Vermont

Combined Sewer Overflow

Long Term Control Plan Guidance Document

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Introduction

Combined Sewer Overflows (CSO) pose a threat to water quality in Vermont. In order to protect public health and aquatic resources it is necessary to control the pollution loading from these overflows. There are many important factors to consider in this process including impacts to existing public and private properties, costs and other contributions to water pollution. This process will take time, will likely require iterative solutions, and will require public input. This document provides guidance for developing a Long-Term Control Plan (LTCP) so that communities can comply with state and federal requirements related to combined sewer overflows.

Overall Goal of CSO LTCP

The goal of creating and implementing a CSO LTCP is to achieve compliance with water quality standards in the receiving waters. There are no longer restrictions on when wet weather discharges may occur, but the discharges must be in compliance with the Vermont Water Quality Standards (VWQS). Each CSO and receiving water is unique and careful consideration will be necessary to develop a plan that will demonstrate that CSO discharges are in compliance with the VWQS.

Integrated Water Quality Planning

Some municipalities may choose to pursue an integrated planning approach for their water quality issues. This process is more holistic than one which solely addresses combined sewer overflows and has a great deal of overlap with the preparation of a CSO LTCP. The EPA issued a guidance document for integrated water quality planning: *Integrated Municipal Stormwater and Wastewater Planning Approach Framework* in May 2012 and an associated document: *Financial Capability Assessment Framework* in November of 2014. These documents should be used in conjunction with this guidance document to prepare a CSO LTCP in communities who have implemented an integrated planning approach. The financial capability document may also provide useful guidance for communities who are preparing their CSO LTCPs.

History of CSO regulations

In 1989 the Environmental Protection Agency (EPA) issued their Combined Sewer Overflow Control Strategy. This policy identified CSO discharges as point sources of pollution subject to both technology and water quality-based controls. The strategy contained three objectives:

- To ensure that if CSO discharges occur, they are only as a result of wet weather;
- To bring all wet weather CSO discharge points into compliance with the technology-based requirements of the Clean Water Act (CWA) and applicable State water quality standards; and
- To minimize water quality, aquatic biota, and human health impacts from wet weather overflows.

The 1989 Strategy also clarified that CSO discharges are not subject to the secondary treatment requirements of publicly owned treatment works. It required the States to develop their own CSO Strategies by January 15, 1990. These policies were to contain guidance for identifying and permitting CSOs, prioritizing CSOs for treatment or elimination, setting compliance schedules, implementing technology-based controls, monitoring CSOs and modifying water quality standards. The 1989 Strategy

contains the basic elements of what would later be known as the 9 Minimum Controls (9MC) which will be described in further detail below.

In 1990 Vermont developed their Combined Sewer Overflow Control Policy. This policy prioritized the elimination of CSO discharge points unless municipalities could demonstrate that the difference between eliminating the CSO and providing the controls required to comply with technology and water quality based effluent limits controls made elimination clearly unreasonable, and that the municipality successfully petitioned the State to reclassify the receiving waters as Class C. Class C waters have been renamed Waste Management Zones. Permitted CSOs were required to comply with the primary treatment requirement and/or best management practices similar to the 9MC. This Policy required treatment systems for CSOs to be sized for a 24-hour, 2.5-inch storm, and it reserved the right for the State to require a large design storm on a case by case basis. This policy also established that permittees were responsible for conducting water quality monitoring in order to demonstrate compliance with water quality standards and designing and constructing treatment facilities necessary to achieve water quality standards. Monitoring programs required the approval of the State prior to implementation.

In 1994 the EPA issued a Combined Sewer Overflow Control Policy in order to update and clarify their goals from the 1989 Strategy. This policy set up the current Federal framework for addressing CSOs and the following four principles to ensure that any plan to control CSOs is both cost effective and meets the objectives of the Clean Water Act:

1. Providing clear levels of control that would be presumed to meet appropriate health and environmental objectives;
2. Providing sufficient flexibility to municipalities, especially financially disadvantaged communities, to consider the site-specific nature of CSOs and to determine the most cost-effective means of reducing pollutants and meeting CWA objectives and requirements;
3. Allowing a phased approach to implementation of CSO controls considering a community's financial capability; and
4. Review and revision, as appropriate, of water quality standards and their implementation procedures when developing CSO control plans to reflect the site-specific wet weather impacts of CSOs.

The 1994 EPA Combined Sewer Overflow Control Policy also expanded upon the best management practices describe in the 1989 Strategy. These practices are called the 9 Minimum Controls (9MC) and are described below.

In 2016, the State of Vermont issued Environmental Protection Rule Chapter 34: Combined Sewer Overflow Rule which superseded the 1990 CSO Control Policy. This rule clarified the requirements for municipalities to control CSO discharges and modified the 9MC to apply to Vermont. This rule lays out the requirements for a CSO LTCP and, in combination with the 1994 EPA CSO Control Policy, forms the basis of this document.

Overview of Long-Term Control Plan Requirements

The Vermont CSO Rule (Environmental Protection Rules, Chapter 34, adopted August 25, 2016, effective September 15, 2016) requires that municipalities with CSO outfalls develop a LTCP to protect public health and the designated uses of receiving waters by controlling the discharge of pollutants from CSO outfalls. Each community has a unique set of assets and concerns, and this guidance document is

intended to allow for flexibility in both document preparation and the technical approaches used to address water quality issues. Some of the recommendations are found in the VT CSO Rule while others are based upon EPA CSO LTCP guidance. In general, a LTCP should include:

- An executive summary that makes it easy for the public to understand how their municipality intends to control or eliminate CSOs.
- A description of actions already taken to address CSOs;
- An evaluation of existing conditions within the affected drainage catchments;
- A set of criteria to evaluate the water quality issues in the receiving waters and alternative projects to address these issues;
- A collection of potential projects designed to ensure that discharges from the Combined Sewer System (CSS) meet the VWQS, the VT CSO Rule and any applicable orders under 10 V.S.A. Sec. 1272 ("1272 Order");
- An evaluation of and prioritized schedule for selected projects;
- A financing plan to design and implement the CSO control projects;
- A plan to monitor water quality during and after implementation of the selected projects in order to determine if the chosen criteria have been met; and
- An assurance that new sources of stormwater and wastewater to the CSS do not increase the volume, frequency or duration of CSO events.

Guidance for each of these components is provided below. The actual format of the LTCP may take multiple forms depending upon the actions already taken by the municipality, the format of existing documentation, funding source requirements and the preferences of the plan preparers. For communities that expect to apply for state and federal funding in the creation or implementation of its LTCP the reports and associated planning documents should be drafted according to the Preliminary Engineering Report (PER) format.

Minimum CSO LTCP Requirements

The VT CSO Rule establishes the minimum legal requirements for a LTCP document. The 1272 orders issued to communities with CSOs clarified what each community's obligations are regarding combined sewer overflows. Those elements must be present in the final document. This document presents a wide variety of guidance for achieving compliance with the VT CSO Rule. Not every element included in this guidance is needed in every situation, and the strategy pursued by each municipality will dictate the elements needed, and the level of effort needed for each element.

If eliminating CSO outfalls is not the strategy being pursued, then sufficient data will need to be collected to reasonably demonstrate that CSO discharges do not cause violations of VWQS. Compliance can be achieved at either the end of the pipe, which will require collecting and analyzing samples from the effluent, or in a mixing zone or waste management zone. If compliance is going to be achieved in a mixing zone/waste management zone, then samples will need to be collected from the receiving waters and the effluent.

