Appendix A:
Background Information

A1: Figure A-1 Wayne County Sewer Service Areas and Interceptors

A2: Fourth Amended Final Order of Abatement

A3: Wayne County Rouge Valley Sewage Disposal System Work Plan for Long Term Corrective Action Plan

A1: Figure A-1 Wayne County Sewer Service Areas and Interceptors

Figure A-1

WAYNE COUNTY
Sewer Service Areas and Interceptors

- County boundaries
- Community boundaries
- Roads
- Rivers
- Lakes
- County owned and/or operated pump stations
- Wayne County flow meters
- County owned and/or operated facility
- Wayne County Downriver Wastewater Treatment Facility

Downriver Sewage Disposal System

- LeBlanc Interceptor
- Wyandotte (Riverdrive) Interceptor
- Pennsylvania Interceptor System
- Downriver Tunnel System
- Local sewer connector
- Overflow to tunnel
- Level sensor

Northeast Sewage Disposal System

- Grosse Pointe Interceptor (Wayne County)
- Fox Creek Enclosure (Wayne County Drain)
- Southeast Macomb Sanitary District
- Sanitary Sewage Directly to DWSD

Rouge Valley Sewage Disposal System

- Jim Daly Trunk Sewer
- Lola Valley Interceptor
- LRI - Lower Rouge Interceptor
- LRIR - Lower Rouge Interceptor Relief
- MRIR - Middle Rouge Interceptor Relief
- MRPIE - Middle Rouge Parkway Interceptor Extension
- NAI - North Arm Interceptor
- PWI - Parkway Interceptor
- RVI - Rouge Valley Interceptor
- Wayne Interceptor
- WRVI - Wayne-Romulus-Van Buren Interceptor

Community Facilities Shown for Reference

- Community flow meters
- Community owned and/or operated facility
- DWSD Interceptor
- DWSD Northwest Interceptor
- HRTS - Oakland County Huron Rouge Trunk Sewer
- Le Blanc Interceptor
- Van Buren Township Force Main
- WCAA Force Main
- WTUA Interceptor (including RVI and PWI leased sections)
- WTUA Service Area
- VBT Equalization Basin Service Area
- WCAA Service Area

CSO - Combined Sewer Overflow
DWSD - Detroit Water and Sewerage Department
EQ - Equalization Basin
INT - Interceptor
NS - Not Sewered
NWI - Northwest Interceptor
RTB - Retention Treatment Basin
VBT - Van Buren Township
WCAA - Wayne County Airport Authority
WTUA - Western Townships Utilities Authority

Robert A. Ficano
County Executive

1:63,360
1 inch = 1 mile
1 0 4 Miles
1 0 8 Kilometers

Department of Public Services
Wayne County

F:\GIS\project\FMD\Sewer Service Areas\WC sewer service areas 2014.mxd 3.2014

A2: Fourth Amended Final Order of Abatement

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER RESOURCES DIVISION

In the matter of:

AACO-000031
Date Entered: 7-29-2015

County of Wayne
Rouge Valley Sewage Disposal System
400 Monroe, Suite 400
Detroit, Michigan 48226

Final Order of Abatement Number 2117, entered on September 20, 1988
First Amended Final Order of Abatement 2117, entered on August 22, 1989
ACO-SW06-010 (Second Amended Final Order of Abatement), entered on May 1, 2007
AFO-SW12-002 (Third Amended Final Order of Abatement), entered on July 23, 2012

FOURTH AMENDED FINAL ORDER OF ABATEMENT

This amendment results from the need to amend the Final Order of Abatement Number 2117 and the Third Amended Final Order of Abatement (AFO-SW12-002) in order to meet the statutory requirement of state and federal law. The Water Resources Division (WRD) of the Department of Environmental Quality (DEQ) has determined that the County of Wayne (County), which is responsible for the maintenance and operation of a regional sewer service district legally named the Rouge Valley Sewage Disposal System(RVSDS), needs a revised schedule in which to perform the corrective actions outlined in AFO-SW12-002 to fully comply with Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), MCL 324.3101 *et seq.*; and the rules promulgated thereunder. The RVSDS provides sewerage services to all or part of 15 communities in southwestern Oakland County and western Wayne County. The AFO and above referenced amendments are hereby amended as follows. Upon the consent of the parties and by the authority granted to the DEQ by the NREPA, it is hereby AGREED AND ORDERED:

COMPLIANCE PROGRAM

Paragraphs 3.4 through 3.14 of the Third Amended Final Order of Abatement 2117 (AFO-SW12-002), shall be amended as specified below:

3.4 The County collected and evaluated flow monitoring data for a period of 12 consecutive months commencing on July 1, 2012 and completed on July 1, 2013, following completion of construction of the projects specified in paragraph 3.2 of ACO-SW06-010. Based on these results, the County was not able to certify adequate system capacity or has had SSOs due to capacity issues. The County shall submit a long term corrective action plan to the DEQ for review and approval no later than June 29, 2016.

3.5 The goals of the long term corrective action plan shall be: a) to bring the County into compliance with Final Order of Abatement Number 2117 and each subsequent amendment; and b) to implement appropriate engineering and structural improvements to the sewer system consistent and acceptable to meet DEQ's SSO Policy Statement Dated December 27, 2002, and the DEQ SSO Clarification Statement dated October 23, 2003.

