

*United States and State of Ohio v. Northeast  
Ohio Regional Sewer District*

**Appendix 2 to Consolidated Fifth Amended  
Consent Decree**

**Post-Construction Monitoring  
Program**

## Appendix 2 - Post-Construction Monitoring Program

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### **2.1 Introduction**

The purpose of the Post-Construction Monitoring Program (PCMP) is to verify that projects constructed as part of the Long Term Control Plan (LTCP) meet the Performance Criteria stipulated in Appendix 1 and the water quality goals established during the development of the CSO Phase II Facilities Plans for the Easterly, Westerly and Southerly combined sewer Districts. Terms used in this Appendix that are defined herein, or in the Consent Decree or any other Appendix thereto shall have the meanings assigned to them in such documents.

NEORSD developed LTCPs for systems tributary to the Easterly, Southerly and Westerly wastewater treatment plants. NEORSD's CSO program was developed with water quality monitoring and modeling components in order to identify water quality impairments attributable to wet weather discharges from the system. The results of these studies were coupled with extensive hydrologic and hydraulic modeling activities to understand the systems' response to wet weather events. In order to calibrate these models, NEORSD also completed several flow monitoring programs to quantify sewer flows. These monitoring programs, model development and application as well as evaluation of control alternatives to meet water quality goals were completed with specific LTCP project recommendations.

The last series of these studies was completed in March 2002 as required by the CSO NPDES Permits for the Easterly and Southerly combined sewer service areas. Following the submission of these plans NEORSD has continued with the design and construction of some of the recommended facilities including early action projects in the Westerly, Easterly and Southerly Districts, and an initial LTCP project in the Easterly District. In addition, NEORSD engaged in negotiations with the United States and Ohio EPAs and the U.S. Department of Justice to agree upon a consent decree that would govern the scope and implementation schedule of the remaining LTCP recommendations.

The recommended LTCP projects depicted in Appendix 1 (treatment facilities, tunnels, pump stations, relief sewers, etc.) comprise “Gray Infrastructure” control measures. In addition, NEORSO will also be developing “Green Infrastructure” control measures for wet weather control providing stormwater inflow reduction and/or detention to reduce overflow volumes. These control measures have not been developed in terms of location and type(s) of Green Infrastructure control measures although the general Performance Criteria and conditions for the program are outlined in Appendices 3 and 4. It is NEORSO’s intent to implement these Green Infrastructure control measures subsequent to a Green Infrastructure Feasibility Study and concurrent with the LTCP projects as a means to provide additional CSO control and provide for credits where Green Infrastructure can be substituted for Gray Infrastructure control measures, in whole or in part, in accordance with the provisions governing Tier 1b and Green for Gray substitutions under the Consent Decree. If this objective is accomplished, the projects selected will complement the LTCP projects and would be integrated into the PCMP monitoring and evaluation for both the Gray and Green Infrastructure components.

The main elements of the PCMP include the following:

- A process to determine whether the CSO control measures are meeting the Performance Criteria identified in Appendix 1.
- A process for assessing environmental benefits attributable to the CSO control measures.
- A monitoring schedule, initial sampling locations, associated monitoring, modeling procedures to collect data related to the Performance Criteria, and the impacts from CSOs on *E. coli* levels in CSO impacted receiving streams and Lake Erie; and
- Evaluation and analysis of the monitoring data to determine whether CSO control measures are achieving desired outcomes and for reporting progress to the regulatory agencies and general public.

### **2.1.1 Regulatory Requirements**

U.S.EPA requires CSO communities to conduct a post-construction monitoring program during and after LTCP implementation “to help determine the effectiveness of the overall program in meeting [Clean Water Act] requirements and achieving local water quality goals.”<sup>1</sup> This program should collect data that measure the effectiveness of CSO controls and their impact on water quality, and should utilize existing monitoring stations used in previous studies of the waterways and sewer system in order to compare results to conditions before controls were put in place. The program should include a map of monitoring stations, a record of sampling frequency at each station, a list of data to be collected, and a quality assurance/quality control (QA/QC) plan.

In U.S.EPA’s December 2001 Report to Congress: Implementation and Enforcement of the Combined Sewer Overflow Control Policy, the agency noted the difficulty of establishing a monitoring and tracking program for CSO control programs. “Monitoring

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<sup>1</sup> *Combined Sewer Overflows, Guidance for Long-Term Control Plan* (EPA 832-B-95-002, August 1995) p. 4-15.

programs need to be targeted and implemented in a consistent manner from year to year to be able to establish pre-control baseline conditions and to identify meaningful trends over time as CSO controls are implemented,” the report said. “In practice, it is often difficult, and in some instances impossible, to link environmental conditions or results to a single source of pollution, such as CSOs. In most instances, water quality is impacted by multiple sources, and trends over time reflect the change in loadings on a watershed scale from a variety of environmental programs.” The report also noted that weather conditions and rainfall totals vary significantly from storm to storm and year to year, making comparisons difficult.

### 2.1.2 Purpose and Scope

The Post-Construction Monitoring Program will collect data needed to document receiving streams and Lake Erie improvements that can be attributed to the implementation of the control measures identified in the LTCP, to evaluate whether CSO control measures have met the Performance Criteria, and whether NEORSD’s CSOs comply with the NPDES permits. In order to enable comparisons to historic data, NEORSD will integrate the required CSO post- construction monitoring program into its current monitoring programs. The general scope of the post-construction monitoring program will include preparation and execution of the monitoring plan, as well as evaluation of the effectiveness of CSO control measures. The combined sewer districts included in this plan include the Easterly, Southerly and Westerly Districts. The following receiving waters are covered by this PCMP - Lake Erie, Cuyahoga River, Big Creek, Burke Brook, Doan Brook, Dugway Brook, Euclid Creek, Green Creek Culvert, Kingsbury Run, Morgana Run, Nine Mile Creek, Rocky River, Shaw Brook Culvert, West Creek, Spring Creek and Treadway Creek. The monitoring program has been developed based upon the following scope of work:

- Document Current Baseline Conditions: During the CSO Phase II Facilities Plans for the Easterly, Southerly and Westerly Districts, NEORSD performed a comprehensive assessment of the baseline conditions for CSO frequency and volumes for the “Typical Year,” as defined in the CSO Phase II Facilities Plans for the Easterly, Doan Valley, Southerly and Westerly Districts, as well as baseline conditions for water quality within the receiving streams and Lake Erie. These assessments will be used as the baseline conditions for comparing the post-construction performance of the various control measures within the LTCP.
- Identify Parameters of Concern: NEORSD evaluated CSO control measures to analyze their ability to improve receiving streams and Lake Erie water quality for specific parameters of concern. During the development of the LTCPs and subsequent discussions with the U.S. EPA and Ohio EPA, NEORSD identified *E. coli* bacteria as the main parameter of concern. NEORSD will use *E. coli* bacteria to measure the effect of its LTCP CSO control measures on its receiving streams and Lake Erie.
- Prepare and Execute Post-Construction Monitoring: The monitoring program will evaluate whether specific CSO control measures are performing as designed and

constructed to meet its Performance Criteria. The program will identify how NEORSD will collect data needed to document receiving waters improvements and any pollutant reduction achieved through implementation of these control measures. Sections 2.2 through 2.5 further describe NEORSD's PCMP.

- **Report results to State and Federal Agencies:** The results of the PCMP will be reported to the U.S. EPA and the Ohio EPA. Upon completion of each CSO control measure, NEORSD will prepare a Control Measure Report that evaluates whether the constructed projects that comprise that Control Measure have achieved the desired results. Section 2.6 presents NEORSD's approach for tracking and reporting on the achievement of Performance Criteria described in Appendix 1.
- **Provide Public Information on Water Quality:** Information from the monitoring program will be available to the general Cleveland area public and interested parties. This information will allow the public to be informed and educated relative to NEORSD's water quality improvement programs and water quality issues.

## **2.2 Performance Criteria**

The Performance Criteria developed during the CSO Control Program by NEORSD were based on number of overflows per a "Typical Year." The original LTCP recommended numbers of overflows that have been updated through subsequent discussions with the U.S. EPA and the Ohio EPA. Appendix 1 shows the Performance Criteria for the various control measures comprising the current LTCP, design criteria, critical milestones and provides information on outfalls controlled.

## **2.3 Post-Construction Monitoring and Data Collection**

An important element of the PCMP is the type, location and frequency of monitoring. The intent is not to replicate the extent of intense monitoring that was performed during the development of the LTCP. To the extent possible, these monitoring locations will be used again for the performance monitoring. The difference is that density of monitoring locations will be reduced; however, the duration of monitoring will likely be longer on average than what was done during the planning phase. These locations will be reviewed prior to installation of new monitoring for the PCMP. This section describes the various types of monitoring to be performed.

Flow and activation monitoring will be performed for a one-year post-construction monitoring period following "Achievement of Full Operation" for each control measure as indicated in Appendix 1 and discussed in Section 2.3.1, and CSO activation monitoring will again be performed for a one year period following implementation of all Control Measures for each district (Easterly, Southerly, Westerly).

In-stream monitoring will be performed on a continued system-wide basis for the duration of the LTCP implementation beginning at the Achievement of Full Operation of the first control measure to monitor stream improvements over time, as discussed in Section 2.3.2.

General performance criteria and monitoring approaches for the green infrastructure projects will be integrated into the PCMP during planning of the green infrastructure projects as discussed in Appendices 3 and 4.

### **2.3.1 Flow Monitoring**

Numerous temporary flow monitors were installed during the development of the CSO LTCP to calibrate the hydraulic models. These monitors have since been removed. NEORSD will install flow and/or activation monitors at numerous locations and utilize, where applicable, existing permanent flow meters to validate and calibrate the models, as described in Section 2.4.1, during the post-construction phase of the CSO control measure implementation. These locations were considered to reflect overflow monitoring in all priority outfall locations, including at least one CSO location within each control measure and represent the CSOs contributing 86% of the current baseline CSO volume and 96% of the CSO volume expected following implementation of the CSO controls required by this Consent Decree. These locations are listed in Table 2.2. CSOs not monitored have remaining volumes less than 1 MG each.

The flow meter locations listed in Table 2.2 are identified by outfall. However, the actual flow monitors would be placed within the new diversion structures that divert flow to either the associated control facility (i.e., tunnel, storage tank, etc.) or the CSO outfall if the capacity of the control measure is exceeded. These diversion structures are situated downstream of the combined sewer regulator structures, on the outfall conduits. When the control facility exceeds its capacity, these structures divert overflow to this existing conduit, and a flow monitor would be placed within this structure to measure these overflows. For some outfalls, such as the Dugway Brook (CSO-230), multiple diversion structures would be constructed upstream of the permitted outfall location diverting flow to the control facility. In these cases, each diversion structure would be equipped with a flow monitor to measure the total overflow activation event in a cumulative manner. These locations will be confirmed and additional monitoring will be performed as deemed necessary as the program design advances to ensure that the appropriate data to validate and/or calibrate the model and subsequently prove achievement of the Performance Criteria is collected. Augmentation of the monitoring locations will proceed with approval from Ohio EPA and U.S. EPA.