While this guidance document contains suggestions for monitoring combined sewer systems, thought should be put into monitoring all of the collection systems (combined sewer, sanitary sewer, storm drains) in a municipality with the intention of identifying and addressing water pollution problems

in the collection systems, at the wastewater treatment plant and in the receiving waters. This should be done because many CSO solutions will involve redirecting storm water away from the CSS and WWTF and into the storm drains. Point source discharges from storm drains are the responsibility of the municipalities but are not addressed by the VT CSO Rule or this guidance document. Knowing the flow and chemical makeup of the sewage is helpful in both operating the WWTF and in identifying the sources of pollution. The Agency will work with municipalities to determine if CSS separation projects require stormwater permits on a case by case basis.

Modelling collection systems is also a suggestion found in this document. It is highly advisable to prepare and calibrate a computer model that correlates precipitation with CSO discharges but may not be necessary depending upon the chosen strategy. Consideration should be paid to how complicated a model is necessary to address a particular community's CSO issues, and how to balance the cost of the modelling effort against the risks of designing projects to account for unknown flows.

Municipalities should consider a Request for Proposals (RFP) process that allows for consultant to tailor their proposals for CSO LTCP preparation to the actual level of effort required for the community. It may be worthwhile to hire a consultant familiar with the preparation of similar plans to conduct a technical review of the proposals in order to determine if the level of effort proposed is appropriate, or to help with the preparation of the RFP to more accurately determine the specific needs for the municipality.

Existing Conditions Characterization

Evaluating existing conditions and developing a strategy to address water quality concerns requires some baseline technical work. Throughout this section, and this document as a whole, it is important to remember that these are suggestions on how to address water quality issues related to CSOs. Any references to storm drains or the sanitary sewer are intended as guidance for examining receiving water quality in a holistic manner. Full characterization of storm drains and their impact on water quality are beyond the scope of this document.

Location Information

It is important that the readers of a CSO LTCP (regulators, WWTF operators, road crews, the general public, etc.) be able to identify where specific features (pipe outfalls, diversion structures, river crossings, etc.) are located. It is also important to have an accurate accounting of the location and characteristics of the collection system so that it can be modeled with the necessary degree of accuracy. The professionals developing any models or graphics for the LTCP should be consulted prior to large scale data collection efforts in order to restrict those efforts to what is necessary to construct models of sufficient resolution.

The amount of information already available, either in electronic or paper form, will be an important factor in determining the cost to develop a model. Many communities have already used GIS to map their infrastructure and this information can be obtained from the Vermont Center for Geographic Information (VCGI). Some communities have already gathered GIS location information for their collection systems. The Agency of Natural Resources Natural Resources Atlas is another option for viewing this data and contains other information and tools that may be of use in the preparation of a CSO LTCP. Communities with a robust asset management program are likely to already have much of the information about their collection systems available, possibly in an electronic format.

Modelling

It is anticipated that modelling will be necessary for characterizing the responses of collection systems to a variety of design storm events. The complexity of the model will be dependent upon the complexity of the system(s) being modelled. It is anticipated that most CSO LTCPs will involve modeling the watersheds contributing flow to the combined sewer system, the other collection systems, and the receiving waters.

Some municipalities with infrequent CSO events may be able to use a simple list correlating precipitation events with discharges. Other municipalities with more frequent overflows, or who intend to install more advanced systems to control flow volumes in real time will require a more complicated model. Decisions about which specific model(s) to use should be determined in consultation with the modelling professionals working on a specific CSO LTCP.

Watershed Modelling

There are a variety of ways to estimate the hydrologic response of a watershed or sewershed to a precipitation or snowmelt event. Some are very simple and require very little data. Others are more complex and produce more accurate flow estimates but require that a great deal of data be collected about the watershed. Some models are for single design storm while others can estimate the effects of cumulative storms. A model should be chosen that provides the flow data necessary to accurately model the collection systems and receiving waters while also meeting the budgetary and time constraints of the municipality.

Collection System Modelling

A model of the collection system(s) should be prepared to predict the volume and frequency of CSO discharges. It should also be used to evaluate how proposed CSO control strategies will affect flows. The complexity of the model will likely depend upon both the complexity of the collection system, and the control strategies being pursued. A collection system with gravity flows and only a few pipes will not require as complicated a model as one that has multiple pump stations, force mains and a complicated pipe network. Similarly, modelling a hydrodynamic separator at the end of the pipe location may require less effort than modelling a system using real time controls and pumping to store flows in areas with excess capacity.

Collection System Modelling Tools

There are a variety of tools and techniques available to modelling professionals. They vary in price, capability and data requirements. Some are highly specialized, and some are simple spreadsheets. The decision on what model(s) to use should be made in consultation with qualified professionals.

The EPA has developed a free modeling tool called SWMM (Storm Water Management Model) that is designed to model collection systems and their responses to precipitation. There are many commercial adaptations of this product available, and other models are available from vendors.

The EPA has also prepared guidance documents and associated forms called LTCP-EZ and Green LTCP-EZ. These forms are intended to be used by smaller communities in the preparation of their CSO LTCPs and may be of use. However, the LTCP-EZ forms are based upon the assumption that up to 4 CSO discharges are allowable annually, and this is only true in Vermont if those discharges do not violate the

VWQS, so these forms should be used with the understanding that they may not lead to an acceptable LTCP depending upon the specifics of each community.

Receiving Water Modelling

There are two main reasons that the receiving waters should be modelled when preparing a CSO LTCP. The first is that the collection system modelling can be influenced by conditions at the outfalls. Are the outfalls under water? 1' or 20'? Tailwater conditions have a great deal of influence on pipe flow and knowing whether a particular outfall will be submerged could be of interest to designers and maintenance workers.

The second reason is that some communities may choose to model pollutants in the mixing and waste management zones. Receiving water modelling will be most important when the point of compliance with VWQS for CSO discharges is not the end of pipe.

Receiving Water Modelling Tools

There are a variety of tools and techniques available to model water quality in receiving waters. They vary in price, capability and data requirements. Many are available for free from government agencies but there are also commercially available packages that add functionality or improve usability.

One software tool that is available is the WASP (Water Quality Analysis Simulation Program) model developed by the EPA. This software is capable of modelling different types of pollution in multiple dimensions and in the water column. A variety of other modelling software is available from the EPA, the United States Geologic Survey and other sources. The decision on what model(s) to use should be made in consultation with qualified professionals based upon the specific conditions at an outfall.

Precipitation Monitoring

It is important to gather and analyze enough precipitation data with sufficient resolution so that they can be used to develop, calibrate and validate models of the collection systems and receiving waters affected by CSO events. Monitoring precipitation is part of the 9MC and should already be in place in communities with an order under 10 V.S.A. § 1272 related to CSOs. Provide a description of the precipitation monitoring that includes the location where the measurement is occurring, the type of monitoring equipment, a description of how the data is stored and transmitted, and any ongoing issues with the operation and maintenance of the instruments. The minimum requirements for a monitoring system are described in the VT CSO Rule:

> **(i) Establish and maintain a precipitation monitoring system. The system must provide unique precipitation amounts specific to individual CSO subcatchments. Such a system does not necessarily demand a precipitation recording device for each CSO outfall. Precipitation measurements shall be to the nearest 0.01 inches, continuous at a five-minute interval over the duration of a storm event, and indexed to time and date. If establishing a physical precipitation monitoring system, the municipality shall work to minimize impacts of wind and surrounding trees and buildings that may hinder the accuracy of precipitation recording**

devices. If a municipality proposes to use a system other than a physical precipitation monitoring system, the municipality shall get prior approval from the Agency.

