Example Operation, Management and Emergency Response Plan (O, M and ER Plan) for Northfield Village WWTF

The attached Example O,M and ER Plan was developed by Chief Operator Patrick DeMasi and Assistant Chief Operator Phil Gleason for the Northfield Wastewater Treatment Facility, with assistance from Dennis Bryer and Paul Olander of the Vermont Department of Environmental Conservation (VTDEC). It was prepared according to the VTDEC document "Written Guidance for Preparation of Plans to Prevent Sewage Spills" (8/13/07). The Example Plan is intended as a supplement to the guidance document, to provide further assistance to the wastewater operations community in preparing the O, M and ER Plans required by Act 154, Section 5a). As the first plan to be prepared and submitted to VTDEC for approval, Northfield WWTF was selected for the Example.

Act 154, Section 5a) requires that municipalities assess their wastewater treatment facility components to determine which components are prone to failures that would cause a significant release of untreated or partially treated sewage to waters of the State. The law further requires that the municipality set a schedule for the regular inspection of those components and prepare a plan to mitigate sewage spills resulting from a failure. The Department presented the August 2007 guidance document detailing treatment components and types of failures that must be considered in the assessment. Further guidance was presented in November 2007 in the form of presentation slides, on the definitions of key terms in the law, such as "element prone to failure", "significant release", and "untreated or partially treated sewage". The slides also discuss the limits of planning requirements. Both documents were mailed to WWTF Chief Operators and are available on the Wastewater Management Division's website: dec.vermont.gov/watershed/wastewater/operations-management in the Operation, Management and Emergency Response Plan section.

The Northfield WWTF is a Sequencing Batch Reactor (SBR) type of facility, upgraded in 2004 from a 1966-built trickling filter process. The facility design flow is 1.0 MGD and currently receives an annual average of about 0.67 MGD. Preliminary treatment is by fine screening and an aerated grit chamber. There are two SBR basins, followed by a surge tank, and hypochlorination with bisulfite dechlorination. The facility has two aerated sludge holding tanks and dewaters sludge via centrifugation.

The collection system served by the plant is a mix of piping types and ages. The Main Interceptor was constructed in 1966 and is reinforced concrete pipe in relatively good condition. Roughly half the sewerlines are on the "East Side" and are mostly clay tile, installed in 1905 and are in "fair-to-good" condition. The other half are on the "West Side" and are mostly clay tile installed in 1934. There are several newer small subsections in the system as well. There is one small submersible-type pump station which serves 5 houses, and nine concrete-encased, single-barrel gravity sewerline stream crossings in the system.

Development of the Plan began by going through the treatment plant, pump station, stream crossings and collection system to develop a list of all equipment or systems prone to failure (List (1)), shown in Attachment A. The information included for each

component includes the age, history and condition of the equipment and the basis for the assessment of risk. The list style is not important – partial sentences, an outline, bullet-points, etc. are all appropriate. The purpose of the list is to provide documentation of whether to include (or not) a treatment component in the O, M and ER Plan. Note that this list is included in the Example Plan to illustrate the chosen method of assessing the equipment, but is not required to be submitted to the VT DEC.

As described in the Plan Introduction section, a probability-risk assessment was used to determine whether equipment in List (1) posed a risk of significant release of untreated or partially treated sewage to surface waters of the State. Based on age, condition, history, etc., the probability of a failure was assigned to each component on a scale of "1" – "5". Based on proximity to water courses, potential to interfere with disinfection, presence of alarms, etc., the risk of a release was assigned on scale of "1" – "5". The probability and risk values for each component were multiplied and the product compared to a "threshold value" of "10". Those treatment system elements with probability-risk products of "10" and above were determined to be elements requiring inspection and response planning. The results of the evaluations for each component are summarized as List (1) (Attachment A).

Note that the risk assessment methodology used in the Example Plan is but one approach for evaluating the risk of sewage spills from wastewater treatment system components. While the use of this particular method is not mandated, the Department will be evaluating all O, M and ER Plans to insure that they are comprehensive and contain a logical and reasonable justification for including (or not) a system component in the Plan.