Planning, design and construction of the control measures will take place over several years. Consequently, the dates for “Achievement of Full Operation” will vary by project. Appendix 1 summarizes the Achievement of Full Operation for these control measures, which is the year that would initiate the post-construction monitoring for each control measure, and how the CSO control measures in Appendix 1 will be assessed. NEORSD will perform this evaluation by collecting precipitation and CSO outfall monitoring data for a one-year post-construction monitoring period following Achievement of Full Operation of each CSO control measure as identified in Appendix 1. Following collection system hydraulic model

validation using the selected monitoring data, a “Typical Year” simulation will determine performance relative to the overflow frequency for each control measure.

### **2.3.2 In-stream Monitoring**

NEORSD performed an analysis of water quality conditions, for baseline conditions and for conditions after the implementation of the recommended LTCP projects. This analysis was performed to establish levels of CSO controls that would result in water quality benefits. The analysis was performed primarily through the simulation of fecal coliform bacteria loads in the receiving streams, rivers and lake. The analysis involved the following streams: Big Creek, Burke Brook, Doan Brook, Dugway Brook, Euclid Creek, Green Creek Culvert, Kingsbury Run, Mill Creek, Morgana Run, Nine Mile Creek, Rocky River, Shaw Brook Culvert, West Creek, Spring Creek and Treadway Creek. These streams were modeled and the outputs from these models were used to estimate impacts on either the Cuyahoga River or Lake Erie, or both, depending on which is the downstream receiving water.

The LTCP identified fecal coliform bacteria loads for dry weather, storm water and CSOs. This was done to document the specific contribution of CSOs to violations of the in-stream bacteria standards. Through discussions with the U.S. EPA and Ohio EPA, *E. coli* bacteria were identified as the pollutant of concern to measure during the post-construction monitoring period. NEORSD will measure *E. coli* bacteria counts in order to identify trends in water quality. Biological and other monitoring data (to the extent that these are already being collected by NEORSD) can be used as a check since NEORSD is already routinely monitoring the lake and points along tributary rivers and streams. NEORSD has performed several special lake monitoring projects. Among these are fish tissue sampling, which contributed to the State's basis for issuing safe fish consumption advice, and the ongoing daily sampling at two area beaches for bacteriological analysis, which provides the State's basis for posting safe swimming advice at these locations.

Based on the requirements of the CSO permits issued to NEORSD, in-stream monitoring of biological water quality indicators in Big Creek, Doan Brook, Euclid Creek and Mill Creek have been collected for use in establishing baseline conditions prior to implementation of the recommended CSO LTCP. NEORSD will continue to monitor for *E. coli* in these streams. NEORSD proposes additional sites for *E. coli* monitoring in the Cuyahoga River, Dugway Brook, Nine Mile Creek, Ohio Canal, Rocky River, Shaw Brook, Spring Creek, West Creek and Treadway Creek. These sites are appropriate for the purposes of the Post-Construction Monitoring Program to document achievement of Performance Criteria and to document improvements to water quality over time. These sites are listed in Table 2.2 and illustrated in Figure 2.2. NEORSD may add, modify, remove or relocate monitoring stations, as necessary, during or after implementation of control measures to address any changes that may be necessary as a result of planning, design and construction, provided NEORSD obtains approval from the U.S. EPA and Ohio EPA.



### **2.3.3 Outfall Monitoring for Activations**

Pursuant to the EPA's CSO permit and EPA's CSO Nine Minimum Controls Guidance, NEORSD provides public notification of CSO occurrences at various CSO locations. NEORSD monitors CSO activations on a continuous basis at these locations. NEORSD will continue to monitor and collect this type of data at the relevant locations which are listed in Table 2.2 as "activation only" and illustrated in Figure 2.1 Following implementation of all control measures for each district (Easterly, Southerly, Westerly), NEORSD shall conduct one year of activation monitoring at all CSO monitoring locations listed in Table 2.2. These data will be used to validate the models and demonstrate achievement of the Performance Criteria.

### **2.3.4 Outfall Monitoring for CSO Treatment Facilities**

The current list of projects includes Chemically Enhanced High-Rate Treatment (CEHRT) facilities at the Easterly and Westerly WWTPs to control CSO-001<sup>2</sup> and CSO-002, respectively. These facilities will include monitoring systems to measure *E. coli*, total suspended solids and chlorine residual in the treated effluent to demonstrate achievement of their respective Performance Criteria. In addition, these facilities will monitor the overflows that exceed the peak treatment capacity of the CEHRTs. For informational purposes, NEORSD will also measure CBOD, nitrogen, and phosphorus. The specific monitoring requirements for Westerly CEHRT and Easterly CEHRT are described in Sections 2.3.7 and 2.3.8, respectively.

### **2.3.5 Wastewater Treatment Plant Monitoring**

Routine WWTP monitoring will be used to demonstrate compliance for control measures that require increased secondary capacity in order to eliminate primary effluent bypasses (PEB) (in a Typical Year). PCMP compliance of the increased secondary treatment capacity can be performed within the normal plant monitoring contained in their respective NPDES permits. NEORSD will continue to flow monitor the PEB.

### **2.3.6 Southerly WWTP CEHRT Monitoring and Analysis**

Following Achievement of Full Operation of CM 5-2, NEORSD shall perform the monitoring and reporting activities set forth in Sections 2.3.6.1 through 2.3.6.6, below to collect and provide information necessary to evaluate compliance with the CM 5-2 Performance Criteria, as set forth in Appendix 1, which consist of Numeric Performance Criteria (CM 5-2 Numeric Performance Criteria) for TSS, *E. coli*, and TRC, and Operational Performance Criteria (CM 5-2 Operational Performance Criteria).

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<sup>2</sup> CSO 001 flows are discharged to Lake Erie through an outfall called Station Number 3PF00001002 ("Outfall 002"). Note a of Part I.B.1 of NPDES Permit 3PF00001\*MD issued by Ohio EPA on February 13, 2019, states "[t]he discharge at this station [i.e., Outfall 002] is comprised of CSO 001 and any associated emergency bypass events at the treatment plant headworks."



There are two phases of monitoring and reporting requirements: (a) Phase 1 applies following Achievement of Full Operation of CM 5-2 (CM 5-2 Phase 1 Post-Construction Monitoring Period) until Phase 1 ends as described in the remainder of this paragraph; and (b) Phase 2 applies for the duration of the Consent Decree after the CM-5-2 Phase 1 Post-Construction Monitoring Period has ended (CM 5-2 Phase 2 Post-Construction Monitoring Period). The duration of the CM 5-2 Phase 1 Post-Construction Monitoring Period and the start of the Phase 2 Post-Construction Monitoring Period may be different for TSS, *E. coli*, and TRC. Specifically, the duration shall be consistent with the following:

- The CM 5-2 Phase 1 Post-Construction Monitoring Period for TSS, CBOD, phosphorus, and nitrogen shall last until both: (a) NEORSD has been in continuous compliance<sup>3</sup> with the CM 5-2 Numeric Performance Criterion for TSS for either a one-year length of time after Achievement of Full Operation of CM 5-2 or for the length of time it takes NEORSD to collect 14 Qualifying Samples of discharges from the CEHRT on 14 days for TSS, whichever length of time is longer; and (b) NEORSD provides written notification to the U.S. EPA and Ohio EPA in accordance with Section XVII (Notices) of the Consent Decree that it has collected the required number of Qualifying Samples for TSS and has been in continuous compliance with the CM 5-2 Numeric Performance Criterion for TSS for the required period of time. The CM 5-2 Phase 1 Post-Construction Monitoring Period for TSS, carbonaceous biochemical oxygen demand (CBOD), phosphorus, and nitrogen shall end on the date of the written notification, provided that both of these conditions are met. The CM 5-2 Phase 2 Monitoring Period for TSS shall begin on the day after the date of the written notification and last for the duration of the Consent Decree. NEORSD is not required to monitor for CBOD, phosphorus, and nitrogen during the CM 5-2 Phase 2 Post-Construction Monitoring Period.
- The CM 5-2 Phase 1 Post-Construction Monitoring Period for *E. coli* shall last until both: (a) NEORSD has been in continuous compliance with the CM 5-2 Numeric Performance Criterion for *E. coli* for either a one-year length of time after Achievement of Full Operation of CM 5-2 or for the length of time it takes NEORSD to collect 14 Qualifying Samples of discharges from the CEHRT on 14 days for *E. coli*, whichever length of time is longer; and (b) NEORSD provides written notification to the U.S. EPA and Ohio EPA in accordance with Section XVII (Notices) of the Consent Decree that it has collected the required number of Qualifying Samples for *E. coli* and has been in continuous compliance with the CM 5-2 Numeric Performance Criterion for *E. coli* for the required period of time. The CM 5-2 Phase 1 Post-Construction Monitoring Period for *E. coli* shall end on the date of the written notification, provided that both of these conditions are met.

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<sup>3</sup> The primary purpose of the Phase 1 Post-Construction Monitoring Period is to evaluate whether the CM as designed, constructed, and operated will be able to continuously achieve the Numeric Performance Criteria. During the Phase 1 Post-Construction Monitoring Period, there may be a discharge that is not in compliance with the Numeric Performance Criteria in Appendix 1 and the reason(s) may be unrelated to design, construction, or operation. For the purposes of Appendix 2, the Agencies together may use their discretion and consider NEORSD to be in continuous compliance if such a scenario were to occur. In such a scenario, the Agencies may together allow the use of previously collected Qualifying Samples that met the Numeric Performance Criteria to count towards meeting the required 14 Qualifying Sample requirements. This footnote is applicable to Phase 1 Post-Construction Monitoring Period-related provisions throughout Appendix 2. Any decision by the Agencies to exercise or not exercise discretion in accordance with this footnote is not subject to dispute resolution under this Consent Decree.

The CM 5-2 Phase 2 Post-Construction Monitoring Period for *E. coli* shall begin on the day after the date of the written notification and last for the duration of the Consent Decree.

- The CM 5-2 Phase 1 Post-Construction Monitoring Period for TRC shall last until both: (a) NEORSD has been in continuous compliance with the CM 5-2 Numeric Performance Criterion for TRC for either a one-year length of time after Achievement of Full Operation of CM 5-2 or for the length of time it takes NEORSD to collect 14 Qualifying Samples of discharges from the CEHRT on 14 days for TRC, whichever length of time is longer; and (b) NEORSD provides written notification to the U.S. EPA and Ohio EPA in accordance with Section XVII (Notices) of the Consent Decree that it has collected the required amount of Qualifying Samples for TRC and has been in continuous compliance with the CM 5-2 Numeric Performance Criteria for TRC for the required period of time. The CM 5-2 Phase 1 Post-Construction Monitoring Period for TRC shall end on the date of the written notification, provided that both of these conditions are met. The CM 5-2 Phase 2 Monitoring Period for TRC shall begin on the day after the date of the written notification and last for the duration of the Consent Decree.

#### **2.3.6.1 CEHRT Influent and Effluent Flow Monitoring**

Following Achievement of Full Operation of CM 5-2 and for the duration of the Consent Decree thereafter (i.e., during both the Phase 1 and Phase 2 Post-Construction Monitoring Periods), NEORSD shall continuously monitor influent flow to and effluent flow from the Southerly CEHRT. CEHRT influent flow shall be monitored using flow meters installed upstream of the CEHRT at Primary Influent Channel No. 1 B and the CEHRT effluent flow shall be monitored at PEB Flow Control Chamber B. All flow-based determinations of Qualifying Samples shall be based on the effluent flow rate measured at PEB Flow Control Chamber B. All flow criteria in this Section and in Sections 2.3.6.1 through 2.3.6.6 shall be based on 5-minute interval flow measurement data, collected at the referenced flow measurement locations.