Appropriate long term corrective action plan projects may by way of example, but not necessarily, include the following:

a. Wet weather connections from the RVSDS regional system to the Dearborn Heights and Inkster Combined Sewer Overflow (CSO) Retention Treatment Basins (RTB) during wet weather events. Operation of this system shall be in accordance with an approved operation plan (see paragraph 3.7, below). After December 30, 2022, use of these wet weather sanitary connections to the Dearborn Heights and Inkster CSO RTBs are only

authorized in accordance with an approved operation plan for use to protect public health and water quality, unless current state and federal SSO requirements are changed to allow for more frequent use.

b. Flow balancing project to balance wastewater flows on the Lower Rouge interceptor of the RVSDS regional system.

c. Transfers of contract capacity, additional rehabilitation to reduce inflow and infiltration, a regional wet weather sanitary sewage tunnel facility, basin storage, relief sewer, additional lift station capacity, etc.

d. Modification of the regulators that control flow from the Dearborn Heights, Inkster, and Redford Township CSO RTB during wet weather events to the Middle and Lower Rouge interceptors of the RVSDS regional system immediately and remaining regulators as the CSO area is controlled in the future. This available capacity in the Middle and Lower Rouge interceptors may be replaced with excess wet weather separate sanitary flow. Controlling flow through these regulators to the Middle and Lower Rouge interceptors to the equivalent of the average sanitary flow shall be in accordance with an approved operation plan (see paragraph 3.7 below). The long term corrective action plan shall be coordinated with any Administrative Consent Orders entered between the DEQ and the member communities of the RVSDS and shall include a detailed description of the regional projects, and a schedule for each project to; l) submit the basis of design report, 2) submit complete approvable plans and specifications, 3) commence project construction; and 4) complete project construction.

3.6 Following review and approval of the long term corrective action plan and schedules by the DEQ, the approved schedules will be incorporated by reference into this Fourth Amended

Final Order of Abatement. However, final compliance with paragraph 3.5 shall be completed by no later than December 30, 2022.

3.7 The County shall submit an operation plan for the projects specified in paragraph 3.2a-b of ACO-SW06-010 and paragraph 3.5a-d of the Third Final Order of Abatement and of this Fourth Final Order of Abatement to the DEQ for review and approval no later than December 30, 2022. Operation of the implemented projects shall conform to the operation plan once the plan is approved by the DEQ. Should the County elect, this operation plan may be part of any Comprehensive Operation Plan required as part of the RVSDS CSO RTB National Pollutant Discharge Elimination System (NPDES) permits.

3.8 By December 30, 2022, the County shall complete construction in accordance with the approved basis of design and plans and specifications mentioned in paragraph 3.5 above. By January 15, 2023, the County shall submit a letter in writing to the DEQ, WRD, Southeast Michigan District Office Supervisor, verifying the date of construction completion.

3.9 The long term corrective action plan shall be a presumptive project unless otherwise agreed to by the County and DEQ. If the long term corrective action plan is a demonstrative project on or before October 1, 2022, the County shall submit to the DEQ for review and approval, a work plan for conducting a one-year Project Performance Certification Program (PPC) to certify that the long term corrective action plan provides adequate capacity, for the RVSDS to comply with the contract capacity as previously established and defined in the Final Order of Abatement Number 2117, and is consistent and acceptable to meet the DEQ's SSO Policy Statement Dated December 27, 2002, and the DEQ's SSO Clarification Statement dated October 23, 2003.

3.10 If the long term corrective action plan is demonstrative, on or before December 31, 2023, the County shall submit to the DEQ for review and approval, the PPC Program report. If the County does not certify that the long term corrective action plan provides adequate capacity, for the RVSDS to comply with the contract capacity as previously established and defined in the Final Order of Abatement Number 2117, and is consistent and acceptable to meet the DEQ's SSO Policy Statement Dated December 27, 2002 and the DEQ's SSO Clarification Statement dated October 23, 2003, then the County shall submit a Corrective Action Program work plan to the DEQ on or before February 1, 2024.

3.11 The parties acknowledge that the compliance schedule contains design and construction tasks that will be better defined once investigative and planning tasks (sewer system evaluation, flow metering, long term planning) are complete.

3.12 By January 15th of each year, the County shall update and submit for approval to the DEQ, WRD, Southeast Michigan District Supervisor, a work plan for continuation of the Sanitary Sewer System Operation and Maintenance Program.

3.13 Progress reports shall continue to be submitted to the DEQ on an annual basis by January 15th of each year. The submittal of progress reports shall cease upon termination of this order.

3.14 The County shall submit all reports, work plans, specifications, schedules, or any other writing required by this Section to the DEQ, WRD, Southeast Michigan District Supervisor, 27700 Donald Court, Warren, Michigan 48092. The cover letter with each submittal shall identify the

specific paragraph and requirement of this Third Amended Final Order of Abatement that the submittal is intended to satisfy.

GENERAL PROVISIONS

All approved work plans required by this Fourth Amended Order of Abatement shall be incorporated by reference into the Final Order of Abatement 2117 and the First, Second and Third Amended Final Orders of Abatement, where applicable, and shall be enforceable in accordance with the applicable provisions of the Orders. All other terms and conditions of the Final Order of Abatement 2117 and the First, Second and Third Amended Final Orders of Abatement, shall remain in full force and effect and are not altered by this Fourth Amended Final Order of Abatement, except as specifically prescribed in this document. The effective date of this Fourth Amended Final Order of Abatement shall be the date upon which the chief of the DEQ, WRD, signs this document.

Signatories

The undersigned CERTIFY they are fully authorized by the party they represent to enter into this Amended Consent Order to comply by consent and to EXECUTE and LEGALLY BIND that party to it.

