surface water regime post-development and to make any appropriate adjustments to the operation of the stormwater control system.

Benthic invertebrate community samples will be collected every two years. To be able to compare the monitoring results to the baseline data, the samples will be collected and analysed in the same manner, and the descriptors of the benthic invertebrate community will include taxa presence/absence, taxa richness, and percent dominance at each sampling station. Because benthic invertebrates live their entire aquatic lives on, or in, the sediments, they tend to be relatively sensitive to changes in the sediments such as contaminant loadings. This sensitivity can result in changes in community composition, abundance, and trophic structure over time. These community changes can represent long-term trends in water quality. The need for continued monitoring during the post-closure period would be evaluated during the development of the detailed closure plan. Sediment samples at the same survey stations will also be collected and analysed. Benthic and sediment monitoring is recommended at sampling stations B5, B6, B8, B9, and downstream of B5 and B7.

Monitoring for barn swallow, following the creation of the new habitat, will be conducted for a period of three years and a mitigation and restoration record will be maintained for an additional two years, following the requirements of O. Reg. 323/13.

As part of the closure plan, and dependent of course on the final end use for the Site, a rehabilitation plan should be developed and implemented to re-establish vegetation communities in the project footprint. A mix of native species should be planted in order to establish a natural, native community post-closure. The vegetation cover will be surveyed to monitor its success. If there are deficiencies, such as weed encroachment, dead plants or evidence of erosion, the cover should be supplemented with additional plantings of the most successful species.

7.4 Noise Monitoring

As part of the application for approval under Part V of the EPA, Taggart Miller will carry out noise monitoring in accordance with MOECC procedures. Taggart Miller proposes to monitor noise levels annually during peak operations during the initial period of Site operations; modifications thereafter would be determined in consultation with MOECC. The noise monitors will log acoustic data every hour for the duration of the monitoring period. At a minimum, the data will include hourly L_{eq} and L_{90} sound levels. If possible, monitoring will be carried out at or near POR02 and POR03, as defined in Section 4.3.2 and shown on Figure 11. It is proposed that the monitoring period last for 48 hours.

At the completion of the monitoring period, a summary document will be prepared and provided to Taggart Miller. The document will summarize the noise monitoring results at each location. The noise monitoring program requirements will be reviewed annually and any modifications will be proposed to the MOECC for their consideration. The document will be included in the annual monitoring and operations report.



7.5 Dust Monitoring

To complement the Dust Management Plan for the CRRRC, a dust monitoring program was developed. The objective of the dust monitoring program is to:

- Verify effects predictions, and compare actual with predicted effects;
- Confirm effectiveness of mitigation measures, and in doing so determine if alternate mitigation strategies are required; and,
- Provide information for use in adaptive management to address potential unforeseen effects.

A one-time sampling of unpaved and paved road silt loadings will be collected to confirm emission estimates. Property line dust monitoring at the CRRRC will be conducted using dust fall monitors. A minimum of two monitoring stations (one located upwind and one located downwind of the CRRRC) will be established. The dust monitoring will occur after operational start up during the summer season (June to September) for two summer seasons.

The sampling will occur as per the National Air Pollution Surveillance Program (NAPs) schedule and performed following the guidance of the *Operations Manual for Air Quality Monitoring in Ontario* (Operations Manual) (MOE, 2008) by the MOECC Operations Division Technical Support Section (PIBS 6687e). If off-property adverse dust impacts are recorded, the need for more intensive monitoring will be assessed.

There are a number of factors that contribute to the generation of fugitive dust. Through the Dust Management Plan, preventive measures will be implemented to reduce the potential for dust generation and mitigative measures will be implemented to remedy concerns. In order to track the success of the preventive and mitigative measures, a log of the following aspects of Site operation will be maintained:

- Application of aggregate to unpaved roads – a record will be kept of the date of each application of aggregate to unpaved roads.
- Road watering or application of dust suppressants – a record will be kept of the date and time of each road watering event. This will help, in the event of off-property impacts, to determine if increased road watering is a feasible mitigation measure.
- Site inspection – once a week a site inspection will be conducted to monitor general site operations, including compliance with posted speed limits, track out of dust and dirt onto public roadways, the efficacy of dust mitigation activities and any potential concerns with regards to fugitive dust.
- Truck traffic – a record will be kept of the number of trucks coming on-Site each day. This record can tie into the daily waste receipt recording.
- Truck weights – a record will be kept of the weight of trucks coming on-Site each day and the weight upon leaving. This record can tie into the existing record keeping within the scale house.

These records will form the basis for any required refinement of the emission estimation for the Site.



7.6 Geotechnical Monitoring

A geotechnical monitoring program will be implemented for the purposes of:

- Confirming that the performance/behaviour of the underlying foundation soils is consistent with those expected based on the geotechnical investigation program and analyses, to thereby confirm the applicability of the design recommendations provided; and,
- Provide the information needed to optimize the design and/or operation of the landfill, as construction and filling progress.

The following monitoring components are recommended:

- Subgrade settlement monitoring;
- Unit weight of the as-placed waste; and,
- Lateral displacements of the silty clay beneath the perimeter berm of the landfill should be monitoring by means of inclinometers; and surface survey point/monuments.

It is also proposed that the rate of porewater pressure dissipation in the underlying clay be monitored by means of vibrating wire piezometers installed at the time of landfill cell construction at various depths in the upper portion of the silty clay deposit.