#### **2.3.6.2 Qualifying Samples**

During the CM 5-2 Phase 1 Post-Construction Monitoring Periods, a “Qualifying Sample” shall be defined as:

- Any *E. coli* grab sample of the CEHRT discharge that is collected: (a) in a manner consistent with Section 2.3.6.3, at a time when the CEHRT effluent flow rate was 255 MGD or less; and (b) if the CEHRT effluent flow rate exceeded 255 MGD, the grab sample was collected at least one hour after the CEHRT effluent flow rate returned to and remained below 255 MGD.
- Any composite sample of the CEHRT discharge that is collected: (a) in a manner consistent with Section 2.3.6.3, when the CEHRT effluent flow rate was 255 MGD or less; and (b) if the CEHRT effluent flow rate exceeded 255 MGD, the sample was

collected at least one hour after the CEHRT effluent flow rate returned to and remained below 255 MGD.

- All TRC grab samples of the CEHRT discharge are Qualifying Samples.

During the CM 5-2 Phase 2 Post-Construction Monitoring Periods, a “Qualifying Sample” shall be defined as any grab or composite sample that is collected during a Southerly CEHRT Discharge Event (“Southerly CEHRT Discharge Event” is defined in Section 2.3.6.3) when the discharge flow rate from the CEHRT was 255 MGD or less at all times during the Southerly CEHRT Discharge Event.

### **2.3.6.3 CEHRT Discharge Parameter Monitoring**

#### **CM 5-2 Phase 1 Post-Construction Monitoring**

During the CM 5-2 Phase 1 Post-Construction Monitoring Periods, NEORSD shall collect Qualifying Samples of the CEHRT treated effluent and conduct analysis for TSS, *E. coli*, and TRC (to evaluate compliance with the CM 5-2 Numeric Performance Criteria) and for carbonaceous biochemical oxygen demand (CBOD), phosphorus, and nitrogen (for informational purposes only). NEORSD shall follow its established protocols for collecting, handling, preserving, holding and analyzing samples at the Southerly WWTP and 40 CFR Part 136 when collecting and analyzing samples of discharges from the CEHRT. In addition:

- Grab or composite sample collection in accordance with Section 2.3.6 shall not be required to begin until two hours after the start of Southerly CEHRT Discharge Event to exclude flow due to river intrusion.
- Samples for analyzing TSS, CBOD, phosphorus, and nitrogen shall be collected as two sets of flow-proportioned composite samples per calendar day: (a) the first to characterize CEHRT performance at discharge flow rates from the CEHRT that are less than or equal to 255 MGD; and (b) the second to characterize CEHRT performance at discharge flow rates from the CEHRT that are above 255 MGD. NEORSD shall make every effort to collect representative samples of sufficient volume to allow for analysis for all required parameters. If insufficient sample volume is collected by the composite samplers to allow for the analysis for all required parameters, NEORSD shall prioritize the analysis of TSS before CBOD, phosphorus, and nitrogen.
- Samples for analyzing *E. coli* and TRC shall be collected as one or more discrete grab samples per day of discharge from the CEHRT to characterize CEHRT performance at flow rates less than or equal to 255 MGD and, to the extent possible, above 255 MGD. If a discharge from the CEHRT occurs over the course of two or more calendar days, a minimum of one sample per calendar day shall be collected, except:
  - a) if the discharge begins within the last two hours of any calendar day (i.e., after 10 p.m., but before midnight) no samples shall be collected that calendar day to

account for river intrusion and that discharge shall be considered to have begun on the following calendar day; and

- b) if the discharge begins on one calendar day and ends on the following calendar day within the first two hours of the second calendar day (i.e., after midnight, but before 2 a.m.) and no grab sample has been collected during the second calendar day, the discharge is considered to have ended on the first calendar day, for the purpose of collecting *E. coli* and TRC grab samples.

### **CM 5-2 Phase 2 Post-Construction Monitoring**

During the CM 5-2 Phase 2 Post-Construction Monitoring Periods, NEORSD only needs to comply with the monitoring and analysis requirements described above for TSS, *E. coli* and TRC for Southerly CEHRT Discharge Events, with those requirements further modified as follows:

- A Southerly CEHRT Discharge Event is defined as a CEHRT treated effluent discharge that occurs over the weir at Flow Control Chamber B into the PEB for more than two hours. If a discharge occurs intermittently during a day, starting and stopping several times, it shall be considered the same event. If the discharge occurs on more than one calendar day but is the result of a continuing precipitation event, it should be counted as one event. For the purposes of defining a Southerly CEHRT Discharge Event, a continuing precipitation event is one during which any cessation of rainfall and/or snowmelt is less than 12 hours.
- If at any point during a Southerly CEHRT Discharge Event the discharge flow rate exceeds 255 MGD, then no sampling or reporting is required.

### **NPDES Permit Monitoring in Lieu of CM 5-2 Phase 2 Post-Construction Monitoring**

- CM 5-2 Phase 2 Post-Construction Monitoring requirements for TSS, *E. coli*, and/or TRC apply until both:
  - a) There is an NPDES permit with numeric effluent limitations and monitoring requirements for discharges from the CEHRT for the parameter at issue (TSS, *E. coli*, and/or TRC) that are legally in effect (i.e., the limitations and requirements are not stayed) and those limitations and monitoring requirements do not include, incorporate or otherwise account for flows that do not go through the CEHRT; and
  - b) NEORSD provides written notification to the U.S. EPA and Ohio EPA in accordance with Section XVII (Notices) of the Consent Decree of these facts. The date on which the NPDES monitoring requirements begin to apply in lieu of those described above shall be the date of the written notification, provided both of these conditions are met.

#### **2.3.6.4 Rolling 7-day Arithmetic Mean and Geomean Calculations**

NEORSD shall calculate the rolling 7-day TSS arithmetic means and rolling 7-day *E. coli* geomeans based on Qualifying Samples after there have been at least 7 days of discharge in which Qualifying Samples were collected on each day of discharge for the specific parameter at issue for purposes of evaluating compliance with the CM 5-2 Numeric Performance Criteria as follows:

- The first 7-day arithmetic mean and 7-day geomean will be calculated by taking the arithmetic mean and geomean, respectively, of the Qualifying Samples from each of the 7 days of discharge.
- With each additional day of discharge that has a Qualifying Sample, the rolling 7-day arithmetic means and rolling 7-day geomeans will be recalculated using the most recent 7 Qualifying Samples from the most recent 7 days of discharge.

#### **2.3.6.5 Semi-Annual Reporting**

Following Achievement of Full Operation of CM 5-2 and for the duration of the Consent Decree, NEORSD shall include the following information pertaining to discharges from the CEHRT in the Semi-Annual Progress Reports that it submits in accordance with Section IX (Reporting Requirements) of the Consent Decree for the relevant six-month period:

##### **Tabular Summaries of Monitoring Information:**

Except as provided below with respect to NPDES Permit Report Information, the Semi-Annual Reports shall include a tabular summary of:

- a) all 7-day arithmetic means for TSS and 7-day geomeans for *E. coli* that were calculated in accordance with Section 2.3.6.4 for samples that met the definition of Qualifying Sample;
- b) all TRC analytical results; and
- c) identification of whether each 7-day arithmetic mean, 7-day geomean and TRC analytical result complied with the CM 5-2 Numeric Performance Criteria.

##### **NPDES Permit Report Information In lieu of Tabular Summaries:**

If NPDES permit monitoring requirements apply in lieu of Phase 2 Post-Construction Monitoring Requirements in accordance with Section 2.3.6.3 above, then NEORSD shall provide in the Semi-Annual Progress Reports all monitoring reports and all other notifications and reports required by the NPDES permit for the pollutant(s) at issue to be submitted to Ohio EPA for the CEHRT discharges rather than the tabular summaries described above.

##### **CM 5-2 Phase I Post-Construction Monitoring Information:**

Section 2.3.6 includes monitoring requirements that only apply during the Phase 1 Post-Construction Monitoring Periods. In addition to the tabular summaries and NPDES permit

reports described above, the Semi-Annual Progress Reports shall also include tabular summaries of all of the analytical results that have been obtained in accordance with the sampling and monitoring requirements set forth for the CM 5-2 Phase 1 Post-Construction Monitoring Periods in Section 2.3.6, including:

- a) the date and time each sample was collected;
- b) the concentration of each pollutant parameter;
- c) all applicable analytical results data qualifiers;
- d) CEHRT discharge flow rate at the time each sample was collected;
- e) the maximum CEHRT discharge flow rate for the 60 minutes prior to the time each sample was collected;
- f) date and time of the maximum CEHRT discharge flow rate identified in e, above; and
- g) identification of whether each sample is a Qualifying Sample as defined in Section 2.3.6.2.

#### **2.3.6.6 CM 5-2 Control Measures Report**

In lieu of submitting a Control Measures Report to the U.S. EPA and Ohio EPA for their approval within 24 months of the date of Achievement of Full Operation for CM 5-2 in accordance with Section 2.4.3 of this Appendix, NEORSD shall instead submit a “CM 5-2 Control Measures Report” to the U.S. EPA and Ohio EPA for their review and approval within 12 months of the date that the last Phase 1 Post Construction Monitoring Period for TSS; *E. coli*; and TRC has concluded. The CM 5-2 Control Measures Report shall include the following information collected during all the CM 5-2 Phase 1 Post-Construction Monitoring Periods:

1. A tabular summary of all of the analytical results that have been obtained in accordance with the sampling and monitoring requirements set forth for the CM 5-2 Phase 1 Post-Construction Monitoring Periods in this Section 2.3.6, including:
  - a) the date and time each sample was collected;
  - b) the concentration of each pollutant parameter;
  - c) any applicable analytical results data qualifiers;
  - d) CEHRT discharge flow rates at the time each sample was collected;
  - e) maximum CEHRT discharge flow rate for the 60 minutes prior to the time each sample was collected;
  - f) the date and time of the maximum CEHRT discharge flow rate identified in e, above; and
  - g) identification of whether each sample is a Qualifying Sample as defined in Section 2.3.6.2.
2. A tabular summary of:
  - a) all 7-day arithmetic means for TSS and 7-day geomeans for *E. coli* that were calculated in accordance with Section 2.3.6.4 for samples that met the definition of Qualifying Sample since the date of Achievement of Full Operation for CM 5-2;
  - b) all TRC analytical results; and



- c) identification of whether each 7-day arithmetic mean, 7-day geometric mean and TRC analytical result complied with the CM 5-2 Numeric Performance Criteria.
- 3. For each calendar day that there were discharges from the CEHRT, provide a 24-hour hydrograph that presents the CEHRT discharge flow rate during that 24-hour period and that identifies when each grab and composite sample was collected. Include the following additional elements on each calendar day hydrograph:
  - a) total Southerly WWTP influent flow;
  - b) influent flow into second stage secondary treatment; and
  - c) influent flow into the CEHRT.
- 4. Analytical and field measurement methods used to test each sample for the specific parameter analyzed or measured; copies of all field logs and bench sheets; copies of all chain of custody forms; copies of all final analytic laboratory reports; and copies of all records that contain any manual flow-weighted (a.k.a., flow-proportioned) compositing calculations, if any.
- 5. For each Southerly CEHRT Discharge Event, a description of all operational problems encountered during the Event, all remedies taken to address those operational problems, and a summary of all CEHRT chemical dosages used throughout the Southerly CEHRT Discharge Event.
- 6. For any CM 5-2 Phase 2 Post-Construction Monitoring conducted prior to the date of the end of the last CM 5-2 Phase 1 Post-Construction Monitoring Period the following information shall be included in the CM 5-2 Control Measures Report: all information listed in Section 2.3.6.5 and an assessment of whether those CM 5-2 Phase 2 analytical results are consistent with the CM 5-2 Phase 1 analytical results for the same parameter.