DEPARTMENT OF ENVIRONMENTAL QUALITY

for

William Creal, Chief
Water Resources Division

7-29-2015
Date

COUNTY OF WAYNE

for

By: Warren Evans, Chief Executive Officer

7/28/15
Date

APPROVED AS TO FORM:

By: Neil D. Gordon, Assistant Attorney General
For: S. Peter Manning, Chief
Environment, Natural Resources, and Agriculture Division
Michigan Department of Attorney General

7/28/15
Date

RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

DAN WYANT
DIRECTOR

July 31, 2015

CERTIFIED MAIL 7009 2820 0001 9803 9455

Ms. Kelly A. Cave, P.E.
Director, Water Quality Management Division
County of Wayne
Rouge Valley Sewage Disposal System
400 Monroe, Suite 400
Detroit, Michigan 48226

Dear Ms. Cave:

SUBJECT: County of Wayne, Rouge Valley Sewage Disposal System, Amended Administrative Consent Order (AACO) No. AACO-000031

Enclosed please find an original signed copy of AACO No. AACO-000031 entered between the County of Wayne and the Department of Environmental Quality (DEQ). The AACO became effective on July 29, 2015.

If you have any questions, please contact me at 517-284-5496 or at wysockik@michigan.gov.

Sincerely,

Katelyn M. Wysocki, Enforcement Specialist
Water Enforcement Unit
Field Operations Section – Lakes Erie and Huron
Water Resources Division

Enclosure
cc: Mr. Pete Ostlund DEQ
Ms. Laura Verona, DEQ
cc/enc: Mr. Douglas Early, DEQ

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
SOUTHEAST MICHIGAN DISTRICT OFFICE

RICK SNYDER
GOVERNOR

KEITH CREAGH
DIRECTOR

February 4, 2016

Ms. Kelly Cave, P.E., Director
Wayne County Department of Public Services
Water Quality Management Division
400 Monroe, Suite 400
Detroit, MI 48226

Dear Ms. Cave:

SUBJECT: Long Term Corrective Action Plan (LTCAP) Work Plan
Final Order of Abatement No. 2117 (AACO-000031)
Rouge Valley Sewage Disposal System (RVSDS)

We have completed our review of Wayne County's (County) LTCAP Work Plan (Work Plan) dated November 13, 2015, prepared by OHM Advisors on behalf of Wayne County. The Work Plan is hereby approved.

This letter confirms that, as stated on pages 1 and 16 of the Work Plan, the County will complete Phase 2 activities in the LTCAP no later than **June 29, 2019**. Additionally, the final Project Plan for the Phase 2 project(s) shall be submitted to MDEQ for review and approval by **June 29, 2019** to comply with the SRF milestone schedule. This will ensure completion of construction consistent with the deadline posted in paragraph 3.8 of the Fourth Amended Final Order of Abatement.

The GENERAL PROVISIONS section on page 6 of AACO-000031, and Sections V, and IX through XII of the Second Amended Final Order of Abatement No. ACO-SW06-010 set forth the penalties associated with failing to meet all deadlines and the procedures to be taken when any deadline is not anticipated to be met. Please note that these provisions apply to the deadlines listed in this approved Work Plan, as they remain in effect.

Should you require further information, please contact me at the number below, or by e-mail at earlyd@michigan.gov.

Sincerely,

Doug Early
Southeast Michigan District Office
Water Resources Division
586-753-3762

cc: Ms. Elmeka Steele - Director, WCDPS-FMD
Mr. Kenneth Kucel - Deputy Director, WCDPS
Mr. Razik Alsaigh – Wayne County, DPS, WQMD
Mr. Vyto Kaunelis – OHM
Mr. Greg Kacvinski – OHM
Ms. Karen Ridgway – ASI
Ms. Sonya Butler – MDEQ, ODWMA, RLS
Ms. Katelyn Wysocki – MDEQ, WRD, Enforcement
Ms. Laura Verona - MDEQ

A3: Wayne County Rouge Valley Sewage Disposal System Work Plan for Long Term Corrective Action Plan

Wayne County Rouge Valley Sewage Disposal System

Work Plan for
Long Term Corrective Action Plan

Original Report Date: July 16, 2015
Phase 1 Schedule Modifications: November 13, 2015

Prepared by:
OHM Advisors
34000 Plymouth Road
Livonia, MI 48150

and

Wayne County Department of Public Services
Environmental Services Group

Rouge Valley Sewage Disposal System
Work Plan for Long Term Corrective Action Plan
July 16, 2015 (Effective Date of Work Plan)
November 13, 2015 (Updated Schedule for Phase 1)

Introduction

This document presents a Work Plan for development of a Long Term Corrective Action Plan (LTCAP) for Wayne County's Rouge Valley Sewage Disposal System (RVSDS). Upon completion of the Short Term Corrective Action Plan (STCAP) in 2012, Third Amended Final Order of Abatement Number 2117 ("FOA") requires that Wayne County identify in an LTCAP any additional system improvements needed to bring the system into compliance with the FOA including compliance with the Michigan Department of Environmental Quality (MDEQ) Sanitary Sewer Overflow (SSO) Policy and SSO Clarification Statement.

Wayne County has been diligently working since 2012 to develop the LTCAP. Work completed to date includes:

- Continuation of and improvements to the ongoing flow monitoring program;
- Development and enhancements to the RVSDS hydraulic model, including additional structures, enhanced operational characteristics of pump stations and storage units, and more accurate georeferencing for better integration with the County's Geographic Information System (GIS); and
- Enhancements to the County's GIS database for the RVSDS, including more detail on system rim/invert elevations, maintenance/rehabilitation history, and condition ratings for pipes and manholes.

In 2014, Wayne County and MDEQ agreed in principle to a revision of the due date for completing the LTCAP to June 29, 2016. Fourth Amendment No. AACO-000031 to FOA 2117 containing the revised schedule has been signed by Wayne County and is in the MDEQ approval process.