The Example Plan includes photo reproductions of the treatment facility piping plan (Attachment B) and the collection system plan (Attachment C). The collection system plan shows piping direction, sizes and a key to the piping materials and ages. Note that full-sized copies of those plans, not photos, should be attached to O, M & ER Plans submitted to VTDEC. The Plan also includes telephone contact lists for emergencies related to sewage spills (Attachment D).

Note that the Example Plan includes the collection system. The current requirement from the Secretary of the Agency of Natural Resources is that O, M and ER Plans for wastewater treatment facility components, pump stations and stream crossings must be submitted by April 1, 2008. O, M and ER Plans for the collection system must be submitted by July 1, 2010, or as part of the permit renewal application for discharge permits which expire on or after July 1, 2010.

For further information and assistance please contact the Watershed Management Division's Operations and Management (O&M) staff person assigned to your facility. Liz Dickson at 802-490-6183, David DiDomenico at 802-490-6184 or Jeff Fehrs at 802-490-6185.

NORTHFIELD WASTEWATER TREATMENT FACILITY

Operation Management and Emergency Response Plan

I. Introduction:

This document contains the O, M and ER Plan for the Village of Northfield wastewater treatment facility and its pump station, sewerline stream crossings and collection system. It was developed in response to Section 5a) of Act 154, which requires municipalities to prepare and implement Operation, Management and Emergency Response Plans for their wastewater treatment facilities. All components of the treatment system were evaluated to determine whether they were "elements prone to failure…which, if one or more failed, would result in a significant release of untreated or partially treated sewage to the surface waters of the state." This evaluation was performed in accordance with the VTDEC's "Written Guidance for Preparation of Plans to Prevent Sewage Spills" (8/13/07).

An assessment as to which components were prone to failure with a risk of significant release was made using a probability-risk method. Based on age, condition, history, etc., the probability of a failure was assigned to each component on a scale of "1" – "5". Based on proximity to water courses, potential to interfere with disinfection, presence of alarms, etc., the risk of a release was assigned on scale of "1" – "5". The probability and risk values for each component were multiplied and the product compared to a "threshold value" of "10". Those treatment system elements with probability-risk products of "10" and above were determined to be elements requiring inspection and response planning. The results of the evaluations for each component are summarized as List (1) in Attachment A.

The Plan identifies the disinfection chemical feed pump and effluent flowmeter, the Jarvis Lane pump station, the nine sewerline stream crossings, and five known troublespots in the collection system as elements prone to failure with a significant risk of a release. Schedules for inspection and response plans to mitigate the effect of sewage spills on public health and the environment for these components are presented in the following sections.

II. Wastewater Treatment Facility:

All components of the plant were replaced or rehabilitated during the complete upgrade/refurbishment in 2004. Almost all components are new, protected by alarms, and with redundant critical systems. An overview of the WWTF layout is shown in Attachment B. The only components of the wastewater treatment facility deemed to need an inspection schedule and a response plan were the chemical feed pumps for chlorination and the effluent flow meter, which controls/paces the feed rate of the hypochlorite pumps.

a. Chemical Feed Pumps:

The chemical feed pumps were determined to have a moderate (2) probability for being 'prone to failure' with a high (5) level of risk for a significant release of untreated or partially treated sewage to waters of the State. It is not uncommon for this type of pumping equipment to malfunction due to a ruptured diaphragm, debris blockage, or having become air-bound. As a result of such a malfunction, disinfection will be compromised or terminated.

Inspection Schedule

The chemical feed pumps were installed in 2004 as part of the facility upgrade. They are currently checked for proper operation twice per day, at the beginning and end of the work day, and this will continue to be the inspection schedule in the future.

Response Plan

The response plan for dealing with a malfunction of a chemical feed pump is to activate the backup pump that is provided in the chemical feed room at the treatment facility.

b. Effluent Flow Meter

The effluent flow meter was also determined to have a moderate (2) probability for being 'prone to failure' with a high (5) level of risk for a significant release of untreated or partially treated sewage to waters of the State. Effluent flow meters are known to be vulnerable to electrical power surges and lightening strikes, either of which can render them inoperable. In situations where the flow meter controls the hypochlorite feed pumps, once the flow meter is compromised, disinfection will in turn be terminated.