As stated above, municipalities may use different precipitation measurement techniques than physical gauges located in each combined sewer system drainage area. If a different technique is proposed, then a short description of the technique along with its advantages and limitations should be prepared and submitted to the Secretary for approval prior to implementation. This could be included in the LTCP or it can be a separate document.

For precipitation monitoring during winter periods, identification of depth of liquid equivalent precipitation in the form of snow should also be addressed and identified as such, as snow is susceptible to inaccuracies using methods intended for measuring rainfall. When impactful, an estimate of total effective precipitation that includes both depth of rainfall and depth of water from snowmelt should be estimated. The National Oceanic and Atmospheric Administration is one source of information about snowmelt and precipitation.

Flow Monitoring Plan

It is important to gather and analyze enough flow information in the collection systems and receiving waters to be able to develop and calibrate accurate system models. Flow monitoring requirements will vary greatly between communities based upon their existing infrastructure, the nature of their receiving waters, the number of outfalls and the CSO control strategy(ies) being pursued.

Flow monitoring may be required in open channel and closed pipe networks which may gravity flow or be pumped. The approach to monitoring different flow scenarios will vary from municipality to municipality, and between different parts of the collection systems and receiving waters.

Purpose and Effort

There are three main reasons why flow should be monitored. Not every community will need to address all three. First, the CSO Rule requires that the CSO discharge flows be monitored. Each community that retains CSO locations will need to conduct this type of monitoring. The second reason is for modelling the collection system. Data will be needed to calibrate and verify the model of the collection system. This type of monitoring will probably be necessary in communities that develop a hydraulic model of their collection system. The third reason to monitor flow is to have data that can be used in real-time to operate the collection system, such as having dams, valves or pumps that can redirect flows based upon downstream conditions.

Questions to consider while preparing a flow monitoring plan include:

- What level of information is needed? Is just the occurrence of flow enough, or does the flow volume and rate need to be quantified? Consider whether flow should be monitored using a tell-tale block, or if more sophisticated equipment, possibly with telemetry capabilities, should be used.
- How accurate do the measurements need to be?
- What are the data storage and transmittal requirements of any equipment?

- Is the need for flow monitoring short term, such as collecting data for a model, or long term, to support ongoing system operations?
- What are the staffing requirements for installing and maintaining flow monitoring equipment?
- What are the hazards associated with installing and maintaining flow monitoring equipment?
- What are the costs to purchase, install and maintain the equipment? Does it make sense to hire a contractor and/or rent equipment?
- Are there existing systems in place that can be used?

Collection System Monitoring

Combined sewage flowing through the collection system(s) should be monitored in order to determine how much flows to the WWTF and how much overflows out of the system. Treated flows from the WWTF should also be quantified. Flow monitoring should be combined with precipitation monitoring data in order to attempt to correlate precipitation with overflows. A plan should be developed to ensure that the flows are monitored in the collection system under a variety of conditions and with adequate level of detail to analyze when CSO discharges occur and under what conditions.

Flow monitoring is already required in the combined sewer collection system under the 9MC so this plan may already exist. The plan should be reviewed to identify any areas where flow information is lacking and modified to obtain that information. A complete flow monitoring plan should be provided that contains information about where flows are measured, how they are measured, when they have been measured historically and how the measured flows were correlated with precipitation monitoring results.

If data from external groups will be used, the source and any limitations on that data should be described. Flow monitoring should be sufficient to calibrate and validate a model for all storms up to the chosen design storm to the satisfaction of the modeler and the municipality. Any limitations on model response to storms greater than those which can be calibrated using data should be described.

Monitoring locations and subcatchment boundaries should be shown on a map and flow results presented in tabular or graphic form in an appendix. Data should be stored in an electronic format to facilitate sharing and review and provided to others, including VT DEC, upon request.

Flow measurements in closed pipe networks will require balancing the feasibility of installing monitoring devices with the need to capture accurate data and to avoid interfering with the operation of the collection system. A plan should be developed in consultation with qualified professionals. For larger systems, or ones which intend to continue the use of CSOs rather than eliminate them, it may be worthwhile to install specialized monitoring manholes to improve the quality of flow data and to make it easier to access and maintain equipment. A determination should be made about the relative costs and benefits of utilizing monitoring equipment with telemetric capabilities. Remember to consider the restrictions imposed upon workers by confined spaces or other hazards when developing a flow monitoring plan.

Receiving Water Monitoring

Receiving waters should also be monitored so that information about the receiving water quality and river stage can be used in the models for the collection systems(s) and for design purposes. They are also useful in determining the pollutant concentrations resulting from the mixing of CSO discharges with the receiving water, and for determining the extent and characteristics of any mixing zones or waste management zones.

To the extent possible, existing flow monitoring systems should be considered for use in understanding and addressing CSO concerns, especially in receiving waters. If existing gauging stations are proposed for use the degree to which those measurements accurately reflect flow at the outfalls should be discussed and the gauge should be clearly identified. For lakes and impoundments there may be existing locations that report the water level which can be used for modelling purposes.

Flow measurements in open channel systems should generally follow the procedures found in the EPA's National Nonpoint Source Monitoring Program Technotes 3: Surface Water Flow Measurements for Water Quality Monitoring Projects and as outlined by the United States Geological Survey technical reports (Rantz et al., 1982; Turnipseed and Sauer, 2010). If the permittee plans on requesting a mixing zone, then an engineering study should be conducted to determine the degree and rate of mixing. Data and analysis for a Waste Management Zone should be provided in an alternatives analysis for control strategies that involve the creation of a new Waste Management Zone.

Monitoring Plan

It is important to gather and analyze enough data to characterize the contributions of the collection systems to the receiving waters. Collecting data in a well thought out and orderly manner will help to ensure that useful, reproducible data are obtained. Existing data should be reviewed in order to identify areas where data are missing or insufficient and should be collected.

After reviewing the available data and known water quality impairments, thought should be put into whether or not monitoring for water quality is required, and which waters need to be monitored. If the municipality intends to remove CSO outfalls in the near future, then monitoring for biological and chemical pollutants in both the receiving waters and combined sewer system is unnecessary for the CSO LTCP. If the pollutants of concern within a particular CSO discharge can be addressed by primary treatment and disinfection, then end of the pipe sampling and testing may be all that is required. If CSOs cause water quality concerns that are not amenable by primary treatment or disinfection, then monitoring in both the combined sewer system and the receiving waters will likely be required. A plan should be developed that:

- Identifies the pollutants of concern and other water quality parameters that should be measured. Pollutants of concern include any pollutants that are present in concentrations sufficient to violate VWQS or which could negatively impact collection and treatment systems. Pollutants identified in a current or proposed TMDL or on the VT 303(d) list for the receiving water should be included. Pollutants that prevent the attainment of designated uses should be included. Other water quality parameters that should be measured include those which influence the toxicity of pollutants such as temperature, pH and hardness.