The CM 5-2 Control Measures Report that NEORSD submits to the U.S. EPA and Ohio EPA for their approval in accordance with this section need not include information relevant to assessing compliance with the PEB Discharge Frequency Limits Performance Criteria for CM 5-2. Instead, that information will be included in the Control Measures Report that NEORSD submits to the U.S. EPA and Ohio EPA for their approval within 36 months of the date of Achievement of Full Operation of the last Southerly CSO Control Measure as described in Section 2.4.1.1.

### **2.3.7 Westerly WWTP CEHRT Monitoring and Analysis**

Following Achievement of Full Operation of CM 3-2, NEORSD shall perform the monitoring and reporting activities set forth in Sections 2.3.7.1 through 2.3.7.6, below to collect and provide information necessary to evaluate compliance with the CM 3-2 Performance Criteria,



as set forth in Appendix 1, which consist of Numeric Performance Criteria (CM 3-2 Numeric Performance Criteria) for TSS, *E. coli*, and TRC, and Operational Performance Criteria (CM 3-2 Operational Performance Criteria).

There are two phases of monitoring and reporting requirements: (a) Phase 1 applies following Achievement of Full Operation 3-2 (CM 3-2 Phase 1 Post-Construction Monitoring Period) until Phase 1 ends as described in the remainder of the paragraph; and (b) Phase 2 applies for the duration of the Consent Decree after the CM 3-2 Phase 1 Post-Construction Monitoring Period has ended (CM 3-2 Phase 2 Post-Construction Monitoring Period). The duration of the CM 3-2 Phase 1 Post-Construction Monitoring Period and the start of the Phase 2 Post-Construction Monitoring Period may be different for TSS, *E. coli*, and TRC. Specifically, the duration shall be consistent with the following:

- The CM 3-2 Phase 1 Post-Construction Monitoring Period for TSS, CBOD, phosphorus, and nitrogen shall last until both: (a) NEORSD has been in continuous compliance with the CM 3-2 Numeric Performance Criterion for TSS for either a one-year length of time after Achievement of Full Operation of CM 3-2 or for the length of time it takes NEORSD to collect 14 Qualifying Samples of discharges from the CEHRT on 14 days for TSS, whichever length of time is longer; and (b) NEORSD provides written notification to the U.S. EPA and Ohio EPA in accordance with Section XVII (Notices) of the Consent Decree that it has collected the required number of Qualifying Samples for TSS and has been in continuous compliance with the CM 3-2 Numeric Performance Criterion for TSS for the required period of time. The CM 3-2 Phase 1 Post-Construction Monitoring Period for TSS, carbonaceous biochemical oxygen demand (CBOD), phosphorus, and nitrogen shall end on the date of the written notification, provided that both of these conditions are met. The CM 3-2 Phase 2 Monitoring Period for TSS shall begin on the day after the date of the written notification and last for the duration of the Consent Decree. NEORSD is not required to monitor for CBOD, phosphorus, and nitrogen during the CM 3-2 Phase 2 Post-Construction Monitoring Period.
- The CM 3-2 Phase 1 Post-Construction Monitoring Period for *E. coli* shall last until both: (a) NEORSD has been in continuous compliance with the CM 3-2 Numeric Performance Criterion for *E. coli* for either a one-year length of time after Achievement of Full Operation of CM 3-2 or for the length of time it takes NEORSD to collect 14 Qualifying Samples of discharges from the CEHRT on 14 days for *E. coli*, whichever length of time is longer; and (b) NEORSD provides written notification to the U.S. EPA and Ohio EPA in accordance with Section XVII (Notices) of the Consent Decree that it has collected the required number of Qualifying Samples for *E. coli* and has been in continuous compliance with the CM 3-2 Numeric Performance Criterion for *E. coli* for the required period of time. The CM 3-2 Phase 1 Post-Construction Monitoring Period for *E. coli* shall end on the date of the written notification, provided that both of these conditions are met. The CM 3-2 Phase 2 Post-Construction Monitoring Period for *E. coli* shall begin on the day after the date of the written notification and last for the duration of the Consent Decree.

- The CM 3-2 Phase 1 Post-Construction Monitoring Period for TRC shall last until both:  
(a) NEORSD has been in continuous compliance with the CM 3-2 Numeric Performance Criterion for TRC for either a one-year length of time after Achievement of Full Operation of CM 3-2 or for the length of time it takes NEORSD to collect Qualifying Samples of discharges from the CEHRT on 14 days for TRC, whichever length of time is longer; and (b) NEORSD provides written notification to the U.S. EPA and Ohio EPA in accordance with Section XVII (Notices) of the Consent Decree that it has collected the required amount of Qualifying Samples for TRC and has been in continuous compliance with the CM 3-2 Numeric Performance Criteria for TRC for the required period of time. The CM 3-2 Phase 1 Post-Construction Monitoring Period for TRC shall end on the date of the written notification, provided that both of these conditions are met. The CM 3-2 Phase 2 Monitoring Period for TRC shall begin on the day after the date of the written notification and last for the duration of the Consent Decree.

#### **2.3.7.1 CEHRT Flow Monitoring**

Following Achievement of Full Operation of CM 3-2 and for the duration of the Consent Decree thereafter (i.e., during both the Phase 1 and Phase 2 Post-Construction Monitoring Periods), NEORSD shall continuously monitor influent flow to and effluent flow from the Westerly CEHRT, and excess flows around CEHRT, if an excess flow conduit is built/installed. Influent and effluent flows shall be monitored using flow monitoring equipment suited to each monitoring location's hydraulic characteristics. Influent flow monitoring location(s) may include more than one technology to accommodate the anticipated wide range of flows. Influent flow monitoring shall include the flow through CEHRT and the flow conveyed through the center channel when the center channel diversion gates are opened. Effluent flow shall be monitored at the CEHRT discharge weir. Flows in the excess flow conduit shall be monitored in the conduit, if an excess flow conduit is built/installed. All flow-based determinations of Qualifying Samples shall be based on the influent flow rate. All flow criteria in this Section and in Sections 2.3.7.1 through 2.3.7.6 shall be based on 5-minute interval flow measurement data, collected at the referenced flow measurement locations.

#### **2.3.7.2 Qualifying Samples**

During the CM 3-2 Phase 1 Post-Construction Monitoring Periods, a "Qualifying Sample" shall be defined as:

- Any *E. coli* grab sample of the CEHRT discharge that is collected in a manner consistent with Section 2.3.7.3 at a time when the influent flow rate was 411 MGD or less, as follows:
  - a) If the influent flow rate exceeds 411 MGD, the grab sample was collected at least 30 minutes after the influent flow rate remained less than 411 MGD.
  - b) If a center channel diversion occurs, when the center channel diversion gates are opened, the grab sample was collected at least one hour after the center channel

diversion ends and the CEHRT treated effluent discharge has been maintained for one hour.

- Any composite sample of the CEHRT discharge that is collected in a manner consistent with Section 2.3.7.3, at a time when the influent flow rate was 411 MGD or less as follows:
  - a) If the influent flow rate exceeds 411 MGD, the sample was collected at least 30 minutes after the influent flow rate remained less than 411 MGD.
  - b) If a center channel diversion occurs, when the center channel diversion gates are opened, the sample was collected at least one hour after the center channel diversion ends and the CEHRT treated effluent discharge has been maintained for one hour.
- All TRC grab samples of the CEHRT discharge are Qualifying Samples.

During the CM 3-2 Phase 2 Post-Construction Monitoring Periods, a “Qualifying Sample” shall be defined as any grab or composite sample that is collected during a Westerly CEHRT Discharge Event (“Westerly CEHRT Discharge Event” is defined in Section 2.3.7.3) when the influent flow rate did not exceed 411 MGD and the center channel diversion gates did not open at any point during the entire Westerly CEHRT Discharge Event.

### **2.3.7.3 CEHRT Discharge Parameter Monitoring**

#### **CM 3-2 Phase 1 Post-Construction Monitoring**

During the CM 3-2 Phase 1 Post-Construction Monitoring Period, NEORSD shall collect Qualifying Samples of CEHRT treated effluent and conduct analysis for TSS, *E. coli*, and TRC (to evaluate compliance with the CM 3-2 Numeric Performance Criteria), and for CBOD, phosphorus, and nitrogen (for informational purposes only). NEORSD shall follow its established protocols for collecting, handling, preserving, holding and analyzing samples at the Westerly WWTP and 40 CFR Part 136 when collecting and analyzing samples of discharges from the CEHRT. In addition:

- Grab or composite sample collection in accordance with this Section 2.3.7 shall not begin until one hour after the start of the Westerly CEHRT Discharge Event to represent performance from stable process operation.
- Samples for analyzing TSS, CBOD, phosphorus, and nitrogen shall be collected as two sets of flow-proportioned composite samples per calendar day: (a) the first to characterize CEHRT performance at influent flow rates into the CEHRT that are less than or equal to 411 MGD; and (b) the second to characterize CEHRT performance at influent flow rates into the CEHRT that are above 411 MGD or if the center channel diversion gates are opened. NEORSD shall make every effort to collect representative samples of sufficient volume to allow for analysis for all required parameters. If insufficient sample volume is collected by the composite samplers to allow for the analysis for all required

parameters, NEORS D shall prioritize the analysis of TSS before CBOD, phosphorus, and nitrogen.

- Samples for analyzing *E. coli* and TRC shall be collected as one or more discrete grab samples per day of discharge from the CEHRT to characterize CEHRT performance at influent flow rates less than or equal to 411 MGD and, to the extent possible, above 411 MGD. If a discharge from the CEHRT occurs over the course of two or more calendar days, a minimum of one sample per calendar day shall be collected, except:
  - a) if the discharge begins within the last hour of any calendar day (i.e., after 11 p.m., but before midnight) no samples shall be collected that calendar day to account for stabilized process operation and that discharge shall be considered to have begun on the following calendar day; and
  - b) if the discharge begins on one calendar day and ends on the following calendar day within the first hour of the second calendar day (i.e., after midnight, but before 1 a.m.) and no grab sample has been collected during the second calendar day, the discharge is considered to have ended on the first calendar day, for the purpose of collecting *E. coli* and TRC grab samples.

### **CM 3-2 Phase 2 Post-Construction Monitoring**

During the CM 3-2 Phase 2 Post-Construction Monitoring Period, NEORS D only needs to comply with the monitoring and analysis requirements described above for TSS, *E. coli* and TRC for Westerly CEHRT Discharge Events, with those requirements further modified as follows:

- A Westerly CEHRT Discharge Event is defined as a CEHRT treated effluent discharge that occurs over the CEHRT effluent weir for more than one hour. If a discharge occurs intermittently during a day, starting and stopping several times, it shall be considered the same event. If the discharge occurs on more than one calendar day but is the result of a continuing precipitation event, it should be counted as one event. For the purposes of defining a Westerly CEHRT Discharge Event, a continuing precipitation event is one during which any cessation of rainfall and/or snowmelt is less than 12 hours.
- If at any point during a Westerly CEHRT Discharge Event the CEHRT influent flow rate exceeds 411 MGD or the center channel diversion gates open, then no sampling and reporting is required.