Inspection Schedule

A new effluent flow metering system was installed as part of the facility upgrade in 2004. The flow meter is checked for proper operation at least once per day when the total daily sewage flow for the past 24 hours is recorded. This will continue to be the inspection schedule in the future.

Response Plan

The response plan for a failure of the effluent flow meter is to immediately restore disinfection by operating the hypochlorite feed pumps manually during decant periods. Then arrangements will be made to trouble shoot the problem with the flow meter itself, which may entail contacting an instrumentation specialist.

III. Sewage Pump Station:

There is one small sewage pump station (Jarvis Lane) in the collection system that serves five residences. The pump station was installed in 1988 and is equipped with dual alternating pumps, which increases the overall reliability of the station. Also, one of the pumps was replaced in 1998 and the other pump was replaced in 2006. A new pump control panel and floats, along with audio and visual alarms and a battery back-up power supply for the alarm system were installed in 2005. The pump station is located in a residential area, wherein an alarm condition will be promptly acknowledged. The wetwell has sufficient emergency storage volume above the alarm level to accommodate the incoming flow for at least five hours.

The pump station was determined to have a moderately low (2) probability for being 'prone to failure' with a high (5) level of risk for a significant release of untreated or partially treated sewage to waters of the State due to its very close proximity to a small waterway. Therefore an inspection schedule and a response plan for the pump station are necessary.

Inspection Schedule

The sewage pump station is currently checked for proper operation at least once per week. This will continue to be the inspection schedule in the future.

Response Plan

In the event of a spill at the sewage pump station, the overflow will be temporarily relieved by pumping down the station with the Village's vacuum sweeper and disposing of the contents at the wastewater treatment facility. The sweeper is equipped with a solids handling vacuum pump and an 800 gallon holding tank. Alternatively, a local septage hauler could be hired to pump and truck sewage from the pump station to the wastewater treatment facility. The Village also has a 500 gpm portable engine-driven pump and hoses that can be set up to transfer sewage from the pump station to a nearby sewer manhole on an adjacent reach of sewerline, until the repairs have been completed on the pump station.

IV. Stream Crossings:

There are a total of nine single barrel gravity sewerline stream crossings in the collection system. All of the crossings were constructed utilizing concrete-encased cast iron pipe buried in the stream bed. Seven of the stream crossings are associated with the main interceptor, which was constructed in 1966. These crossings were inspected with closed-circuit television equipment in 2006, and were found to be in good condition with no structural concerns. The stream crossing associated with the Water Street sewerline was constructed in 1934. This stream crossing was internally inspected in 1998, and was also found to be in good condition. The Doyon Road sewerline stream crossing was constructed in 1989. In 2006 the pipeline was stabilized with stone rip rap to address some undermining that had begun to develop.

All of the stream crossings were determined to have a moderate (2-3) probability for being prone to failure with a high (5) risk for a significant release of untreated or partially treated sewage to waters of the State. Therefore an inspection schedule and a response plan for sewage spills associated with the stream crossings are necessary. A sewage spill at a stream crossing could occur as the result of either an in-line blockage or a structural failure.

Inspection Schedule

The Village recently purchased closed-circuit television (CCTV) equipment for internal inspection of sewerlines and the equipment has been installed in an enclosed work trailer. In the future, all of the stream crossings will be internally inspected with the CCTV equipment once per year, and a visual inspection of the streambed at each crossing will be performed at least twice per year; once following the springtime high flow period and again in the fall.

Response Plan

In the event of a sewage spill at a stream crossing due to an in-line blockage, refer to Section V, which pertains to the sewage collection system and wherein a response plan is established for dealing with sewerline blockages.