- Identifies the sampling locations. This information should be provided in both tabular and graphical formats. Include Latitude and Longitude coordinates.
- Identifies when samples should be collected. Samples should be collected to characterize each storm up to the design storm. Composite samples should represent a minimum of 90% of the storm flow for each storm including the first inch of precipitation. Grab samples should be obtained during the first flush (first inch of precipitation) at a minimum. For CSOs that do not discharge until after 1" of precipitation has fallen, grab samples should be collected during the beginning portion of the discharge. Consider using multiple grab samples to determine if there are temporal trends in the combined sewer system flows, i.e. do E. coli levels drop after the first flush or are they relatively consistent?
- Estimates the cost to collect and analyze samples required per storm and on an annual basis. This will help bring the sampling effort into alignment with available funding.
- Provides sufficient data to accurately characterize the pollutant loads in the collection systems and receiving waters. These data will play a large role in determining the effectiveness of CSO control projects.

Quality Assurance Project Plan

In order to ensure that data collected and analyzed for determining compliance with VWQS is of sufficient quality, a quality assurance project plan is required. The quality assurance project plan should be formatted following the EPA's or VT DEC's Quality Assurance Project Plan (QAPP) templates and guidance documents. Existing QAPPs are available for reference, and will contain much of the required information regarding testing methods, containers, preservatives, hold times, etc. They will require customization for each project or municipality. QAPPs should be included in an appendix so that they can be easily separated for use. The QAPP should:

- Identify the people (or positions) who will be responsible for various portions of the data gathering and analysis.
- Identify the sample containers, any necessary preservatives, sampling method (grab vs composite), hold times, analysis method and storage requirements. Methods and materials used to demonstrate that water quality standards have been met should comply with 40 CFR 136, however other methods may be used for investigatory and screening purposes.
- Identify the requirements for blanks and duplicates.
- Identify the acceptance criteria for data, including data from outside sources.
- Identify the laboratory(ies) that will conduct the analysis and provides verification that they will be able to receive samples within the required holding times.

Design Storm

Discharges to the waters of the State must meet water quality standards regardless of whether they are caused by a precipitation event. Unlike the Federal CSO Policy, the CSO Rule does not create the presumption of compliance for CSO discharges for storms of a particular size or duration. CSO controls should be designed to handle the largest storms necessary to meet water quality standards.

The 5-year recurrence interval storm described in the CSO Rule is not intended to be a **mandatory** design standard. The Agency **recommends** that interim CSO controls are evaluated and

designed based on storms with a theoretical 5-year recurrence interval, also known as the 5-year design storm. The CSO Rule requires that the response of the combined sewer system, the characteristics of overflows and the water quality impacts from CSOs for a range of precipitation events up to the 5-year design storm be evaluated. CSO discharges resulting from storms greater than the 5-year design storm must comply with the VWQS, but the Department will accept management up through the 1-hr and 24-hr 5-yr storms as appropriate interim measures until the appropriate design storm can be identified and a plan created that will meet water quality standards for that storm event.

The size and characteristic of the design storm for each CSO drainage area should be determined by the municipality. Different design storms may be necessary for each CSO drainage area depending upon the hydrologic characteristics of the drainage area and the hydraulic performance of the collection systems. An iterative approach that evaluates the performance of each proposed alternative in conjunction with CSO modelling for a variety of storms is suggested. The chosen storm and justification for it should be presented for each CSO drainage area.

Once a design storm has been identified by the municipality, the behavior of the existing and proposed combined sewer systems should be analyzed and described in both narrative and tabular formats. It may also be appropriate to model performance of these systems for larger storms (10, 25, 50, 100-year recurrence intervals), or other storms (such as short duration, high intensity storms) if modelling or experience indicates that those storms cause overflows. Modelling should be performed with the goal of informing design decisions. Storms with shorter recurrence intervals are often used to assist in the design of CSO controls while storms with longer recurrence intervals are usually used to look at overall system performance, such as predicting where the collection system may surcharge and overflow upstream of the intended outlet(s). Expected pollutant loads from any combined sewer system discharges and within the receiving water should be included in the reported data. It is recommended that rainfall data be obtained from NOAA Atlas-14 or its official update for storm events.

Provide a narrative description of the effects of storms larger than the design storm on CSO discharges and the performance of the WWTF. This description should identify the largest storm that can be treated at the WWTF as well as the largest storm that can be contained within the combined sewer system without damaging private property or the combined sewer system itself.

Summary of Responses to CSOs

Occurrences

Provide a narrative summary of previous CSO events as well as a table of known CSO events for the five years preceding the preparation of the initial LTCP. The table should include as much information as is available including locations, dates, estimated volume and duration, magnitude of precipitation events and any other information considered relevant. For subsequent revisions of the LTCP a new summary of CSO events in the preceding 5 years should be prepared and the previous summary should be moved to an appendix.

9 Minimum Controls Implementation

The 9MC are technology-based controls that are required irrespective of water quality in the receiving water. Describe how the 9MC described in Section 34-402 of the VT CSO Rule have been implemented. Other sections of the plan can be referenced for brevity. These controls are:

(1) Proper operation and regular maintenance programs for collection systems and CSO outfalls;
(2) Maximum use of the collection system for storage without endangering public health or property, or causing solids deposition problems;
(3) Review and modification of pretreatment requirements to assure that CSO impacts are minimized;
(4) Maximization of flow to the treatment plant for treatment consistent with an evaluation of alternative treatment options;
(5) Prohibition of CSOs during dry weather;
(6) Control of solid and floatable materials in CSOs;
(7) Establishment of pollution prevention programs to minimize contaminants in CSOs
(8) Public notification to ensure that the public receives adequate notification of CSOs and CSO impacts, which shall, at a minimum, comply with § 34-404 of this Rule;
(9) Monitoring to effectively characterize CSO impacts and the efficacy of CSO controls

Please refer to the VT CSO Rule for a more complete description of the monitoring and reporting requirements.

1272 Orders

Provide a narrative summary of actions taken in response to previous 1272 orders and any other regulatory orders related to CSO discharges. Reference may be made to effectiveness studies on file with the Agency or other sections of the plan for the sake of brevity. A summary of funds spent to comply with the 1272 order(s) should be provided. Specifically, the date at which an order first required characterization of the CSO impacts and the efficacy of the CSO controls should be identified and the efforts made to comply with this should be described.

Existing Conditions

In order to formulate a plan to control CSOs it is necessary to describe the existing conditions under wet weather conditions. This should be done for the drainage areas that drain to the receiving waters, the collection systems that transport the water to the receiving water, the existing wastewater treatment facilities, any existing stormwater infrastructure of note, and for the receiving waters themselves. The degree of effort put into characterizing each of these should be determined in consultation with the professionals working on the CSO LTCP.

Existing Drainage Area

The area contributing flows to each combined sewer outfall should be characterized. This should include sufficient information about the drainage area for a reader to gain familiarity with the size of the area, the amount of impervious surfaces, the land uses, the density of the development within the area, the topography, soil types, any dischargers whose effluent is expected to have a significant contribution to the volume of flows in the collection system or to the pollutant load, and any other conditions considered relevant to the area by the municipality or modeler. A map, or multiple maps, should be used to show each drainage area. Consider placing maps in an appendix so that they can be of a usable scale. GIS also is a useful tool that can be used, but it should be supplemented with maps that can be viewed without the use of GIS software.