During the effort to calibrate the hydraulic model of the RVSDS to data from recent storm events, a good match to observed conditions in the majority of the RVSDS was obtained except for the lower reaches of the Middle Rouge interceptor between Inkster Road and Lift Station 1A (LS1A). Considerable effort was expended to adjust parameters in the model such as hydraulic characteristics (e.g., junction losses and pipe friction coefficients), across the range of typical values in order to better match observed conditions; however, this effort did not reconcile the differences between observed and modeled flow depth.

Although a reasonable model/tool has been developed to characterize the RVSDS, it would be premature to base large-scale capital improvements on this model given the hydraulic discrepancies observed in the Inskster-to-LS1A reach (depicted in Figure 1). Since the majority of model-predicted SSOs in the RVSDS hinge on this critical interceptor reach, additional detailed work to characterize this reach is necessary in order to determine the source(s) of the hydraulic discrepancies (see Figure 2 for a schematic of the lower reaches of the Middle Rouge Interceptor).

A two-phase strategy is now proposed for a LTCAP to meet the requirements of the FOA 2117 for the RVSDS. The phased approach is summarized as follows:

- **Phase 1**:
  - Complete the RVSDS LTCAP (expected to be completed in late 2015). This document will identify specific activities (Phase 1 projects) focused on the primary causes of suspected SSOs along the RVSDS Middle Rouge interceptor.
  - Establish additional temporary flow meters along the Middle Rouge interceptor, primarily downstream of Inkster Road, to better characterize the location(s) and severity of hydraulic losses and to confirm flow rates in this reach of the RVSDS.
  - Implement select modifications to the Middle Rouge interceptor system to further reduce river inflow and eliminate hydraulic constraints likely caused by venting limitations and/or extraordinary junction losses.
  - Address known hydraulic restrictions within the Lower Rouge interceptor.
  - Complete additional system analysis as the foundation for determining targeted and cost-efficient capital improvement projects for the RVSDS under Phase 2 projects.
  - Enhance the GIS data for the interceptor system, including structural condition, maintenance history, and other information useful for ongoing analysis, modeling, and O&M.

Phase 1 Goals:

Address existing SSO on Inkster Arm by lowering the HGL on the Middle Rouge interceptor at Inkster Road

Enhance confidence in design flow conditions for other potential SSOs along the Middle Rouge interceptor

- **Phase 2:**
  - Finalize RVSDS hydraulic model calibration.
  - Submit a LTCAP SRF Project Plan for Phase 2 projects that identifies recommended capital improvements. Plan, design, finance, and construct the remaining capital improvements necessary to bring the RVSDS system into compliance with the FOA including compliance with the MDEQ SSO Policy and SSO Clarification Statement.

- **Ongoing Activities**
  - Continued flow metering and rainfall monitoring in the RVSDS service area.
  - Continued floodplain manhole inspection program (reduce potential for river inflow).

Proposed Work Plan

The following pages describe the specific activities that will be undertaken as part of this phased approach to implement a LTCAP for RVSDS as required under FOA 2117. As demonstrated in this work plan, the Wayne County team's knowledge of the system, based on modeling completed to date, allows for a targeted and systematic approach that is intended to increase the confidence of the MDEQ, the County, and the RVSDS communities in the efficacy of future improvements. A graphical schedule for work plan implementation is included as Exhibit 1.

PHASE 1 ACTIVITIES (Began Early 2014; through May 30, 2017)

Phase 1 activities are targeted to the lower reaches of the Middle Rouge interceptor where the model discrepancies have been noted. Each task below is an integral component of characterizing this portion of the RVSDS. The LTCAP document developed under Task A is proposed to be completed ahead of the scheduled June 2016 completion date so as to identify and expedite the Phase 1 activities. The LTCAP document will outline the Phase 1 / Phase 2 approach and will include additional detail on the components within this Work Plan. The LTCAP is not intended to be a conclusion or summary of the Phase 1 effort, but will serve as a formal declaration of the Phase 1 / Phase 2 strategy and to meet the documentation requirements in the FOA.

The LTCAP will include information developed as part of Tasks B-N (as available by December 2015). Under Phase 2, key reports and findings developed after December 2015 will be documented in a State Revolving Fund (SRF) Project Plan for Phase 2 LTCAP projects.

A. LTCAP Development and RVSDS Community Coordination

Work tasks to include:

1. Prepare LTCAP report document, including the following sections
    i. Technical Memoranda on meter analysis and modeling
    ii. Model-predicted SSOs
    iii. Discussion of hydraulic discrepancies in the Middle Rouge interceptor (lower reach)
    iv. Phase 1 / Phase 2 approach
    v. Recommended Phase 1 projects and cost estimates, including projects along the Middle Rouge and Lower Rouge interceptors
    vi. Preliminary, planning level information about likely Phase 2 projects
2. Prepare for and attend up to three (3) RVSDS Community update meetings

Deliverables: RVSDS Stakeholder Meetings (communities, MDEQ, etc.)
Draft LTCAP Document
Final LTCAP Document

Schedule: Began: March 6, 2014
Draft LTCAP: April 30, 2016

B. Field Survey

This task includes survey and field work necessary to update the RVSDS hydraulic model and to better understand the hydraulic conditions in the lower reaches of the Middle Rouge interceptor between Inkster Road and LS1A.