In the event of a sewage spill at a stream crossing due to a structural failure, arrangements will be made to control the discharge of sewage from the structure. This will be accomplished through the use of inflatable plugs or sand bags in the manholes just upstream and downstream of the crossing. The Village has several different size inflatable plugs on hand, up to twelve inch diameter. Larger pipe sizes will require the use of sandbags.

A portable engine-driven pump and hoses will be set up to maintain sewage flow around the stream crossing. The Village has a 500 gpm portable pump that would be used for situations involving lower sewage flows or as an initial action for larger sewage flows. If larger capacity portable pumping equipment is required it will be obtained from another municipality, or rented from Godwin Pumps, a local construction company, or a septage hauling/pumping company. A fully equipped construction company may need to be hired to repair the sewerline at a stream crossing. Several local companies are available.

V. Sewage Collection System:

The majority of the sewage collection system is between 70 and 100 years old (circa 1934 and 1905, respectively), and constructed of vitrified clay pipe. The Main Interceptor was installed in 1966, in conjunction with the construction of the original sewage treatment facility. The Main Interceptor was constructed with reinforced concrete pipe. Smaller extensions to the collection system were installed in 1940, 1955, 1988, 1992 and 1997. The 1940 and 1955 extensions were constructed using vitrified clay pipe and the 1988, 1992, and 1997 extensions are constructed of PVC. The pipe sizes and material for the various sections of sewerline, along with their age, are indicated on the collection system plan in Attachment C.

The Main Interceptor was internally inspected with closed-circuit television equipment in 2005 to assess its condition. This inspection found the pipe to be structurally sound and in very good condition, despite being in service approximately 40 years. The Village has a high pressure jetter for flushing sewerlines, and by having this capability the entire collection system is cleaned on a five year cycle, or more often if deemed necessary. The portions of the collection system receiving storm water in addition to sanitary waste are flushed on a two year cycle.

The Village will use the recently purchased closed-circuit television equipment for internal inspection of the sewerlines to routinely and conveniently inspect problem areas to identify the reason for recurring problems and to assess the effectiveness of flushing/cleaning activities. The equipment will be used to internally inspect the entire collection system to assess the current condition of the sewerlines and to identify locations in need of further attention or repair.

There are five known problem areas within the collection system; four of which are associated with root intrusion and one associated with grease accumulation from a food preparation establishment. The known problem areas are also indicated on the drawing depicting the layout and configuration of the overall collection system. The root intrusion troublespots are as follows:

On the “East Side” - Central St., MH1S to MH4S
On the “West Side” - Water St MH8 to MH9, Vine Street MH4 to MH5 and the Pearl Street to Water Street connector.

The grease accumulation troublespot is in the stub off the Main Interceptor that serves the restaurant.

All of the collection system, and particularly the problem areas, were determined to have a moderate (3 or 4) probability for being prone to failure with a moderate (4) to high (5) risk for a significant release of untreated or partially treated sewage to waters of the State. Therefore an inspection schedule with a spill response plan is necessary for potential sewage spills associated with the collection system in general, and the problem areas in particular.

Inspection Schedule

The areas in the collection system known to have root intrusion are cleared using the Village's rodding/root cutting equipment twice per year, in the spring and fall, and the section prone to grease accumulation is flushed/cleaned twice per year. This will continue to be the inspection/maintenance schedule for these portions of the collection system known to be problem areas. The older sections of the collection system, the "East" and West" sides and the Main Interceptor will be inspected via CCTV on a basis of every five years. The newer sections of the system will be CCTV-inspected on a basis of every ten years.

The East Street Overflow structure will be studied further, and inspected after each significant rainfall event.

Response Plan

Inline Blockage - In the event of a spill within the sewage collection system due to an in-line blockage, the overflow will be temporarily relieved by pumping down the surcharged manhole with the Village's vacuum sweeper and the Village's rodding/root cutting equipment will be utilized to clear the blockage. If the blockage cannot be cleared in a timely manner with the Village's rodding/cutting equipment, the Village's 500 gpm portable engine-driven pump and hoses will be set up to transfer sewage flow around the location to a downstream manhole. Larger capacity portable pumping equipment can be obtained from another municipality, or rented from Godwin Pumps, a local construction company, or a septage hauling/pumping company. If necessary, larger capacity flushing/cleaning equipment will be obtained through a private contractor, such as the Hartigan Company.