Existing Collection Systems

The existing collection systems should be described. This includes:

- The location, size, slope, condition of, age of and material composition of major lines, trunk sewers and drainage structures.
- Pipes should be identified as either a gravity line, siphon or a force main.
- The location, pumping rate and storage capacity of pump stations.
- The location and size of each outfall or overflow location.
- Known problems or limitations in the system, especially when experiencing wet weather flows.
- Information about pollutants transported by the systems.
- Flow data.
- Elevation data as necessary for modelling purposes.
- Any existing end of pipe treatment such as a Wastewater Treatment Facility (WWTF) should be noted and described in the Existing Wastewater Treatment Facility section below. This includes primary treatment and disinfection systems located within the collection system(s).
- The location of stormwater infrastructure should be noted and described in the Existing Stormwater Infrastructure Projects section below.

This data should be presented in a combination of narrative text, graphics such as maps, and in tables. The use of appendices should be considered if it improves the readability of the report or maps.

Hydraulics of the collection system

A narrative description of the collection system(s) hydraulics should be presented. This may benefit from having a model of the system(s) developed, or it may be possible to describe the behavior of the system based upon the anecdotal knowledge of someone with experience with the system. This description should include what conditions cause a CSO discharge, and what areas of the system are hydraulically inadequate. Hydraulically inadequate areas are those where pipe size, pipe slope, blockages, pipe conditions or other problems within the collection system prevent the maximum amount of combined sewage from flowing to the WWTF without creating overflows during wet weather conditions. Describe how these hydraulic inadequacies present themselves: ponding, water flowing out of structures, exfiltration, infiltration, discharges of untreated combined sewage flows, etc. An assessment of required steps to eliminate the hydraulic inadequacies should be presented. Consider the use of tables or graphs to correlate problems, environmental conditions or maintenance practices with overflow events.

Pollutants in collection system

Any information collected by the municipality regarding the concentrations and loads of pollutants in the waters entering, within or exiting each collection system should be summarized in this section and presented in a tabular form in an appendix. At a minimum this data should include time/date of sampling, location and the concentration of the pollutants. Contemporaneous flow rates/volumes should be presented to the degree possible in order to estimate pollutant load.

The emphasis for pollutants carried by the collection system should be placed on pollutants that pose a threat to the collection system, to the WWTF, to the receiving waters and to public health. These include BOD from high strength waste sources, bacteria, toxic substances, FOG (fat, oil, and grease) and floatables. Each community should holistically examine the water quality issues in their receiving waters

and within their collection systems to determine which pollutants should be characterized. Special consideration should be made for any pollutants for which the receiving water is subject to a TMDL (Total Maximum Daily Load), pollutants which have resulted in the receiving water being on the 303(d) list and pollutants that either pose a threat to the WWTF and collection system, or which are unamenable to treatment by the available processes.

Discharges from the collection system at CSO locations is prohibited during dry weather, and the contents of the collection system change dramatically under the influence of storm flows. Some of the pollutant sources will be the same regardless of weather conditions, such as domestic sewage, while the pollutants associated with precipitation are expected to be more variable. For the purposes of preparing a CSO LTCP wet weather flows of mixed sewage and stormwater are what should be characterized. Characterizing dry weather flows may provide additional information, including valuable clues about the sources of pollution, but by definition dry weather flows do not need to be addressed by a CSO LTCP.

Problem areas within the system

Provide a description of areas within the systems that are known to present operational or maintenance problems, and a description of the problems. **Describe how these problems contribute to CSOs discharges.** Include details on actions that are taken on a regular basis to correct these problems, and necessary steps to eliminate the problems (if possible). Some examples of problems include root intrusion, reduced capacity due to accumulation of sediment or fat, oil, and grease (FOG) or pumps that routinely get clogged by rags.

Maintenance and operation of the system

Maintenance practices play an important role in how effectively a combined sewer system can convey flows to the WWTF. Provide a summary of regular maintenance activities performed in the combined sewer system and any problems that required repairs beyond what would be considered maintenance. Describe how those maintenance activities affect the ability of the system to transport combined sewer flows or the pollutant loads in the discharge. For example, does flushing lines remove accumulated sediment that could cause an overflow? If the lines were not flushed would that sediment be discharged to the receiving waters? Does regular video inspection allow the municipality to schedule repairs before an emergency occurs? If storage tanks are present, are they washed after use?

Existing Wastewater Treatment Facility (WWTF)

The existing Wastewater treatment Facility(ies) should be described. This should include:

- the location of the plant(s),
- the location of the outfall(s) and information about mixing zones and waste management zones,
- history of repairs and renovations,
- a general evaluation of the its condition.

Please describe the hydraulic capacity of the plant under typical conditions and under storm conditions. Identify how much hydraulic capacity is available for wet weather treatment and if the plant operates differently during a storm. Any existing mixing zones or waste management zones should be included on maps of the collection systems.

Existing Stormwater Infrastructure Projects

Describe existing stormwater infrastructure projects that have been constructed in order to reduce, capture, treat or attenuate stormwater flows to the combined system. This may include Green Infrastructure projects as well as more traditional Grey Infrastructure projects. Grey Infrastructure refers to systems made of steel, plastic, rubber and concrete (as well as other materials) that are composed of pipes, pumps, tanks, machinery and other components that are not designed to closely mimic the natural water cycle. Publicly funded projects and projects whose construction was compelled by governmental agencies should be included. If information is available about large scale or otherwise significant projects located on private property this information should also be considered for inclusion. These descriptions should include:

- location of project and bounds of contributing drainage area
- what does the stormwater infrastructure do? Infiltrate, attenuate, treat?
- What volume of stormwater can the project handle? Depth or rate limited?
- Where does treated water go? Does it reenter the drainage system?
- Describe how the infrastructure changes the water quality. Are any pollutants increased by this?

Stormwater infrastructure projects should be included in any models used to predict the behavior of the collection systems. The destination of infiltrated water should be identified, and volume and flow rates should be estimated for water that reenters the collection systems or receiving waters. The results and assumptions used for any groundwater mounding analysis should be provided.

Receiving Waters

The receiving waters for each collection system of concern should be described. The description should include:

- Name, type of water body, and the drainage basin it is in (i.e. Lake Champlain, Long Island Sound, Lake Memphremagog)
- Seasonal and storm related elevation changes and how they correspond with outfalls. If the receiving water is a stream or river describe flow rates.
- Any known water quality issues.
- Any known sensitive areas or receptors such as threatened or endangered species.

Designated Uses

Describe the Designated Uses for the receiving waters. Identify which uses currently exist and any uses that are not currently achievable due to water quality. Also identify any other factors that make any Designated Uses unachievable.

Designated Uses can be found in the Vermont DEC's 2012 Surface Water Management Strategy, in the Vermont Water Quality Standards, and in the Tactical Basin Plans for each drainage basin.

Water Quality

Provide a summary of the water quality for each CSO receiving water in both narrative and tabular format including all water quality data collected by the municipality and other publicly available data. Identify the pollutants associated with any impairments that preclude Designated Uses and their

likely sources. Information should be provided for waters both upstream and downstream from the CSO outfalls. Existing mixing zones and waste management zones should be taken into account.

At a minimum water quality data should include physical and chemical measurements. Biological data such as fish and macroinvertebrate assessments should also be considered. If the municipality has determined that additional evaluation criterion is appropriate, such as beach closures, then sufficient information should be provided to allow for a robust comparison of these criteria before, during, and after the final implementation of the CSO LTCP. Nutrient loading should be considered for any outfalls that discharge directly or indirectly into a nutrient impaired waterbody.

Some existing data can be found in the State of Vermont's Integrated Watershed Information System. Some information may be easier to find using the Vermont Agency of Natural Resources Natural Resources Atlas.