### **NPDES Permit Monitoring in Lieu of CM 5-2 Phase 2 Post-Construction Monitoring**

- CM 3-2 Phase 2 Post-Construction Monitoring requirements for TSS, *E. coli*, and/or TRC apply until both:
  - a) there is an NPDES permit with numeric effluent limitations and monitoring requirements for discharges from the CEHRT for the parameter at issue (TSS, *E.*

*coli* and/or TRC) that are legally in effect (i.e., the limitations and requirements are not stayed) and those limitations and monitoring requirements do not include, incorporate or otherwise account for flows that do not go through the CEHRT; and

- b) NEORSD provides written notification to the U.S. EPA and Ohio EPA in accordance with Section XVII (Notices) of the Consent Decree of these facts. The date on which the NPDES monitoring requirements begin to apply in lieu of those described above shall be the date of the written notification, provided both of these conditions are met.

#### **2.3.7.4 Rolling 7-day Arithmetic Mean and Geomean Calculations**

NEORSD shall calculate the rolling 7-day TSS arithmetic means and rolling 7-day *E. coli* geomeans based on Qualifying Samples after there have been at least 7 days of discharge on which there have been Qualifying Samples collected on each day of discharge for the specific parameter at issue for purposes of evaluating compliance with the CM 3-2 Numeric Performance Criteria Performance as follows:

- The first 7-day arithmetic mean and 7-day geomean will be calculated by taking the arithmetic mean and geomean, respectively, of the Qualifying Samples from each of the 7 days of discharge.
- With each additional day of discharge that has a Qualifying Sample will be recalculated using the most recent 7 Qualifying Samples from the most recent 7 days of discharge.

#### **2.3.7.5 Semi-Annual Reporting**

Following Achievement of Full Operation of CM 3-2 and for the duration of the Consent Decree, NEORSD shall include the following information pertaining to discharges from the CEHRT in the Semi-Annual Progress Reports that it submits in accordance with Section IX (Reporting Requirements) of the Consent Decree for the relevant six-month period:

##### **Tabular Summaries of Monitoring Information:**

Except as provided below with respect to NPDES Permit Report Information, the Semi-Annual Reports shall include a tabular summary of:

- a) all 7-day arithmetic means for TSS and 7-day geomeans for *E. coli* that were calculated in accordance with Section 2.3.7.4 for samples that met the definition of Qualifying Sample;
- b) all TRC analytical results; and
- c) identification of whether each 7-day arithmetic mean, 7-day geomean and TRC analytical result complied with the CM 3-2 Numeric Performance Criteria.

### **NPDES Permit Report Information In lieu of Tabular Summaries:**

If NPDES permit monitoring requirements apply in lieu of Phase 2 Post-Construction Monitoring Requirements in accordance with Section 2.3.7.3 above, then NEORSD shall provide in the Semi-Annual Progress Reports all monitoring reports and all other notifications and reports required by the NPDES permit for the pollutant(s) at issue to be submitted to Ohio EPA for the CEHRT discharges rather than the tabular summaries described above.

### **CM 3-2 Phase I Post-Construction Monitoring Information:**

Section 2.3.7 includes monitoring requirements that only apply during the Phase 1 Post-Construction Monitoring Periods. In addition to the tabular summaries and NPDES permit reports described above, the Semi-Annual Progress Reports shall also include tabular summaries of all of the analytical results that have been obtained in accordance with the sampling and monitoring requirements set forth for the CM 3-2 Phase 1 Post-Construction Monitoring Periods in Section 2.3.7, including:

- a) the date and time each sample was collected;
- b) the concentration of each pollutant parameter;
- c) any applicable analytical results data qualifiers;
- d) CEHRT discharge flow rates at the time each sample was collected;
- e) maximum CEHRT discharge flow rate for the 60 minutes prior to the time each sample was collected;
- f) the date and time of the maximum CEHRT discharge flow rate identified in e, above; and
- g) identification of whether each sample is a Qualifying Sample as defined in Section 2.3.7.2.

### **2.3.7.6 CM 3-2 Control Measures Report**

In lieu of submitting a Control Measures Report to the U.S. EPA and Ohio EPA for their approval within 24 months of the date of Achievement of Full Operation for CM 3-2 in accordance with Section 2.4.3 of this Appendix, NEORSD shall instead submit a “CM 3-2 Control Measures Report” to the U.S. EPA and Ohio EPA for their review and approval within 12 months of the date that the last Phase 1 Post Construction Monitoring Period for TSS; *E. coli*; and TRC has concluded. The CM 3-2 Control Measures Report shall include the following information collected during all of the CM 3-2 Phase 1 Post-Construction Monitoring Periods:

1. A tabular summary of all of the analytical results that have been obtained in accordance with the sampling and monitoring requirements set forth for the CM 3-2 Phase 1 Post-Construction Monitoring Periods in this Section 2.3.7, including:
  - a) the date and time each sample was collected;
  - b) the concentration of each pollutant parameter;
  - c) any applicable analytical results data qualifiers;
  - d) influent flow rates at the time each sample was collected;



- e) maximum influent flow rate for the 60 minutes prior to the time each sample was collected;
  - f) the date and time of the maximum influent flow rate identified in e, above; and
  - g) identification of whether each sample is a Qualifying Sample as defined in Section 2.3.7.2.
2. A tabular summary of:
- a) all 7-day arithmetic means for TSS and 7-day geomeans for *E. coli* that were calculated in accordance with Section 2.3.7.4 for samples that met the definition of Qualifying Sample since the date of Achievement of Full Operation for CM 3-2;
  - b) all TRC analytical results; and
  - c) identification of whether each 7-day arithmetic mean, 7-day geomean and TRC analytical result complied with the CM 3-2 Numeric Performance Criteria.
3. For each calendar day that there were discharges from the CEHRT, provide a 24-hour hydrograph that presents the CEHRT influent flow rate during that 24-hour period and that identifies when each grab and composite sample was collected. Include the following additional elements on each calendar day hydrograph:
- a) total Westerly WWTP influent flow;
  - b) influent flow;
  - c) flows in the excess flow conduit, if an excess flow conduit is installed; and
  - d) CEHRT discharge flow.
4. Analytical and field measurement methods used to test each sample for the specific parameter analyzed or measured; copies of all field logs and bench sheets; copies of all chain of custody forms; copies of all final analytical laboratory reports; and copies of all records that contain any manual flow-weighted (a.k.a., flow-proportioned) compositing calculations, if any.
5. For each Westerly CEHRT Discharge Event, a description of all operational problems encountered during the Event, all remedies taken to address those operational problems, and a summary of all CEHRT chemical dosages used throughout the Westerly CEHRT Discharge Event.
6. For any CM 3-2 Phase 2 Post-Construction Monitoring conducted prior to the date of the end of the last CM 3-2 Phase 1 Post-Construction Monitoring Period the following information shall be included in the CM 3-2 Control Measures Report: all information listed in 2.3.7.5 for the CM 3-2 Phase 2 Post-Construction Monitoring analytical results and an assessment of whether those CM 3-2 Phase 2 analytical results are consistent with the CM 3-2 Phase 1 analytical results for the same parameter.

The CM 3-2 Control Measures Report that NEORSD submits to the U.S. EPA and Ohio EPA for their approval in accordance with this section need not include information relevant to assessing compliance with the CM 3-2 Discharge Frequency Limits Performance Criteria. Instead, that information will be included in the Control Measure Report that NEORSD submits to the U.S.



EPA and Ohio EPA for their approval within 24 months of the date of Achievement of Full Operation of the last Westerly CSO Control Measure as described in Section 2.4.1.2.

### **2.3.8 Easterly WWTP CEHRT Monitoring and Analysis**

Following Achievement of Full Operation of CM 2, NEORSD shall perform the monitoring and reporting activities set forth in Sections 2.3.8.1 through 2.3.8.6, below to collect and provide information necessary to evaluate compliance with the CM 2 Performance Criteria, as set forth in Appendix 1, which consist of Numeric Performance Criteria (CM 2 Numeric Performance Criteria) for TSS, *E. coli*, and TRC, and Operational Performance Criteria (CM 2 Operational Performance Criteria).

There are two phases of monitoring and reporting requirements: (a) Phase 1 applies following Achievement of Full Operation of CM 2 (CM 2 Phase 1 Post-Construction Monitoring Period) until Phase 1 ends as described in the remainder of the paragraph; and (b) Phase 2 applies for the duration of the Consent Decree after the CM 2 Phase 1 Post-Construction Monitoring Period has ended (CM 2 Phase 2 Post-Construction Monitoring Period). The duration of the CM 2 Phase 1 Post-Construction Monitoring Period and the start of the Phase 2 Post-Construction Monitoring Period may be different for TSS, *E. coli*, and TRC. Specifically, the duration shall be consistent with the following:

- The CM 2 Phase 1 Post-Construction Monitoring Period for TSS, CBOD, phosphorus, and nitrogen shall last until both: (a) NEORSD has been in continuous compliance with the CM 2 Numeric Performance Criterion for TSS for either a one-year length of time after Achievement of Full Operation of CM 2 or for the length of time it takes NEORSD to collect 14 Qualifying Samples of discharges from the CEHRT on 14 days for TSS, whichever length of time is longer; and (b) NEORSD provides written notification to the U.S. EPA and Ohio EPA in accordance with Section XVII (Notices) of the Consent Decree that it has collected the required number of Qualifying Samples for TSS and has been in continuous compliance with the CM 2 Numeric Performance Criterion for TSS for the required period of time. The CM 2 Phase 1 Post-Construction Monitoring Period for TSS, carbonaceous biochemical oxygen demand (CBOD), phosphorus, and nitrogen shall end on the date of the written notification, provided that both of these conditions are met. The CM 2 Phase 2 Monitoring Period for TSS shall begin on the day after the date of the written notification and last for the duration of the Consent Decree. NEORSD is not required to monitor for CBOD, phosphorus, and nitrogen during the CM 2 Phase 2 Post-Construction Monitoring Period.
- The CM 2 Phase 1 Post-Construction Monitoring Period for *E. coli* shall last until both: (a) NEORSD has been in continuous compliance with the CM 2 Numeric Performance Criterion for *E. coli* for either a one-year length of time after Achievement of Full Operation of CM 2 or for the length of time it takes NEORSD to collect 14 Qualifying Samples of discharges from the CEHRT on 14 days for *E. coli*, whichever length of time is longer; and (b) NEORSD provides written notification to the U.S. EPA and Ohio EPA in accordance with Section XVII (Notices) of the Consent Decree that it has collected the required number of Qualifying Samples for *E. coli* and has been in continuous

compliance with the CM 2 Numeric Performance Criterion for *E. coli* for the required period of time. The CM 2 Phase 1 Post-Construction Monitoring Period for *E. coli* shall end on the date of the written notification, provided that both of these conditions are met. The CM 2 Phase 2 Post-Construction Monitoring Period for *E. coli* shall begin on the day after the date of the written notification and last for the duration of the Consent Decree.