Work tasks to include:

1. Perform survey for identified components of the RVSDS necessary to update the hydraulic model. These components include:
    i. There are 5 tipping gate regulators in Redford for which assumptions have been made; these regulators greatly affect the downstream interceptor flow rates. These are Regulators U2, U6, U7, U8, and U11. The tipping gates will be inspected to determine size, model number and current pin setting. Also, for Regulator U6, a new regulator chamber structure was built downstream of the older regulator. Verify the current conditions in the older regulator and whether there is still a gate or wall opening.
    ii. There are 3 former CSO outfalls that are now SSO outfalls, M-21, M-22 and M-25. The Wayne County team has assumed that the regulators are fully open shear gates on wall pipes at these regulators and this needs confirmation. These regulators were surveyed by Wade-Trim (WTA) in 2008 as part of the Sanitary Sewer Evaluation Survey (SSES). However, accurate information is not available on the regulator itself, and the pipe connection from the regulator and the Wayne County interceptor in the vicinity of the regulators. This information is critical in how SSOs are estimated for these locations in the model. Survey data will include: the incoming pipe, the regulator itself, the connection to the interceptor, the interceptor, the overflow weir, the BWG and the SSO outfall.
    iii. There are two locations in the Lower Rouge system with interconnections between the Lower Rouge Interceptor and the Wayne Interceptor. Stop logs may or may not exist at these interconnections. These interconnections are included in the RVSDS hydraulic model as fully open. One interconnection is at RVI 15 JC-18 in Wayne; the other is near RVI 15 MH-1 at Merriman Road in Westland. Survey will include elevations of connecting pipes and verification of the presence/absence of stop logs.
    iv. There are two complex junction chambers along the Middle Rouge interceptor system. One chamber is where the Redford Arm connects to the Middle Rouge interceptor system; the other is where the Inkster Arm connects. The following information will be collected for JC 2-38 (Telegraph Road) and JC 3-37 (Inkster Road): dimensions, layout, presence of sludge deposits, and key elevations (rim, invert, overflow) of interconnection chambers.
    v. JC 2-8 was rebuilt and raised as part of the STCAP. But the top elevation of the structure is not on the as-built drawings. The structure was raised to accommodate the gate operators and the top elevation was determined during construction in the field. The top elevation will be surveyed., as well as the dimensions, layout, and all invert elevations of the interior of the junction chamber.
    vi. There is an old 30-inch sewer along Inkster Road that runs from the Bell Branch to near the LV Basin (Livonia EQ Basin) flow meter. It runs from RVI 12 MH-19 to MH-16 and is shown to be interconnected with the RVI

interceptor at these locations. This sewer will be surveyed with invert elevations, rim elevations, interconnections and diameters of incoming pipes.

vii. There is a regulator/CSO outfall in Livonia, M26, whose status is unknown. The regulator and CSO outfall are included in the hydraulic model but it is suspected the outfall was bulkheaded by Livonia during a sewer separation project in the 1990s. The regulator and CSO outfall will be surveyed to confirm the operational status.

viii. There is an overflow weir chamber that discharges to the connecting pipe to LS1A. The weir plate is adjustable and the setting is not known. In the hydraulic model, it was assumed that the weir plate top elevation is at the MRPIE interceptor crown elevation in the model. The top elevation of the weir plate will be surveyed.

ix. There is an old regulator chamber at Warren Avenue along Middlebelt Road in Garden City. The regulator chamber is on a 72 inch sewer (which was previously combined) that diverted low flows into a pumping station that discharged westerly towards Merriman Road. The regulator chamber also had a diversion dam and backwater gate. The survey will be conducted to confirm that no flow occurs through the old regulator towards Merriman Road. The survey will also include a confirmation of the presence and elevation of the diversion dam and backwater gate.

x. There is an existing regulator chamber at the Middle Rouge River and Middlebelt Road that serves Garden City and Westland (M-20). This regulator chamber is at the downstream end of the 72 inch sewer on Middlebelt Road. A 22 inch diameter opening trough the regulator chamber that controls the flow rate into the MRPIE interceptor has been assumed in the hydraulic model. Previously, a 22 inch vortex valve existed at this location. The outfall to the river is reportedly bulkheaded. Also, there are two parallel 16 inch ductile iron siphons downstream of the regulator chamber that connect to the MRPIE interceptor. Significant SSO volumes are predicted to occur in this vicinity through manhole/regulator chamber openings. The regulator chamber will be surveyed including the regulator opening dimensions and elevations, the presence/absence (and model number) of a vortex valve, and top elevations of all manholes and chamber openings, including the downstream siphon manholes.

2. Verify information for select local sewers and their connections to the RVSDS. This will require coordination with Wayne County and local community staff. At this time, additional information is needed about the following sewers connected to RVSDS:
   i. Lefler-Ready sewer,
   ii. Lefler-Ready Relief sewer,
   iii. Red Run sanitary sewer, and
   iv. Two parallel sewers servicing Dearborn Heights (Area 13).

Deliverables: Documentation of sewers and connections, including survey data and survey schematics where necessary

Schedule: Survey Completed September 2015, except for two local reaches (Lefler-Ready and Area 13). These two reaches will be surveyed by December 15, 2015.

C. Temporary Flow Meter and Level Sensor Installation

This task includes installation of temporary flow meters and level sensors in select sections of RVSDS to better understand: the hydraulic conditions in the lower reaches of the Middle Rouge interceptor, relationship of Rouge River stage to RVSDS flow delivery in the lower reaches of the Middle Rouge interceptor, and how conditions in the downstream Detroit Water and Sewerage Department (DWSD) sewers affect RVSDS flow delivery.

Wayne County has recently installed additional meters within the RVSDS, including two along the Inkster Arm (near the Livonia EQ Basin) and a meter and level sensor at the Oakwood / DWSD interceptor crossover. In addition to this, Wayne County has also upgraded 17 meters, installed 11 new meter cabinets, and upgraded 13 meter power supplies as part of the ongoing Priority 1B improvements.

If specific meters and/or sensors, as included in the list below, are found to be useful for the County's ongoing System Monitoring Plan, they may, at the County's discretion, be maintained as permanent meters following this task.