Hydrology

Describe the hydrology of the receiving water. This should include the drainage area at each CSO outfall and information regarding the range of elevations the surface of the water can be expected to be at seasonally or during storm events. For lakes, ponds, or impounded waters, seasonal high and low water elevations should be provided. For rivers and streams, provide flow and stage information for 7Q10, the Low Monthly Median Flow, Ordinary High Water, the chosen design storm for each CSO outfall and the 10, 25, 50, and 100-year recurrence interval storms. Floodways and the 100-year floodplains should be identified and shown on any appropriate maps or plans. The intent and purpose of investigating flows and stages during multiple storm events, including some that are not especially probable, is to encourage municipalities to design for and understand how their CSO controls and other drainage outfalls will perform under different circumstances.

Hydrologic information should be developed by a qualified professional using accepted methodologies. A description of the resources used, and methodology employed should be provided along with the numerical and graphical data.

Sensitive Areas

The VT CSO Rule identifies "sensitive areas" as: "designated Outstanding Resource Waters, designated National Marine Sanctuaries, waters with threatened or endangered species and their habitat, waters where primary contact recreation occurs, public drinking water intakes or their designated protection areas, and shellfish beds." These areas should be identified and their proximity to CSS, storm drain and WWTF outfalls should be shown on a map. Additional sensitive areas may be designated that reflect the concerns of the local community such as areas near schools, homeless encampments, historic resources or aesthetic resources. The Tactical Basin Plans contain information about some sensitive areas. As with other maps, the scale and size should be considered when placing maps in the text or an appendix.

Evaluation Criteria

It is the responsibility of each community with CSOs to develop and implement site specific solutions to water quality problems in the receiving waters associated with their outfalls. In order to develop and implement the solutions it is necessary to establish the criteria on which decisions will be made. There are two basic sets of criteria: Compliance Criteria and Project Alternatives Criteria.

Compliance Criteria

In order to achieve compliance with the VT CSO Rule municipalities must demonstrate that discharges from the CSOs will not cause exceedances of the VWQS. This can be done in several ways depending upon how the municipality decides to go about controlling CSO discharges.

CSO Elimination

The simplest way to demonstrate compliance with the VT CSO Rule is to eliminate the CSO outfalls. If the outfall doesn't exist anymore it is impossible for sewage to discharge through it, and therefore there are no effects on the receiving waters attributable to CSO discharges. To provide that this method has been successfully implemented the municipality should document that the CSO has been removed or permanently sealed and also document that there are no further discharges from that outfall in situations where the effluent pipe may extend for a distance beyond the interface with the CSS.

End of Pipe Compliance

The second way to demonstrate compliance is to show through a comprehensive sampling program that the waters discharged from the CSO meet the VWQS. To show that compliance with the VWQS is being achieved it is necessary to sample the effluent and analyze it for microbial and chemical pollution. These samples must be representative of the discharge under a range of flow conditions. It is likely that this method will require a minimum of primary treatment, and perhaps disinfection, of the outfall to comply with the VWQS.

Receiving Water Compliance

The third way to demonstrate compliance is to show through a comprehensive sampling program that discharges from the CSO mix with the receiving waters and that the mixed waters meet VWQS at the edge of a mixing zone or waste management zone. Samples will need to be collected at the edge of/end of the mixing zone/waste management zone with sufficient frequency to demonstrate compliance with VWQS when there is a CSO discharge. This compliance strategy is the most complicated because of the difficulty in obtaining representative samples during storm conditions.

Receiving water compliance can also be demonstrated through the use of a water quality model that has been calibrated against wet weather samples. A properly calibrated model may limit the need to collect samples in the receiving waters during all storm events by providing a mechanism to compare samples collected from within the collection system to expected water quality conditions in the receiving water.

Project Alternatives Criteria

A set of evaluation criteria is needed in order to evaluate and prioritize the alternatives for mitigating CSO discharges in each affected community. Some criteria to consider include: the likelihood that the alternative will reduce pollutant loads, the likelihood that the alternative will ensure that Designated Uses can be achieved, the ability of the alternative to reduce or eliminate CSO flows at the outfall, design costs, construction costs, operation and maintenance costs, aesthetics, land availability or requirements, community concerns, conflicts with other infrastructure, environmental impacts, construction duration, effects on sensitive receptors and phasing requirements. Costs should be analyzed for project lifecycle costs as well as for affordability. The EPA has existing and proposed guidance on affordability that should be followed. Communities should develop these criteria and use

them consistently when evaluating and prioritizing alternatives. It is strongly recommended that the public be involved in developing the evaluation criteria and that they have a chance to comment on the recommended alternatives. A brief description of some of the potential evaluation criteria can be found below but each municipality should refine and expand this list to meet their own needs.

Pollutant Load Reduction

The ability of a project to reduce the loading of pollutants of concern should be considered when evaluating and prioritizing projects. Each project should identify which pollutants it is expected to address, and the expected degree of treatment provided under various flow conditions. Flow may be considered to be a pollutant under some circumstances.

Project Costs

The overall lifecycle costs of a project should be considered in order to identify which projects will provide the greatest return on investment. Project costs will also influence the rate at which projects can be designed and constructed. Each alternative should have an estimate of costs to design, construct and operate the project as well as the expected useful life of the project.

Land Availability

The availability of land to construct and operate a project can be a significant factor in whether a project is feasible. Each project should have a clear declaration of whether land rights are currently available, or if the municipality is willing to obtain those rights.

Environmental Impacts

Projects should be evaluated based upon their effect on the natural and built environments. Environmentally sensitive areas and species (wetlands, state and nationally threatened and endangered species, wildlife refuges, shellfish beds, etc.) should be avoided to the degree possible and clear documentation of any necessary impacts should be included in the LTCP. Impacts to the built environment should also be examined with consideration of environmental justice and avoid siting projects only in areas with lower property values or incomes or prioritizing projects based upon the socio-economic status of the residents. Each proposed project should include an evaluation of the environmental permits and documentation required; these may vary based upon funding sources.

Construction Timetables

The time necessary to fund, design and construct a project should be considered. Some projects may offer large benefits to the quality of the receiving waters but may require many years between planning and final implementation. Other projects may offer lesser benefits to the receiving waters but can be implemented in a very short time span. Additionally, communities may wish to phase projects over time or to lump many projects together in order to take advantage of cost savings offered by a single contractor or economies of scale.

Community Concerns

Addressing CSOs is resource intensive. It is not only fair, but necessary, to take the concerns of the community into consideration when determining how to use their resources to solve the problem and when determining how to best obtain and maintain their support. Community concerns will likely include many ideas that are captured in other categories, but they also include unique ideas that merit

consideration on their own. Addressing the concerns of the community will help to enhance public support for chosen projects.

The community is also likely to have concerns about the scope of the CSO control process. Clear efforts should be made to communicate that an iterative process will likely be needed. Changes in the environment will not be immediately apparent and patience and focused leadership will be required to mitigate the impacts of CSOs on water quality.

Permits and Environmental Documentation

The permits and environmental documentation required to construct or implement each alternative should be identified. If these requirements are influenced by the funding source, then the requirements of each likely source should be clearly stated so that this can be considered when evaluating the various alternatives.

Effect on other systems

Each alternative should be evaluated to determine if it will solve or simply transfer flow or water quality concerns to other systems. Of primary concern is the stormwater collection systems. Redirecting excess storm flows and pollutant loads to the storm drains may solve the CSO problem, but it may not improve the water quality in the receiving waters. Impacts to other systems should be considered in the evaluation of alternatives, and if necessary, should lead to the development of projects to address those impacts. An iterative process is to be expected.