- The CM 2 Phase 1 Post-Construction Monitoring Period for TRC shall last until both: (a) NEORSD has been in continuous compliance with the CM 2 Numeric Performance Criterion for TRC for either a one-year length of time after Achievement of Full Operation of CM 2 or for the length of time it takes NEORSD to collect 14 Qualifying Samples of discharges from the CEHRT on 14 days for TRC, whichever length of time is longer; and (b) NEORSD provides written notification to the U.S. EPA and Ohio EPA in accordance with Section XVII (Notices) of the Consent Decree that it has collected the required amount of Qualifying Samples for TRC and has been in continuous compliance with the CM 2 Numeric Performance Criteria for TRC for the required period of time. The CM 2 Phase 1 Post-Construction Monitoring Period for TRC shall end on the date of the written notification, provided that both of these conditions are met. The CM 2 Phase 2 Monitoring Period for TRC shall begin on the day after the date of the written notification and last for the duration of the Consent Decree.

### **2.3.8.1 CEHRT Flow Monitoring**

Following Achievement of Full Operation of CM 2 and for the duration of the Consent Decree thereafter (i.e., during both the Phase 1 and Phase 2 Post-Construction Monitoring Periods), NEORSD shall continuously monitor flow as follows:

- influent flow to the Easterly CEHRT;
- effluent flow from the Easterly CEHRT;
- flow from the diversion structure to the ECT/DST drop shaft; and
- flow that discharges through CSO 001 without going through the CEHRT.

### **2.3.8.2 Qualifying Samples**

During both the CM 2 Phase 1 and Phase 2 Post-Construction Monitoring Periods, a “Qualifying Sample” shall be defined as any grab or composite sample that is collected during an Easterly CEHRT Discharge Event (“Easterly CEHRT Discharge Event”):

- Any *E. coli* grab sample of the CEHRT discharge that is collected in a manner consistent with Section 2.3.8.3;
- Any composite sample of the CEHRT discharge that is collected in a manner consistent with Section 2.3.8.3; and
- All TRC grab samples of the CEHRT discharge that are collected in a manner consistent with Section 2.3.8.3.

An “Easterly CEHRT Discharge Event” is defined as a CEHRT treated effluent discharge that occurs over the CEHRT effluent weir for more than one hour. If a discharge occurs intermittently during a day, starting and stopping several times, it shall be considered the same event. If the discharge occurs on more than one calendar day but is the result of a continuing precipitation event, it shall be counted

as one event. For the purposes of defining an Easterly CEHRT Discharge Event, a continuing precipitation event is one during which any cessation of rainfall and/or snowmelt is less than 12 hours.

### **2.3.8.3 CEHRT Discharge Parameter Monitoring**

#### **CM 2 Phase 1 Post-Construction Monitoring**

During the CM 2 Phase 1 Post-Construction Monitoring Period, NEORSD shall collect Qualifying Samples of CEHRT treated effluent and conduct analysis for TSS, *E. coli*, and TRC (to evaluate compliance with the CM 2 Numeric Performance Criteria), and for CBOD, phosphorus, and nitrogen (for informational purposes only). NEORSD shall follow its established protocols for collecting, handling, preserving, holding, and analyzing samples at the Easterly WWTP and 40 CFR Part 136 when collecting and analyzing samples of discharges from the CEHRT. In addition:

- Grab or composite sample collection in accordance with this Section 2.3.8 shall not begin until one hour after the start of the Easterly CEHRT Discharge Event to represent performance from stable process operation.
- Samples for analyzing TSS, CBOD, phosphorus, and nitrogen shall be collected as a flow-proportioned composite sample per calendar day to characterize CEHRT performance. NEORSD shall make every effort to collect representative samples of sufficient volume to allow for analysis for all required parameters. If insufficient sample volume is collected by the composite sampler to allow for the analysis for all required parameters, NEORSD shall prioritize the analysis of TSS before CBOD, phosphorus, and nitrogen.
- Samples for analyzing *E. coli* and TRC shall be collected as one or more discrete grab samples per day of discharge from the CEHRT to characterize CEHRT performance. If a discharge from the CEHRT occurs over the course of two or more calendar days, a minimum of one sample per calendar day shall be collected, except:
  - a) If the discharge begins within the last hour of any calendar day (i.e., after 11 pm, but before midnight) no samples shall be collected that calendar day to account for stabilized process operation and that discharge shall be considered to have begun on the following calendar day; and
  - b) If the discharge begins on one calendar day and ends on the following calendar day within the first hour of the second calendar day (i.e., after midnight, but before 1 am) and no grab sample has been collected during the second calendar day, the discharge is considered to have ended on the first calendar day, for the purpose of collecting *E. coli* and TRC grab samples.

#### **CM 2 Phase 2 Post-Construction Monitoring**

During the CM 2 Phase 2 Post-Construction Monitoring Period, NEORSD is not required to sample for CBOD, phosphorus, or nitrogen but, except as set forth below pertaining to NPDES permit monitoring, must continue to comply with the same monitoring and analysis requirements described above during the CM 2 Phase 1 Post-Construction Monitoring Period for TSS, *E. coli*, and TRC.

### **NPDES Permit Monitoring in Lieu of CM 2 Phase 2 Post-Construction Monitoring**

- CM 2 Phase 2 Post-Construction Monitoring requirements for TSS, *E. coli*, and/or TRC apply until both:
  - a) there is an NPDES permit with numeric effluent limitations and monitoring requirements for discharges from the CEHRT for the parameter at issue (TSS, *E. coli* and/or TRC) that are legally in effect (i.e., the limitations and requirements are not stayed) and those limitations and monitoring requirements do not include, incorporate or otherwise account for flows that do not go through the CEHRT; and
  - b) NEORSD provides written notification to the U.S. EPA and Ohio EPA in accordance with Section XVII (Notices) of the Consent Decree of these facts. The date on which the NPDES monitoring requirements begin to apply in lieu of those described above shall be the date of the written notification, provided both of these conditions are met.

#### **2.3.8.4 Rolling 7-day Arithmetic Mean and Geomean Calculations**

NEORSD shall calculate the rolling 7-day TSS arithmetic means and rolling 7-day *E. coli* geomeans based on Qualifying Samples after there have been at least 7 days of discharge on which there have been Qualifying Samples collected on each day of discharge for the specific parameter at issue for purposes of evaluating compliance with the CM 2 Numeric Performance Criteria Performance as follows:

- The first 7-day arithmetic mean and 7-day geomean will be calculated by taking the arithmetic mean and geomean, respectively, of the Qualifying Samples from each of the 7 days of discharge.
- With each additional day of discharge that has a Qualifying Sample, the rolling 7-day arithmetic means and rolling 7-day geomeans will be recalculated using the most recent 7 Qualifying Samples from the most recent 7 days of discharge.

#### **2.3.8.5 Semi-Annual Reporting**

Following Achievement of Full Operation of CM 2 and for the duration of the Consent Decree, NEORSD shall include the following information pertaining to discharges from the CEHRT in the Semi-Annual Progress Reports that it submits in accordance with Section IX (Reporting Requirements) of the Consent Decree for the relevant six-month period:

#### **Tabular Summaries of Monitoring Information:**

Except as provided below with respect to NPDES Permit Report Information, the Semi-Annual Reports shall include a tabular summary of:

- a) all 7-day arithmetic means for TSS and 7-day geomeans for *E. coli* that were calculated in accordance with Section 2.3.8.4 for samples that met the definition of Qualifying Sample;
- b) all TRC analytical results; and
- c) identification of whether each 7-day arithmetic mean, 7-day geomean, and TRC analytical result complied with the CM 2 Numeric Performance Criteria.

**NPDES Permit Report Information In lieu of Tabular Summaries:**

If NPDES permit monitoring requirements apply in lieu of Phase 2 Post-Construction Monitoring Requirements in accordance with Section 2.3.8.3 above, then NEORSD shall provide in the Semi-Annual Progress Reports all monitoring reports and all other notifications and reports required by the NPDES permit for the pollutant(s) at issue to be submitted to Ohio EPA for the CEHRT discharges rather than the tabular summaries described above.

**CM 2 Phase I Post-Construction Monitoring Information:**

In addition to the tabular summaries and NPDES permit reports described above, the Semi-Annual Progress Reports shall also include tabular summaries of all of the analytical results that have been obtained in accordance with the sampling and monitoring requirements set forth for the CM 2 Phase 1 Post-Construction Monitoring Periods in Section 2.3.8, including:

- a) the date and time each sample was collected;
- b) the concentration of each pollutant parameter;
- c) any applicable analytical results data qualifiers;
- d) CEHRT discharge flow rates at the time each sample was collected;
- e) maximum CEHRT discharge flow rate for the 60 minutes prior to the time each sample was collected;
- f) the date and time of the maximum CEHRT discharge flow rate identified in e), above;
- g) volume discharged from the CEHRT during the Easterly CEHRT Discharge Event from which each sample was collected;
- h) volume directed into the ECT/DST drop shaft;
- i) volume returned from the CEHRT facility to the Easterly WWTP when no discharge has occurred;
- j) volume returned from the CEHRT facility to the Easterly WWTP following each Easterly CEHRT Discharge Event; and
- k) identification of whether each sample is a Qualifying Sample as defined in Section 2.3.8.2.

**2.3.8.6 CM 2 Control Measures Report**

In lieu of submitting a Control Measures Report to the U.S. EPA and Ohio EPA for their approval within 24 months of the date of Achievement of Full Operation for CM 2 in accordance with Section 2.4.3 of this Appendix, NEORSD shall instead submit a “CM 2 Control Measures Report” to the U.S. EPA and Ohio EPA for their review and approval

within 12 months of the date that the last Phase 1 Post Construction Monitoring Period for TSS, *E. coli*, and TRC has concluded. The CM 2 Control Measures Report shall include the following information collected during all of the CM 2 Phase 1 Post-Construction Monitoring Periods:

1. A tabular summary of all the analytical results that have been obtained in accordance with the sampling and monitoring requirements set forth for the CM 2 Phase 1 Post-Construction Monitoring Periods in this Section 2.3.8, including:
  - a) the date and time each sample was collected;
  - b) the concentration of each pollutant parameter;
  - c) any applicable analytical results data qualifiers;
  - d) CEHRT discharge flow rates at the time each sample was collected;
  - e) maximum CEHRT discharge flow rate for the 60 minutes prior to the time each sample was collected;
  - f) the date and time of the maximum CEHRT discharge flow rate identified in e), above;
  - g) volume discharged from the CEHRT during the Easterly CEHRT Discharge Event from which each sample was collected; and
  - h) identification of whether each sample is a Qualifying Sample as defined in Section 2.3.8.2.
2. A tabular summary of:
  - a) all 7-day arithmetic means for TSS and 7-day geomeans for *E. coli* that were calculated in accordance with Section 2.3.8.4 for samples that met the definition of Qualifying Sample since the date of Achievement of Full Operation for CM 2;
  - b) all TRC analytical results; and
  - c) identification of whether each 7-day arithmetic mean, 7-day geomean, and TRC analytical result complied with the CM 2 Numeric Performance Criteria.
3. For each calendar day that there were discharges from the CEHRT, provide a 24-hour hydrograph that presents the CEHRT discharge flow rate during that 24-hour period and that identifies when each grab and composite sample was collected. Include the following additional elements on each calendar day hydrograph:
  - a) total Easterly WWTP influent flow;
  - b) CEHRT influent flow;
  - d) Flow diverted to the ECT/DST; and
  - e) CEHRT discharge flow.
4. Analytical and field measurement methods used to test each sample for the specific parameter analyzed or measured; copies of all field logs and bench sheets; copies of all chain of custody forms; copies of all final analytical laboratory reports; and copies of all records that contain any manual flow-weighted (a.k.a., flow-proportioned) compositing calculations, if any.