Work tasks to include:

1. Three parallel interceptor meters at Outer Drive (one flow meter on each interceptor; 24-month monitoring duration expected due to need to have flow meter data after the implementation of venting and floodplain manhole retrofits):
    i. MRPIE I-11
    ii. RVI 6-13
    iii. MRIR 2-21
2. Three parallel interceptor meters west of Telegraph Road (one flow meter on each interceptor; 24-month monitoring duration expected due to need to have flow meter data after the implementation of venting and floodplain manhole retrofits):
    i. MRPIE II-1
    ii. RVI 6-28
    iii. MRIR 2-21
3. Install flow meters at five locations in Dearborn Heights (two flow meters at each location placed upstream and downstream of suspected river inflow and/or SSO point; 4-month monitoring duration expected):
    i. Lefler-Ready (Bill's Drain)
    ii. Lefler-Ready Relief along Beech-Daly Road
    iii. Red Run Sanitary Sewer through Warren Valley Golf Course
    iv. Area 13 sanitary sewer
    v. Area 13 sanitary relief sewer
4. Extend level sensor range at JC 2-8 (if possible): Determined unnecessary, October 2015

5. Use data from USGS depth gage at Middle Rouge River at Hines Drive (USGS 04167150)
    i. This gage (river stage only) was reinstated with funding from the US EPA Great Lakes Restoration Initiative (GLRI) and has been collecting data since late April 2015. There are plans to establish the stage-discharge relationship, so discharge may be available (although stage alone will be useful for the purposes of this project).
    ii. The USGS intends to fund the operation of this gage for three years (through April 2018), although funds are appropriated annually. For the purposes of this scope, it is assumed that the gage will remain in operation (at the expense of USGS) through the duration of this project.

Deliverables: Temporary meter and level sensor installation and ongoing data collection (assumed to be performed as part of a separate contract)
Technical Memoranda – Meter Data Evaluation

Schedule: Items 1 and 2 (interceptor meters) installed on September 11, 2015
Item 3 (Temporary local sewer meters) to be installed by April 30, 2016 to capture spring storms
Item 4 (level sensor) will not be modified (deemed unnecessary, October 2015)
Item 5 (USGS data): collection of data is ongoing by USGS (started April 2015)

D. Junction Chamber Inspection

This task will include the collection of specific data to better understand and hydraulically model **u**nique hydraulic characteristics in select segments of the RVSDS.

Work tasks to include:

1. Conduct detailed field survey with confined space entry to confirm junction chamber dimensions, configuration, inverts, connecting pipe diameter and inverts for the following junctions:
    i. JC 2-8 (just upstream of LS1A)
    ii. JC 2-38 (near Telegraph Road)
    iii. JC 3-37 (near Inkster Road)
    iv. Junction chambers between Meters 9P, 10P, and 11P
2. Field work will be performed during low flow periods. If flow conditions do not permit an adequate inspection of a particular junction, a bypassing plan will be developed and recommended to isolate chambers for physical entry.
3. Document physical condition and any unusual conditions affecting hydraulics conditions with photos and sketches. Perform a video inspection using High Definition video technology, such as GoPro or similar.
4. Adjust the RVSDS hydraulic model to reflect observed conditions.

5. If the observed conditions (through metering and internal inspection) confirm the existence of extraordinary head losses or other adverse conditions at any specific junction, develop a physical model of the structure. The physical model(s) will be constructed in a hydraulic laboratory and will consist of a scaled-down model(s) under various flow conditions. The physical model(s) will reveal the following:
    i. Actual head losses under normal and wet weather conditions
    ii. Constructible junction retrofits that will minimize losses and maximize flow capacity
6. Based on the findings from this task, develop schematics for modification of select junctions to minimize hydraulic losses. Junction modifications will be prioritized based on the potential magnitude of head loss reduction.

Deliverables: Junction Survey Data, Schematics, Photos and Videos
Physical Hydraulic Model(s) with Technical Memoranda
Junction Modification Schematics

Schedule: Hydraulic model summary and retrofit schematics: July 31, 2016
Construction of junction modifications (if deemed necessary): May 30, 2017

In October 2015, it was determined that it would be more effective to complete this task after reviewing additional flow meter data available upon the execution of additional temporary flow metering provided under Task C.

E. Inspection/Cleaning of Siphons and Restrictions

This task will include field inspection and cleaning of select restrictions within RVSDS, along with data to better describe the restrictions in the RVSDS hydraulic model.

Work tasks to include:

1. Identify locations for inspection and (if necessary) cleaning of select siphons and restrictions. The preliminary (high priority) list of structures includes:
    i. R-3
    ii. R-4
    iii. R-5A
    iv. R-45 through R-50: Restrictions 45, 46, 47 & 49 are removed from this list in November 2015 because of their small size and very low probably of causing pipe clog.
    v. R-60
2. Other structures within the overall RVSDS may also require inspection and cleaning. These structures should be considered Priority 2 and are listed in Exhibit 2 *Special Structures and Siphons*. Exhibit 2 also includes a map illustrating the locations of the special structures and siphons.

Deliverable: Structure Inspection (County Operations Staff / Contracted Services)
Structure Cleaning (Contracted Services)

Schedule: Planning: October 15, 2015
High Priority Structure Inspection: June 30, 2016
High Priority Structure Cleaning: September 30, 2016
Other Structures: Future activity, if needed.

F. SCADA System Improvements

This task includes the implementation of select improvements to the Supervisory Control and Data Acquisition (SCADA) system for the RVSDS to provide better data for the RVSDS hydraulic model and better control of RVSDS operations. Wayne County is currently implementing Priority 1B SCADA improvements. These ongoing improvements will be complemented with the improvements outlined below.