Pipe Structural Failure - In the event of a sewage spill within the sewage collection system due to a structural failure, arrangements will be made to control the discharge of sewage from the system. This will be accomplished through the use of inflatable plugs or sand bags in the manholes just upstream and down stream of the location. The Village has several different size inflatable plugs on hand, up to twelve inch diameter. Larger pipe sizes will require the use of sandbags.

A portable engine-driven pump and hoses would be set up to transfer sewage flow around the location to a downstream manhole. The Village has a 500 gpm portable pump that could be utilized for situations involving lower sewage flows or as an initial action for larger sewage flows. If larger capacity portable pumping equipment is required it will be obtained from another municipality, or rented from Godwin Pumps, a local construction company, or a septage hauling/pumping company. The Village has a backhoe that can be utilized in conjunction with municipal personnel to repair small structural failures. However, a fully equipped construction company may need to be hired to repair a large structural failure. Several local companies are available.

Attachments

Attachment A – Components Prone to Failure (List 1)

Attachment B – Photo Reproduction of Treatment Facility Plan
Treatment Facility Layout

Attachment C – Photo Reproduction of Collection System Map

Attachment D – Northfield Contact Lists

Attachment A

Northfield Village WWTF – List of "Elements Prone to Failure" (List 1)

Following is a listing of all the treatment components of the Northfield WWTF, including those determined to be "Elements Prone to Failure" (List (1)). An assessment of the "probability of failure" and a "risk of a significant release to surface waters of the State" was made for each component. The assessment was made using a probability-risk method. Based on age, condition, history, etc., the probability of a failure was assigned to each component on a scale of "1" – "5". Based on proximity to water courses, potential to interfere with disinfection, presence of alarms, etc., the risk of a release was assigned on scale of "1" – "5". The probability and risk values for each component were multiplied and the product compare to a "threshold value" of "10". Those treatment system elements with probability-risk products of "10" and above were determined to be elements requiring inspection and response planning. The results of the evaluations for each component are summarized as follows.

Wastewater Treatment Facility

Headworks:

Mechanical Screening Device – new rotary fine screen in 2004 plant upgrade. Alternate channel with manual bar rack available. Probability of failure is low (1). Risk of compromised treatment/disinfection is nil (0).

Grit Removal System – new aerated grit chamber, grit pump and classifier in 2004 upgrade. Inoperability of system will not adversely affect treatment/disinfection. Probability of failure is low (1), and risk is nil (0).

Influent Pumps – three influent pumps, new in the 2004 upgrade. Probability of failure is moderately low (2). Risk of release is also moderately low (2) due to alarm dialer system, pump size (one pump can handle most flows, excluding those in excess of the "two year CSO storm"), and emergency storage in the main interceptor.

Influent Flow Meter – new in 2004 upgrade. Does not pace disinfection or influent pumping. Probability of failure low (1) and risk is nil (0).

Yard Piping – two 14 inch ductile iron pipes from influent pumps to SBRs, installed new in 2004. Probability of failure is very low (1), but risk of a release, should failure occur, is high (5) given the volume of pumping and the proximity to the Dog River.

Northfield Village WWTF O, M and ER Plan – List 1 (cont'd)

SBR Treatment Unit

SBR Process Control PLCs – new installation in 2004; probability of failure is low (1). Replacement cards are on-hand and programming can be restored via on-line connection with software provider. Process can be controlled manually if necessary. Risk is low (1).

SBR Blowers and Aeration System - new in 2004. Probability is low (1). Five blowers provided, ample redundancy; risk is low (1).

SBR Decanters – new in 2004, probability of failure is low (1). High SBR basin level alarm, failure to open/close alarms, overflow line to surge tank, risk is low (1).

SBR Motorized Valves (Infl and Effl) – new in 2004, have had actuator problems; probability of failure moderately low (2). Failure to open / close alarms provided. Can manually operate valves, can operate on one SBR tank; risk is low (1).