5. For each CEHRT Discharge Event, a description of all operational problems encountered during the Event, all remedies taken to address those operational problems, and a summary of all CEHRT chemical dosages used throughout the CEHRT Discharge Event.
6. For any CM 2 Phase 2 Post-Construction Monitoring conducted prior to the date of the end of the last CM 2 Phase 1 Post-Construction Monitoring Period, the following information shall be included in the CM 2 Control Measures Report: all information listed in 2.3.8.5 for the CM 2 Phase 2 Post-Construction Monitoring analytical results and an assessment of whether those CM 2 Phase 2 analytical results are consistent with the CM 2 Phase 1 analytical results for the same parameter.

The CM 2 Control Measures Report that NEORSD submits to the U.S. EPA and Ohio EPA for their approval in accordance with this section need not include information relevant to assessing compliance with CM 2 Discharge Frequency Limits Performance Criteria. Instead, that information will be included in the Control Measures Report that NEORSD submits to the U.S. EPA and Ohio EPA for their approval within 24 months of the date of Achievement of Full Operation of the last Easterly CSO Control Measure as described in Section 2.4.1.3.

### 2.3.9 Rainfall Monitoring

NEORSD currently maintains a rain gauge network within the service area. Table 2.3 and Figure 2.3 show these existing rain gauges. These rain gauges will be utilized in each Control Measure post-construction monitoring period and in the district-by-district post-construction monitoring periods to measure rainfall within the service area for each CSO control measure. If required, additional rain gauges will be installed to ensure accurate measurement of rainfall, and NEORSD will consider the use of radar-rainfall measurements to improve accuracy of rainfall estimates, and particularly where rain gage coverage is not adequate or difficult to implement.

Table 2.3 NEORSD's Rain Gauges

Site ID	
RNT	North Olmsted
RWF	Westlake
RST	Strongsville
ROA	Oakwood
RJA	James Rhodes H.S.
RBT	Brook Park
RSG	Shaker Heights
RNR	North Royalton
ROL	Olmsted Falls
RBC	Brecksville
RIN	Independence
RMA	Maple Heights



RJO	John Marshall H.S.
RPM	Parma
RSY	Southerly WWTP
RMY	Mayfield
RBH	Beachwood
RDA	Division Ave P.S.
RDR	Dille P.S.
RWK	Wade Park
RCL	Cleveland Heights
REA	Easterly WWTP
RMN	Moreland Hills
RMD	Macedonia P.S.
RSO	South Euclid

### **2.3.10 Data Management**

NEORSD currently maintains its data within various data management systems for the collection system and its three wastewater plants. Considering the number of monitoring locations and types of data that are being collected, the retrieval, record keeping and analysis of the data is essential in maintaining an effective monitoring program. Field procedures and QA/QC approaches to ensure that the collected data are suitable for the intended analysis are also a critical component of this program. This PCMP will use the existing NEORSD data management systems to store the data. The effectiveness of the CSO control measures will be evaluated using appropriate modeling tools. The PCMP will be designed to ensure collection of appropriate data; establish consistency of sampling methods and data acquisition; and define performance standards for maintaining data integrity. All measures necessary will be taken to validate, track, store and manage the collected data to ensure that monitoring objectives are achieved.

Sampling and modeling protocols will be administered and conducted by experienced personnel responsible for the existing database and model. As data are generated during the PCMP, the program may need to be revised to accommodate alternative data collection techniques or data evaluation approaches to meet monitoring objectives. Any revisions or additions to the data retrieval or management aspects of the PCMP will be submitted to the U.S. EPA and Ohio EPA for review and approval.

## **2.4 Performance Assessment**

### **2.4.1 Model-Based Approach to Assessing Compliance**

Under the model based approach to demonstrate compliance, NEORSD plans to update and utilize the various CSO models that were prepared during the development of the LTCP. The models will be used to perform appropriate simulations to demonstrate compliance with the Performance Criteria for each CSO control measure identified in Appendix 1. Models will also be used in conjunction with monitoring data to assess the

performance of CSO control measures installed pursuant to Appendices 3 and 4. This approach is outlined in the following steps:

1. Collect selected rainfall and CSO outfall data for the post-construction monitoring period of each CSO control measure upon completion, and rainfall data and activation data for all selected CSO outfalls following implementation of all control measures for each district (Easterly, Southerly, Westerly).
2. Perform quality assurance and quality control of the data collected in Step 1.
3. Utilize the appropriate LTCP CSO model and rainfall data collected during the monitoring period to run simulations of CSO discharges for the post-construction monitoring period.
4. Adjust precipitation/runoff information used in the model to take into account the effects of green infrastructure implementation, reflecting green infrastructure monitoring data.
5. Compare the simulation outputs to the CSO monitoring data for the post-construction monitoring period to determine whether re-calibration of the hydraulic model is required. Model re-calibration will not be required if the model-predicted activations are not less than the monitored CSO activations for each remaining CSO outfall for the post-construction monitoring period. Otherwise, model re-calibration will be required in accordance with Steps 6 -8 below.
6. For re-calibration, select two or more appropriate rainfall events from the post-construction monitoring period.
7. Develop an initial data set for use with the model and perform successive applications of the model with appropriate parameter adjustments until the degree of agreement between the model output and the CSO monitoring data for the post-construction monitoring period meets the criteria set forth in Step 5, above. In making re-parameterization adjustments, NEORS D will consider the inherent variability in both the collection system model and in flow monitoring data, and will exercise sound engineering judgment and best industry practices so as to not compromise the overall representativeness of the model.
8. Upon completion of Step 7, NEORS D shall run an additional continuous simulation for the entire post-construction monitoring period to verify the recalibrated model. Thereafter, NEORS D shall compare the continuous simulation outputs to the CSO monitoring data described in Step 5 to determine whether additional recalibration is needed. If so, NEORS D shall conduct recalibration in accordance with steps 6 through 7 until the model achieves the criteria described in Step 5, above.
9. Overflow frequency performance criterion is based upon a "Typical Year" developed as part of the CSO Phase II Facilities Plans. The "Typical Year" was comprised of

actual rain events recorded at Cleveland Hopkins Airport based on an analysis of 46 years of rainfall recorded at this site. Table C-1 - Storm Events for Typical Year Continuous Year Simulation from the *CSO Facilities Planning Summary Report, March 2005* is attached to the PCMP. This table lists all the Typical Year storms, the dates, the hour, duration, depth and intensity of rainfall.

10. NEORSD will utilize the validated, and/or re-calibrated, hydraulic models to run the Typical Year to determine whether the CSO control measures have achieved the Performance Criteria identified in Appendix 1. If the modeled overflow frequency exceeds this level for any of the CSO control measures, NEORSD shall submit an analysis that will include: (1) the factors causing the additional overflow frequency, (2) any impact on water quality from the additional overflow frequency, (3) control options, including green infrastructure improvements, to reduce the overflow frequency to meet the Performance Criteria levels, (4) associated costs from the additional control options, (5) any expected benefits from such control options and (6) a recommendation of additional control measures necessary to meet water quality requirements.

#### **2.4.1.1 Model-Based Approach to Assessing Compliance with Southerly PEB Discharge Event Performance Criteria**

During the one-year post-construction monitoring period following Achievement of Full Operation of the last Southerly CSO Control Measure, NEORSD shall conduct one year of PEB discharge activation monitoring to be used as part of implementing the model-based approach to assessing compliance with the Southerly PEB Discharge Frequency Limits Performance Criteria in Appendix 1 in accordance with Section 2.4.1 of Appendix 2 of the Post Construction Monitoring Program. The monitoring and model validation/recalibration process will focus on the model's ability to accurately represent flows, and in particular, peak flows, into the Southerly WWTP.

NEORSD shall carry out rainfall, flow and hydraulic grade line (HGL) data collection in support of the process specified by Section 2.4.1 in accordance with Section 2.3 of Appendix 2.

In evaluating the Typical Year simulation results, NEORSD shall determine if the Typical Year continuous simulation demonstrates the following regarding discharges from the PEB: (i) peak influent flow to the Southerly WWTP exceeds its full-treatment capacity of 480 MGD for no more than 3 events; and (ii) peak influent flow to the CEHRT exceeds 255 MGD for no more than 0 simulated CSO events.

NEORSD shall include the results of this monitoring, data collection and modeling exercise and the other information required by Section 2.4.3 of this Appendix in the Control Measures Report that it submits to the U.S. EPA and Ohio EPA for approval within 36 months of the date of Achievement of Full Operation of the last Southerly CSO Control Measure in accordance with Section 2.4.3 of this Appendix. This Control Measures Report shall be submitted as a separate section or chapter of the Final Post-Construction Monitoring Program Report as required by Section 2.6.1 of this Appendix.

#### **2.4.1.2 Model-Based Approach to Assessing Compliance with CSO 002 Discharge Event Performance Criteria**

During the one-year post-construction monitoring period following Achievement of Full Operation of the last Westerly CSO Control Measure, NEORSD shall conduct one year of CEHRT discharge activation monitoring to be used as part of implementing the model-based approach to assessing compliance with the CSO 002 Discharge Frequency Limits Performance Criteria in Appendix 1 in accordance with Section 2.4.1 of Appendix 2 of the Post Construction Monitoring Program. The monitoring and model validation/recalibration process will focus on the model's ability to accurately represent flows, and in particular, peak flows, into CEHRT.

NEORSD shall carry out rainfall, flow and hydraulic grade line (HGL) data collection in support of the process specified by Section 2.4.1 in accordance with Section 2.3 of Appendix 2.

In evaluating the Typical Year simulation results, NEORSD shall determine if the Typical Year continuous simulation demonstrates the following regarding discharges through CSO 002: (i) peak influent flow to the CEHRT is less than 411 MGD for no more than 11 events; and (ii) peak influent flow to the CEHRT exceeds 411 MGD for no more than 3 simulated CSO events.

NEORSD shall include the results of this monitoring, data collection and modeling exercise and the other information required by Section 2.4.3 of this Appendix in the Control Measures Report that it submits to the U.S. EPA and Ohio EPA for approval within 24 months of the date of Achievement of Full Operation of the last Westerly CSO Control Measure in accordance with Section 2.4.3 of this Appendix.

#### **2.4.1.3 Model-Based Approach to Assessing Compliance with CSO 001 Discharge Event Performance Criteria**

During the one-year post-construction monitoring period following Achievement of Full Operation of the last Easterly CSO Control Measure, NEORSD shall conduct one year of CEHRT discharge activation monitoring to be used as part of implementing the model-based approach to assessing compliance with the CSO 001 Discharge Frequency Limits Performance Criteria in Appendix 1 in accordance with Section 2.4.1 of Appendix 2 of the Post Construction Monitoring Program. The monitoring and model validation/recalibration process will focus on the model's ability to accurately represent flows, and in particular, peak flows, into the CEHRT.

NEORSD shall carry out rainfall, flow and hydraulic grade line (HGL) data collection in support of the process specified by Section 2.4.1 in accordance with Section 2.3 of Appendix 2.

In evaluating the Typical Year simulation results, NEORSD shall determine if the Typical Year continuous simulation demonstrates the following regarding discharges through CSO 001: (i) CEHRT facility discharges in no more than 17 events; and (ii) untreated discharges through CSO 001 in no more than 2 events.