Work tasks to include:

1. Identify RVSDS components that would benefit from enhancements to controls and system data availability. Preliminary identified upgrades include:
    i. Re-program SL-3 at LS1A to remain closed when pumps are running
    ii. Historize RTB dewatering flow meters
    iii. Historize SL-3 position at LS1A
    iv. Add an alarm level at JC 2-8
    v. Include information from the Inkster CSO RTB at Middlebelt Road

Deliverables: Technical Memorandum on recommended SCADA upgrades
Implementation of SCADA upgrades (to be performed by Wayne County and/or their SCADA contractor(s)).

Schedule: Technical Memorandum: November 30, 2015
Implementation: Began May 2015. Completion August 31, 2016

G. Inspect Floodplain Manholes for Inflow/Outflow Potential

Under the STCAP, Wayne County rehabilitated 968 RVSDS manholes, including modifications intended to prevent river inflow along the Middle and Lower Rouge floodplains. This task will include the inspection of additional manholes where potential remains for river inflow to the RVSDS.

Work tasks to include:

1. Create a set of manhole maps to be used by field staff to identify and prioritize manholes for inspection. The manhole maps will be limited to the Middle Rouge RVSDS reaches downstream of Merriman Road. Manholes will be color-coded for prioritization:
    i. Blue: manholes above the 10-year floodplain (low priority for inspection)

ii. Green: manholes below the 10-year floodplain and above the 2-year floodplain (medium priority)
iii. Yellow: manholes below the 2-year floodplain and above the 1-year floodplain (high priority)
iv. Red: manholes below the 1-year floodplain (FIRST priority)

2. Locate the "unfound" manholes from the previous SSES and confirm coordinates and rim elevations (using GPS-based survey). It is likely that a significant percentage of the "unfound" manholes are buried or otherwise inaccessible. This effort will focus on finding as many as is practical. Mark those manholes found with permanent posts
3. Initiate the inspection by focusing on the FIRST priority manholes. Based on USGS flood frequency data and known RVSDS manhole rim elevations, there are about 260-270 manholes below the 1-year recurrence interval flood elevation. This inspection will include a physical evaluation of the manhole rim, including:
    i. Evidence of a dislodged cover or frame (take photo)
    ii. Presence of gasketed manhole cover (Y/N)
    iii. Is manhole bolted down (Y/N)
    iv. Other opportunities for river inflow, such as damaged chimney or manhole wall
    v. This inspection will be conducted as follows:
        1. County-owned manholes between Inkster and LS1A
        2. County-owned manholes between Merriman and Inkster
        3. County-owned manholes along Brady and Lower Rouge
        4. City-owned manholes on community sewer connections on the Middle Rouge interceptor downstream of Merriman (only those suspected to be below the 1-year floodplain). The initial assumption is that there will be 50-60 locally-owned manholes as part of this inspection effort.
4. Inspect manholes for illicit storm water connections, possibly including smoke testing.
5. Design and construction of manhole modifications are included in Task J.

Deliverables: Survey Needs Map – Floodplain Manholes
"Unfound" Manhole Survey
Summary Tables for First and High Priority Manholes

Schedule: Inspection & Summary Results (First Priority Manholes) November 30, 2015
Inspection & Summary Results (High Priority Manholes): April 30, 2016

H. LS1A Operational Modifications

Under this task, operational protocols for LS1A will be reviewed, with particular emphasis on hydraulic conditions for flows through the lift station that may be increasing upstream hydraulic gradients beyond those intended in the design of LS1A.

Work tasks to include:

1. Meet with Wayne County operations staff to review current operation and maintenance practices, pump settings, and station performance
2. Conduct field survey and confined space entry inspection to confirm configuration, dimensions, weir and control gate sizes and inverts for wet well inlets, bar racks, and master control diversion structure.
3. Compile findings and evaluate potential hydraulic issues that may be contributing additional head losses beyond those intended in the design of LS1A.
4. Based on findings, evaluate potential alternatives to improve station performance, including the following items:
    i. Operational modifications,
    ii. Lowering the overflow weir plate at Master Control,
    iii. Adding strainers to pumps (existing pumps have 5 inch and 4-1/2 inch maximum sphere sizes),
    iv. More capital intensive projects will likely be reviewed during Phase 2 (see scope under Phase 2 Activities).

Deliverables: Summary report with recommendations and construction cost estimates
Implementation of recommended operational modifications
Design and construction of select improvements

Schedule: Summary Report: January 15, 2016
LS1A Phase 1 Modifications: December 31, 2016 (could need implementation by a construction contractor. It is unknown at this time what improvements are needed. The size of the project may affect the completion date for project).

I. System Venting

This task will include planning and implementation for the installation of vents in the RVSDS at select locations. A gravity sewer system requires adequate venting to operate efficiently, especially in cases where there are multiple junctions and community flow inputs, as these transitions typically require adequate venting to avoid scenarios with compressed air and/or vacuums, both of which can significantly reduce the hydraulic capacity of the interceptor system.

Work tasks include:

1. Identify vent locations, focusing on the following types of junctions:
    i. Significant sources of community inflow
    ii. Upstream of siphons or sewer size transitions (such as river crossings)
    iii. Other junctions deemed critical by the RVSDS project team
2. Conduct field reconnaissance for each identified structure, noting the type of structure, dimensions, and other characteristics that may hinder vent installation.

3. Determine the floodplain elevations at each structure and identify the appropriate freeboard and resulting vent height to avoid inundation during the selected river event (i.e. 10-year, 100-year).
4. Determine the appropriate modifications required at each structure to accommodate a vent and provide schematics for installation. It is assumed that these schematics will be used by Wayne County staff for installation.
5. Install vents at recommended structures.