Types of Alternatives

There are several basic types of alternatives that should be considered for each CSO drainage area in addition to the 9MC. Multiple alternatives of the same type may be considered at each outfall, i.e. it may be appropriate to consider treatment alternatives for different volumes, or to consider alternatives that are a combination of storage and treatment. The major types of alternative projects are:

- Treat the effluent to primary treatment standards and disinfect
- Store the effluent for subsequent treatment and release
    - Tankage and Tunnels
    - Smart Valves & Controls
- Green or grey stormwater infrastructure/ source reduction
- Separation of sewage and stormwater collection systems
- Non-structural control projects
    - Local stormwater ordinances and Low Impact Development requirements
    - Inflow and Infiltration Reduction
        - Sump Pump Ordinance and Inspection Program
        - Roof Drain Ordinance and Inspection Program
        - Surcharge Fees for Illicit Discharges from I/I
    - Pollution Prevention Program

Please refer to the VT CSO Rule for a complete listing of project types that must be considered and included in a CSO LTCP. It is very likely that a combination of different project types will be needed to fully address CSOs.

Treatment

Municipalities should consider projects that provide treatment for CSOs. For CSOs it is necessary to remove solids, floatables and pathogens by screening, settling and disinfecting the storm volume. Treatment may occur either at an existing WWTF or at new combined sewer system facilities. Treatment may occur at the end of the pipe, or within the combined sewer system as appropriate. Treatment alternatives located somewhere other than the end of the pipe should take pollutant loading downstream of the proposed treatment into consideration.

Treatment can take different forms depending upon the pollutants of concern. The most basic level of treatment is similar to primary wastewater treatment and disinfection. This is the settling and/or screening for solids removal, and disinfection. For waste streams that contain floatable materials treatment may involve baffles or booms, or treatment could occur further upstream in the form of nets or baskets. Chemical treatment or filtration may be necessary to remove pollutants that aren't amenable to treatment by strictly physical means such as metals or dissolved pollutants. The quality of CSOs proposed for treatment should be characterized so that any proposed treatment systems can be designed to bring the discharges into compliance with the VWQS.

Storage

Municipalities should consider projects that provide storage for CSS flows and then later route the stored water to the WWTF for treatment. The required storage volume is dependent upon the storage already available in the collection system, the capacity of the WWTF, and the amount of flow generated by the storm(s) selected by the municipality.

Green Stormwater Infrastructure

Municipalities should consider the use of Green Infrastructure to reduce the amount of stormwater and/or pollutants entering a combined sewer system. The 2016 Vermont Combined Sewer Overflow Rule defines "Green Stormwater Infrastructure" as "a wide range of multifunctional natural and semi-natural landscape elements that are located within, around, and between developed areas, that are applicable at all spatial scales, and that are designed to control or collect stormwater runoff through detention or soil absorption." Care should be taken to avoid infiltrating water in areas with soil contamination or in areas with known Inflow/Infiltration problems. Please note that while the VT CSO Rule encourages the use of Green Stormwater Infrastructure to address CSO issues, this should not be interpreted to mean that more traditional Grey Stormwater Infrastructure projects should not be considered. Both of these types of infrastructure can be useful in reducing stormwater flows or pollutant loads.

Development of Alternatives

Qualified professionals should prepare alternative projects for each CSO outfall that are intended to address the CSO related water quality issues in the receiving waters. Sufficient information to fairly and equitably evaluate each alternative against the criteria developed for the receiving waters and the other alternatives shall be developed. **Projects should be designed to allow for cost effective expansion or retrofitting if additional controls on CSO discharges are required after project construction.**

Evaluation of Alternatives

Once a suite of alternative projects has been developed, they need to be fully evaluated using the criteria previously discussed in this guidance. The design storm(s), modelled and measured responses, and historic data should be used in this evaluation. Evaluation should occur in a holistic and transparent manner. Records should be kept regarding the decision-making process in case questions come up later during subsequent updates and revisions of the CSO LTCP. It is suggested that an evaluation matrix be used to summarize how each alternative project satisfies the evaluation criteria developed by the municipality.

Projects should be ranked according to expected effectiveness in addressing the receiving water's water quality issues and an implementation schedule that shows how implementation of each project should be prioritized should be developed. The VT CSO Rule requires that projects be **"prioritized based on the relative importance of adverse impacts upon water quality, including impacts on designated uses. When prioritizing projects, the municipality shall give the highest priority to bringing overflows to sensitive areas into compliance with the VWQS.**"

Public Outreach

After alternative projects have been developed and evaluated, they should be presented to the public. The complexity of the local CSO problem and LTCP may influence the extent of the public outreach. Small communities with a single outfall may be able to notice and hold a single public meeting. Larger communities with more complex CSO infrastructure may need a public outreach coordinator, a media campaign and multiple public meetings. At a minimum the public should be presented with the proposed alternatives and the evaluation matrix and then given chance to provide comments.

Section 34-403(2) of the VT CSO Rule states:

In developing a LTCP, the municipality shall employ a public participation process that actively involves the affected public in the decision-making to develop and select the long term CSO controls. The affected public includes rate payers, industrial users of the sewer system, persons who reside downstream from the CSO outfalls, persons who use and enjoy the downstream waters, and any other interested persons.

Public participation in the decision-making means, at a minimum, noticing and allowing for public comment on the LTCP, and holding one or more meetings on the LTCP and complying with the State's open meeting law requirements.

There may be additional requirements for public notice and participation depending upon the funding sources being used to fund planning and/or construction efforts. Federal funding usually has requirements associated with the National Environmental Permitting Act (NEPA) that may exceed what is required by Vermont law. Please confirm any requirements with the funding source.

It is suggested that the public outreach include the following steps and documentation:

- Public notice that the draft CSO LTCP has been prepared and is available for public review and comment. Evidence of this notice should be included in the LTCP.

- Public notice of a public meeting to discuss the CSO LTCP. Evidence of this notice should be included in the LTCP.
- A public meeting with an opportunity for the public to comment. A sign-in sheet should be provided at the meeting and minutes prepared. The meeting should be held outside of normal business hours in order to facilitate attendance and held in a location that is convenient and accessible. The sign-in sheet and minutes should be included in the LTCP.
- Public comments should be responded to in writing. These comments and responses should be included in the LTCP.

Outreach efforts should be as inclusive as possible. Some ways to help ensure that may include:

- Consider including CSO LTCP outreach efforts in any educational campaigns currently underway, as well as contacting civic groups, schools, business owners and advocacy groups.
- Identifying and targeting areas most directly affected by the CSOs and proposed projects.
- Consider using communication mediums that will reach members of the public who may be illiterate, who have limited English skills and/or who may not use computers and social media.
- Public notices and an executive summary of the CSO LTCP should be prepared using simple language that clearly and concisely presents the ideas within the report in manner that the general public can understand.