SBR Tanks – new in 2004, probability of rupture low (1). Risk is high (5) due to volume contained and proximity to Dog River.

SBR Biological Treatment Process – moderately low (2) probability of failure of biological process causing partial nitrification and chlorination interference. Risk is moderate (3) due to SBR process stability and denitrification step. Slow development of process problem and adequate hypochlorite delivery capacity allow process control correction.

Effluent Units

Surge Tank – new in 1966 (trickling filter tank), refurbished as surge tank in 2004; low probability of failure (1). Due to volume and proximity to Dog River risk is high (5).

Outlet Control Valve – new in 2004, probability is low (1). Can be controlled manually, risk of spill due to failure is low (1).

Chlorine Contact Chamber – refurbished 1966 clarifiers. Chlorination interference can be caused by sludge accumulations. Probability of failure moderately low (2). Regular chamber cleaning reduces risk (2).

Chemical Feed Pumps (Cl2 and de-Cl2) – new in 2004, moderately low (2) probability of failure due to diaphragm failure, air-binding, etc. Risk of undisinfected effluent high (5). This treatment component is an element prone to a failure that would cause a significant release. See further discussion in Plan.

Northfield Village WWTF O, M and ER Plan – List 1 (cont'd)

Effluent Flow Meter – new in 2004, but moderately low probability (2) of failure due to power surges or lightening strikes. Paces chlorination and dechlorination pumps; failure would cause lack of disinfection, risk is high (5). This treatment component is an element prone to a failure that would cause a significant release. See further discussion in Plan.

Polymer/Alum/Caustic Storage Tanks – new in 2004, probability of failure low (1). Tanks are contained and risk is nil (0).

Sludge Handling Units

Sludge Holding Tanks – one new in 1966, refurbished in 2004 upgrade, one new in 2004, probability of failure is low (1). Structural failure would pose high risk (5) due to volume and proximity to Dog River.

Centrifuge – new in 2004, probability of failure low (1). Risk of release is nil (0) as sludge can be stored.

Waste Activated Sludge Pumps – new in 2004, low probability of failure (1). Redundant pumps, other pumps available, risk is nil (0).

Emergency Systems

Emergency Generator – new in 2004, probability of failure due to engine malfunction, etc. is moderately low (2). Risk is moderately low (2), without influent pumping influent flow surcharges into main interceptor but power failure is alarmed.

Alarm System – new in 2004, battery backup, probability of failure is low (1). Risk of significant release due to failure of alarms is moderate (3), as a failure of another critical system would be necessary to cause a release.

Jarvis Lane Pump Station

Sewage Pumps – new in 1988, one replaced in 1998, the other in 2006, failure history is good, probability of pump failure is moderately low (2). Two pumps on automatic, each with capacity to pump design flow, emergency storage is 5+ hours at peak design flow conditions, wetwell high level local alarm. Relatively short distance to surface waters; risk is high (5).

Pump Control System – new in 2005, probability of failure is low (1). Protected by wetwell high level alarm, emergency storage is 5+ hours under spring high flow conditions; risk of release is moderately low (2)

Isolation/Check Valves – new in 1988, probability of failure is moderately low (2). Emergency storage is 5+ hours under spring high flow conditions, wetwell high level local alarm, long distance to surface waters; risk is moderately low (2).

Pump Discharge Piping – new in 1988, probability of failure is moderately low (2). Emergency storage is 5+ hours under spring high flow conditions, wetwell high level local alarm, long distance to surface waters; risk is moderately low (2).

Force Main – new in 1988, PVC pipe, probability of failure is low (1). Emergency storage is 5+ hours under spring high flow conditions, wetwell high level local alarm, long distance to surface waters; risk is moderately low (2).

Pump Wetwell – new precast concrete in 1988, probability of failure is low (1). Risk of release to surface water due to failure is low (1).

Alarm System – new in 2005, probability of failure is low (1). Risk of significant release due to failure of alarms is moderately low (2) as a failure of another critical system would be necessary to cause a release.