NEORSD shall include the results of this monitoring, data collection and modeling exercise and the other information required by Section 2.4.3 of this Appendix in the Control Measures Report that it submits to the U.S. EPA and Ohio EPA for approval within 24 months of the date of Achievement of Full Operation of the last Easterly CSO Control Measure in accordance with Section 2.4.3 of this Appendix.

#### **2.4.2 Evaluating the Performance of Appendix 3 CSO Control Measures**

For all Green and Gray Infrastructure CSO Control Measures that NEORSD has constructed or expanded in accordance with Appendix 3, NEORSD shall evaluate the performance of such measures in meeting the Appendix 3 performance criteria in accordance with Section 2.4.1 of this Appendix 2 with the Final Post Construction Monitoring Program. This evaluation will be submitted with the Final Post Construction Monitoring Program Report in accordance with Section 2.6.1 of this Appendix 2. The Appendix 3 performance criteria shall be determined to have been met if the remaining overflow volume from the continuous simulation of the Typical Year in the model that contains all Appendix 1 and Appendix 3 Gray and Green Infrastructure as constructed and operated is at a minimum 54 million gallons less than the remaining overflow volume from the continuous simulation of the Typical Year in the model that represents the Appendix 1 Gray Infrastructure as constructed and operated, except for Control Measures 7, 8, 14, 21, and 22, which shall be represented in the model as if they were constructed in accordance with the original smaller effective storage volumes set forth in Footnote 8 of Appendix 1 and operated so as to maximize the capture of wet weather flows.

NEORSD submitted its proposed Green Infrastructure Post-Construction Monitoring Programs (GIPCMP) in accordance with Old Appendix 3 on July 1, 2013, and submitted a revised proposal on July 31, 2015. EPA and Ohio EPA approved the GIPCMP on September 9, 2016. NEORSD implemented the GIPCMP and submitted the Appendix 3 Green Infrastructure Performance Report on December 27, 2021.

#### **2.4.3 Control Measures Reports**

Following Achievement of Full Operation of each CSO Control Measure listed in Appendix 1, NEORSD shall submit a Control Measures Report to the U.S EPA and Ohio EPA for their approval. The Control Measures Report will be submitted within 24 months of the date of Achievement of Full Operation for each control measure. The reports will include information for the completed control measures implemented and data related to the following:

- Description of the area served by the particular CSO Control Measure, affected receiving waters, and CSO Control Measures being evaluated
- CSO Monitoring and Rainfall Monitoring Results

- Evaluation of the CSO Control Measures
- Significant Variances and Impacting Factors (with regard to verification of level of control)
- Re-evaluation and Corrective Actions as outlined in section 2.4.4 (if necessary)

NEORSD can submit the Control Measures Report for the Big Creek Tunnel System as part of the Final Post Construction Monitoring Program Report pursuant to section 2.6.1.

#### **2.4.4 Corrective Action Plans**

If, following post construction monitoring, the analysis conducted pursuant to Section 2.4.3 above fails to demonstrate that the CSO control measures, combined with any Green for Gray substitutions if applicable, have met the pertinent Performance Criteria in a Typical Year set forth in Appendix 1, NEORSD shall submit to EPA and Ohio EPA for their approval a Corrective Action Plan (“CAP”) as part of the Control Measures Report. The CAP shall describe: (1) the specific measures to be carried out to address performance shortcomings and ensure the Performance Criteria in Appendix 1 is met; (2) a schedule, as expeditious as possible, for implementation of the corrective measures and (3) how the improvements when fully constructed shall be evaluated in accordance with this Appendix. The corrective measures described in the CAP shall achieve the Performance Criteria set forth in Appendix 1.

U.S. EPA and Ohio EPA shall review each CAP submitted by NEORSD. The Agencies may request clarifications or supplemental information to make informed decisions on each CAP. Upon the conclusion of reviews of the CAP, the Agencies will approve the CAP, approve with conditions, or disapprove the CAP. If a CAP is disapproved, NEORSD must submit a revised CAP addressing the deficiencies identified by U.S. EPA and Ohio EPA in the initial CAP. NEORSD shall implement those measures set forth in the approved CAP in accordance with the schedule in the approved CAP.

##### **2.4.4.1 Green Infrastructure Measures Implemented Pursuant to Appendix 4**

Proposals to substitute green infrastructure control measures for gray infrastructure control measures will include a description of post-construction monitoring and modeling to be performed to determine whether the Performance Criteria set forth in Appendix 1 will be met upon completion and implementation of the control measures outlined in the Proposal. NEORSD shall implement the post-construction monitoring of green and gray infrastructure as described in approved proposals. If green infrastructure post-construction monitoring does not demonstrate that constructed green infrastructure components are meeting the Performance Criteria in a Typical Year on which the substitution was based, NEORSD may implement early corrective measures to address identified deficiencies. Early correction actions may include measures such as constructing additional green infrastructure capacity or increasing the size and/or capacity of gray infrastructure control measures. Stipulated Penalties will not accrue and become payable if an individual green infrastructure control measure is not meeting the criteria on which the substitution was based beginning at the time the green infrastructure control measure begins operation. However, stipulated penalties will



accrue and become payable as of the date of Achievement of Full Operation as defined in Appendix 1 if at the time the pertinent green and gray control measures together are not meeting the Performance Criteria for a Typical Year.

## **2.5 Quality Assurance/Quality Control**

An important component of any CSO quality sampling effort includes sample preservation, handling, and shipping; chain of custody documentation; and quality assurance and quality control (QA/QC) procedures. The QA/QC procedures are essential to ensure that data collected in environmental monitoring programs are useful and reliable. NEORSO will employ quality control procedures to ensure consistent delivery of quality work and products for all aspects of the PCMP. The quality control procedures include documentation for the following:

- Monitoring and field measurement activities
- CSO outfall monitoring activities including installation activities, calibration records, field truthing equipment and maintenance, and data downloads
- Field sampling activities
- Laboratory analysis activities
- Rainfall monitoring activities
- Data retrieval, management and analysis activities
- Quality control reviews of all internal and external deliverables

### *Flow Monitoring Data*

Data will be reviewed continually throughout the monitoring program by a data analyst to identify data gaps, questionable data, estimate uncertainty in flow data, and monitor service or gage maintenance needs. The data will be reviewed for the following items:

- consistent diurnal patterns, as applicable
- consistent flow vs. level patterns
- consistent level vs. velocity patterns (i.e., scatter graphs)
- correspondence with field points and wet weather responses to rainfall

Questionable data will be flagged and the raw data will be converted into final data by editing questionable data, where possible.

Upon installation and activation of each flow meter, field crews will take manual depth and velocity readings (when there is a reasonable amount of flow present) using independent instrumentation to confirm that the monitor in-situ yields data representative of actual field conditions, and to quantify uncertainty in the instrument's measurement of flow. All measurements, adjustments, and efforts undertaken during site visits will be logged. In addition to the manual measurements taken at installation, routine calibrations will be performed throughout the flow monitoring period including at least two wet weather calibrations. These routine calibrations will provide an independent confirmation that the meters are working properly.



*Water Quality Data*

The NEORSD Analytical Services Quality Manual and associated Standard Operating Procedures are on file with Ohio EPA. The Quality Assurance Officer at Analytical Service will send updates, revisions and any information on document control to Ohio EPA as needed.

## **2.6 Progress Reporting and Final Post Construction Monitoring Procedures**

The post-construction monitoring program will evaluate whether CSO control measures are achieving the Performance Criteria. It will also assess water quality conditions in CSO receiving waters within the NEORSD combined sewer service areas against the baseline conditions identified in the CSO Phase II Facilities Plans for the Easterly, Southerly and Westerly districts. This section discusses how progress will be reported to the U.S. EPA, Ohio EPA and the public.

### **2.6.1 Final Post-Construction Monitoring Program Report**

Within three years following Achievement of Full Operation for all of the LTCP projects, NEORSD shall submit a Final PCMP Report to the U.S. EPA and Ohio EPA for their approval, containing a consolidation of all of the information identified in Section 2.4.2, Section 2.4.3 for each control measure, the results of the final district-by-district rainfall and activation monitoring of all CSOs listed in Table 2.2, a re-validation of the collection system models using the aforementioned CSO activation monitoring results for the outfalls listed in Table 2.2 for each District, water quality monitoring results, effluent testing results, plus any additional relevant information collected since submittal of the Control Measures Reports. The purpose of the Final PCMP Report shall be to evaluate and document the performance of NEORSD's fully implemented LTCP CSO control measures on a system-wide basis (based upon CSO activation data and water quality monitoring). The report shall include an assessment of whether the improvements are meeting the Performance Criteria in accordance with Appendix 1 (CSO activation frequencies, bypass frequencies) and the performance criteria in Appendix 3, and water quality based numeric and/or narrative effluent limitations applicable to CSO discharges in NEORSD's NPDES Permits. NEORSD shall also provide a further assessment of the long-term trends in water quality of NEORSD's receiving waters. If the Final PCMP Report fails to demonstrate that the Performance Criteria in Appendix 1 and the performance criteria in Appendix 3 are met, NEORSD shall include in the report whatever further re-evaluation or corrective action necessary to meet the Performance Criteria in Appendix 1 and the performance criteria in Appendix 3 as well as a schedule for such re-evaluation or corrective action. NEORSD shall then implement any further re-evaluations or corrective actions in accordance with the approved Final PCMP Report.

### **2.6.2 Progress Reports to Public**

Public involvement, information and education is an important part of the overall LTCP Program development approach recommended by U.S. EPA's CSO Control Policy and utilized by NEORSD in the development of the control program. As part of the PCMP,

public outreach activities will continue with periodic updates using various media available to NEORSD. Available media will include the NEORSD website, local newsprint, radio and television. Updates will include status of remaining construction projects, improvements or trends in monitored water quality parameters any available anecdotal evidence from public's interaction with the waterways.

## **2.7 Summary**

NEORSD's Post-Construction Monitoring Program will determine the effectiveness of the CSO control program in achieving its performance requirements and water quality objectives. The program includes the following elements:

- Implementation of a defined monitoring program designed to measure reductions in overflow activations and changes in stream water quality
- Analysis and assessment of monitoring data and/or model simulation results to determine whether implemented CSO Control Measures are meeting the Performance Criteria in Appendix 1
- Analysis and assessment of in-stream monitoring data to establish trends in stream improvements
- Preparation of Control Measures Reports and a Final PCMP Report to document the success of the LTCP implementation or identify any shortcomings and necessary corrective action
- Dissemination of information on the LTCP implementation to NEORSD's rate payers and Cleveland area general public

NEORSD's Post-Construction Monitoring Program addresses the U.S. EPA and Ohio EPA requirements for monitoring the performance of the CSO control measures. NEORSD will use the Performance Criteria in Appendix 1 as performance measures to determine the effectiveness of the overall LTCP CSO control measures, augmented by any additional green infrastructure improvements. NEORSD will use existing monitoring systems, augmented as necessary, to collect and evaluate data. This includes flow and/or activation monitoring, in-stream sampling, plant sampling and rain gauge monitoring. NEORSD shall also use the appropriate LTCP CSO hydraulic models to measure performance of the CSO control measures as described in Section 2.4. NEORSD shall submit Control Measures Reports to the U.S. EPA and Ohio EPA, as required, to demonstrate performance and achievement of LTCP objectives. In addition, NEORSD shall prepare public information reports to educate the public on the advancement of the program and the effectiveness of the control measures being implemented.