Long Term Control Plan

Required Components

Once background data has been collected, evaluation criteria have been decided upon, alternative projects developed and evaluated, and a list of projects has been finalized with public input it is necessary to prepare the Long-Term Control Plan. The plan should contain the following components:

- Executive Summary
- A prioritized list or lists of selected control projects including project cost estimates
- A financing plan for funding the design and implementation of the CSO control projects
- A cost and affordability analysis for the selected control projects
- An implementation schedule
- An operational plan to ensure that the new and existing facilities are run in accordance with the 9MC
- A plan for post-implementation monitoring and analysis of water quality, including a QAPP
- A request for new mixing zones and waste management zones
- An assurance that new sources of stormwater and wastewater to the Combined Sewer System (CSS) do not increase the volume, frequency or duration of CSO events.
- Appendices

Executive Summary

CSO LTCPs are expected to be fairly lengthy documents with a great deal of technical discussion. In order to enhance the usefulness of the document, an Executive Summary should be prepared that summarizes the plan for the public and decision makers. This summary should include a brief

description of the proposed projects including their costs and schedules. More emphasis should be placed on future activities that require the public's cooperation than in summarizing historical events.

List of Selected Projects

The prioritized list of selected projects should be presented along with information about each project. It may be appropriate to have both a short term and a long term list of projects if the project development process resulted in a suite of projects, some of which can be implemented quickly and inexpensively in addition to more complicated projects that will require more time and effort to implement.

The LTCP should include an achievable schedule for implementing the chosen projects. It should include target dates, budgets and important interim milestones. The plan should also include expected water quality effects in the receiving waters. The LTCP should identify next steps for situations in which the expected improvements to the receiving waters are not realized or for situations in which expected funding is not available.

Financing Plan

The CSO LTCP must contain a plan to finance the design, construction, operation and post-implementation monitoring of the selected projects. Reasonable projections for costs, income sources, debt service and future replacement costs need to be determined in order to provide a realistic schedule for project implementation. An analysis for life cycle costs for each project should be prepared.

The financial plan should identify and describe potential funding sources for each project. This could include funding already included in municipal budgets, but likely will require new funds obtained through bonds, loans, and/or grants. Smaller projects may be paid for with existing revenue. Municipalities should explore all funding options. The LTCP should identify funding sources for capital and annual O&M expenses for each project.

Plan preparers should be familiar with EPAs rules regarding funding sources as well as the rules regarding Vermont's State Revolving Loan Funds.

An analysis of the affordability of the proposed project(s) should be prepared. This should generally follow the guidance prepared by the EPA using the most recently available census data. Consideration should be paid to using some of the methods that have been proposed for updating the EPA's guidance. The methodology chosen and data sources should be documented. The existing EPA guidance document is called Combined Sewer Overflows Guidance for Financial Capability and was published in February 1997. A document with proposed updates to this method is titled: Developing a New Framework for Household Affordability and Financial Capability Assessment in the Water Sector and was prepared for The American Water Works Association, the National Association of Clean Water Agencies and the Water Environment Federation in April 2019. The EPA also prepared financial guidance in November 2014 for the integrated planning process which can be used: *Financial Capability Assessment Framework.* The municipality may determine the method used to determine affordability of the LTCP but the proposed projects should be projects that the community is able and willing to fund on the proposed implementation schedule. The proposed projects and implementation schedule from an approved CSO LTCP will be written into a 1272 order.

Implementation Schedule

The schedule should consider factors related to how quickly a project can be implemented, including time necessary to obtain funding, time to prepare contract design plans time to obtain permits, time to obtain property rights and any necessary local legal actions such as revising a sewer ordinance.

The schedule should be presented in a graphical format such as a Gantt chart or Critical Path Method system. It may be helpful to present an overall implementation schedule as well as more detailed schedules for individual projects.

The implementation schedule should cover approximately 2-7 years with the expectation that the CSO LTCP will be periodically revised as projects are completed and monitoring efforts indicate how much additional work is needed to achieve compliance with VWQS, or to eliminate CSO discharges. Compliance with the VT CSO Rule should be achieved by January 1, 2040 or 20 years after submission of the initial CSO LTCP, whichever is later, though significant and timely efforts will be expected in the near-term.

Operational Plan

The LTCP should include a plan to operate and maintain a municipality's combined sewer system and CSO controls. This should be an expansion of the documentation prepared in order to comply with the 9MC regarding the operation and maintenance of the existing combined sewer system. This plan's complexity will vary depending on the complexity of the municipality's combined sewer system and CSO controls. For larger systems it should contain practices to coordinate and optimize the performance of all of the drainage, treatment and control systems.

Post-Implementation Monitoring

As projects that address the CSO issue are constructed (or implemented for non-structural solutions), it will be necessary to collect and evaluate data to determine if the project is successful as defined by the evaluation criteria chosen for the receiving water and for the project itself. This process will require the collection and analysis of new data and a comparison to historical data. Newly collected data should build upon the historical data to the extent possible. This is of particular importance for receiving water data; post-construction conditions should be investigated at the same locations that were investigated before implementation of the long-term control plan.

Quality Assurance Project Plan

A QAPP should be prepared for monitoring water quality in the receiving and at any remaining CSO outfalls. This should largely resemble the plan prepared for the monitoring of the existing conditions and should contain all the same elements.

Permitting CSO Discharges

Vermont law prohibits the discharge of wastes that once contained human pathogens from being directly discharged into Class A or B waters. In order to discharge wastes of this nature it is necessary to have a Waste Management Zone authorized for that location. Therefore, if a permittee intends to continue to discharge waste that has contained human pathogens it may be necessary to modify their NPDES discharge permit to include a Waste Management Zone. Criteria for Waste

Management Zones can be found in 10 V.S.A. § 1252 and in the VWQS. A proposal to create new waste management zones should be included in the LTCP that demonstrates why a Waste Management Zone is necessary and provides information necessary to evaluate the proposal against the criteria. An appendix may be used to facilitate the preparation and reading of the plan.

New Source CSO Prevention

The VT CSO Rule requires that a CSO LTCP ensures that new sources of stormwater and/or wastewater do not increase the volume, frequency or duration of CSO events. Reporting on these efforts are required annually. Please summarize the steps taken to ensure that new sources do not contribute to CSOs. These steps could include:

- Reducing existing sources of stormwater and wastewater to the combined sewer system,
- Increasing storage within the combined sewer system,
- Requiring new developments to maintain pre-development stormwater discharges,
- Requiring upgrades to collection systems before allowing a new source to connect.

Reevaluation of Conditions

A strategy for evaluating the new conditions within the collection systems and receiving waters should be included in the plan. After CSO control projects have been implemented and post-implementation monitoring conducted, the overall success of the project should be evaluated. If the water quality standards are being met, then the project(s) can be considered a success and plans should be made to continue with the maintenance and best management practices that have led to this achievement. If the water quality standards are not being met, then the CSO LTCP should be reevaluated to determine the next course of action.

Plan Update

CSO overflows are a problem without a quick solution. LTCPs are intended to be a plan of action to address this problem, but even the best of plans is limited by the information available at the time of preparation. As time passes and CSO projects are implemented it will be necessary to update the LTCP to reflect the current water quality conditions and the as-built performance of CSO control projects. Updates may occur voluntarily at the discretion of the municipality, or they could be tied to the completion of projects included in a 1272 order. It is recommended that communities maintain working copies of their LTCP and background data so that the level of effort to update the plan is minimized.

Appendices

The preparation and implementation of a Combined Sewer Overflow (CSO) Long Term Control Plan (LTCP) is expected to be a long data-intensive process that will require the many pages of tables, maps, plans and other information that, while necessary, may not be of immediate interest to the reader of the plan. It is therefore recommended that appendices be attached to the LTCP. These appendices should be referred to in the text of the report and should be labelled so that it is easy to reference the appropriate sections.