Power Supply – power failure history is good – no failures have occurred in the past 5 years. Probability of failure is moderately low (2). Emergency storage is 5+ hours under peak design flow conditions, high wetwell level alarm is backed up by battery; risk of release is high (5) due to proximity to brook.

Stream Crossings

The nine stream crossings in the collection system are shown on the collection system plan in Attachment C.

Main Interceptor Crossings – seven, concrete-encased single-barrel cast iron pipe, gravity flow, new in 1966, CCTV inspections in 2006 – good condition; probability of failure moderately low (2). Risk of significant discharge to surface waters is high (5).

Doyon Rd. Crossing – concrete-encased single-barrel ductile iron pipe, gravity flow, new in 1989. Some undermining detected in 2006 inspection and repaired; probability of failure is moderate (3). Risk of significant discharge to surface waters is high (5).

Water Street Crossing - concrete-encased single-barrel cast iron pipe, gravity flow, new in 1934, CCTV inspection in 2007 – good condition; probability of failure is moderately low (2). Risk of significant discharge to surface waters is high (5).

All nine stream crossings are elements prone to a failure that would cause a significant release. See further discussion in Plan.

Collection System

Section 1 – "East Side" – new in 1905, clay tile, 8" – 24" diameter. Cleaned and inspected by CCTV as follows, Central Street 1997 and 2006, Main Street in 2000 and the South End in 1995. The remainder will be inspected in 2008. Inspections found the condition of the sewerlines in these areas to be fair-to-good. Probability of failure moderate (3), risk is high (5), due to the proximity of water courses and the separated stormwater catchbasins in this area drain to a wetland that feeds brook near Jarvis Lane pump station.

One troublespot identified – Central St. MH1S to MH4S root intrusion – checked and roots cut in spring and fall. Probability of failure is moderately high (4), risk is high (5).

East Street Overflow – last overflow structure remaining in system. Recent CSO Effectiveness study indicated that of the three overflow events since 2005, perhaps only one occurred during a storm that exceeded the CSO policy level of 2.5" in 24 hours or 1.07" per hour. Further study will be performed.

Section 2 – "West Side" – new in 1934, clay tile, two subsections, pipe sizes 6" – 12". Inspected Vine Street and lines to the south in 2007, condition was found to be good-to-excellent. Other section will be done in 2008. Probability of failure is moderately low (2), risk is high (5) due to proximity of water courses.

Three troublespots of root intrusion identified – Water Street MH8 – MH9, Vine Street MH4 to MH5 and Pearl Street to Water Street connector. Check and roots cut in spring and fall. Probability of failure is moderately high (4) and risk is high (5).

Section 3 – "Main Interceptor" – new in 1966, reinforced concrete, pipe sizes: 12" – 24". Inspected in 2005 – very good condition. Probability of failure is low (2). Risk of failure causing significant release is high (5) due to volume of flow and proximity to Dog River.

One troublespot for grease accumulation identified in stub serving restaurant. Stub is flushed spring and fall. Probability of failure is moderately high (4) and risk is high (5).

The Main Interceptor had an overflow event in summer 2007 from a manhole in Dog River Drive, the approach to the WWTF. The storm causing this overflow was an intense thunderstorm that dumped 3" of rain in about 15 minutes, well over the CSO Policy storm.

Northfield Village WWTF O, M and ER Plan – List 1 (cont'd)

Section 4 – "Braley / Byam / Hill Streets" – new in 1940, clay tile, pipe sizes: 8 – 10". Probability of failure is moderate (3), risk is moderate (3) due to distance to water courses.

Section 5 – "Winter Street / Alpine Drive" – new in 1955, clay tile, pipe size: 6". Probability of failure is moderate (3), risk is moderate (3).

Section 6 – "Jarvis Lane / Wall Street" – new 8" PVC pipe in 1988. Probability of failure is moderately low (2), risk is moderately high (4).

Section 7 – "Norwich University Extension" – new 8" PVC pipe in 1997. Probability of failure is moderately low (2), risk is moderately high (4).