Deliverables: Proposed Vent Location Map
Vent Schematics (type, height, dimensions, and related improvements)
Installation of RVSDS vents

Schedule: Proposed Vent Location Map and Schematics: November 30, 2015
Install vents: September 30, 2016

J. Floodplain Manhole Improvements

Work tasks include:

1. Using the data collected in the field (Task G), develop a plan and specifications for improvements to select manholes to prevent river inflow. Improvements may include, but will not necessarily be limited to:
    i. Upper manhole / chimney modifications to prevent soil/water intrusion and to provide an adequate base for a waterproof casting and cover.
    ii. Replace manhole frame and cover with a waterproof (bolted/gasketed) cover. Consider alternate cover types, including hinged covers with locks.
    iii. Where deemed necessary, include a waterproofing wrap (such as WrapidSeal or similar) around the chimney and frame. This will help to reduce inflow and infiltration caused by floodplain waters around the top portion of the manhole.
    iv. In locations where venting is recommended (Task I), manhole retrofit details will be provided as part of the Task I deliverables.
2. Prepare a summary memorandum (with related figures/schematics) for manholes not owned by the County (City-owned structures). This document will be shared with the appropriate communities for their use in addressing river inflow on their local systems.
3. Implement recommended manhole improvements.

Deliverables: Proposed Manhole Improvement Map
Specifications, schematics and other information necessary to construct manhole improvements, specific to each identified manhole
Construction of select manhole improvements

Schedule: Proposed Manhole Retrofit Map: November 30, 2015
Specifications, schematics and other information necessary to construct FIRST priority manhole improvements: April 30, 2016
Construction of FIRST priority manhole improvements: December 30, 2016 (It is unknown at this time how many manholes will be improved. The size of the project may affect the completion date for project).

K. Regulator Modifications

Under this task, configurations for RVSDS regulator configurations will be assessed and recommendations for revisions (if any) prepared.

Work tasks include:

1. As part of the RVSDS hydraulic model updates, regulator survey data (from Task B) will be added to the hydraulic model, including updates to regulator configurations, inverts, and regulator opening dimensions.
2. Evaluate potential for enlarging regulator openings at M-20, M-21, M-22 and M-25 to reduce SSO frequency.
3. Use model to verify appropriate regulator opening sizes at selected regulators.
4. Run model for different scenarios to quantify benefits of SSO reduction and impact on design event flow rates in RVSDS Interceptor.
5. Summarize results in Technical Memorandum with recommendations on feasibility for implementation.
6. Implement recommended regulator modifications.

Deliverables: Technical Memorandum – Proposed Regulator Modifications
Implement recommended regulator modifications

Schedule: Technical Memorandum: February 29, 2016
Implement regulator modifications: May 30, 2017. (It is unknown at this time what improvements are needed. The size of the project may affect the completion date for project).

L. Determine the Range of DWSD Boundary Conditions with RVSDS

Analysis of RVSDS observed flows and hydraulic model results to date have revealed that current DWSD operations are having a significant impact on the ability of RVSDS to deliver contracted flows. This task will continue that analysis and discussions with DWSD, for the purpose of setting boundary conditions with DWSD in the RVSDS hydraulic model for a variety of hydrologic/hydraulic conditions.

Work tasks include:

1. Coordinate with DWSD staff to verify intended operations during wet weather events for those facilities that may impact the RVSDS and LS1A.
2. Develop and submit a list of recommended operational enhancements (as discussed at previous meetings between Wayne County and the RVSDS Project Team) that DWSD may consider. Seek feedback on those enhancements and determine whether they may impact assumed boundary conditions.
3. Establish up to four (4) sets of DWSD boundary conditions (based on a range of potential operational conditions) that can be used in the RVSDS EPA SWMM model. Each boundary condition will be based on a combination of DWSD system conditions that are based on known operational history and potential future operational modifications.
4. Summarize the information in a Technical Memorandum. This document will include specific instructions on how to model each boundary condition in EPA SWMM, including some or all of the following information at downstream nodes that require a boundary condition:
    i. Constant hydraulic grade line (HGL) (if applicable)
    ii. Time series (variable) HGL (if applicable)
    iii. Defined flow hydrograph
    iv. Changes to key hydraulic components (such as stop-log weirs)

Deliverable: Technical Memorandum – DWSD Boundary Condition Scenarios

Schedule: Work is currently ongoing. Technical Memorandum: September 30, 2016. (Depends on availability and willingness of DWSD to resolve this issue).

M. Wet Weather Response Team

Work tasks include:

1. Establish a formalized Floodplain Manhole Inspection plan with Wayne County Operations staff. This would be based on the GIS-based Initial Asset Inventory and handheld tablets to systematically inspect high-priority manholes and correct deficiencies as they are noted. This will be established as an ongoing program, and will focus first on those manholes that are at the highest risk of river inflow (those within the 1-year floodplain).
2. Develop and update a list of high priority manholes. These manholes would be those that have been found to be more susceptible to inflow or SSO activity.
3. Develop a plan to engage Wayne County staff during wet weather events. This plan will include the following:
    i. Rainfall depth triggers to activate team (i.e. >1.0 inch of rainfall)
    ii. Online data sources to monitor conditions (i.e. USGS gage data, SCADA data feeds, NOAA radar-based rainfall estimates, etc.)
    iii. Specific facilities to inspect, including key attributes to note at each facility. For example:

1. Water levels (relative to rim elevation or top of pipe elevation)
2. Unusual hydraulic characteristics
3. Debris/blockage
4. Overflows to (or inflows from) Middle/Lower Rouge
5. Other (TBD)

4. During the first 24 months of this project, the OHM-led RVSDS Project Team will assist in the implementation of the Wet Weather Response Plan, including the deployment of field staff to critical structures. It is assumed that Wayne County staff will be available during this period to assist in accessing structures and SCADA data feeds.

Deliverable: Wet Weather Response Plan

Schedule: Began and will continue throughout Phase I. May continue into Phase 2 (if needed)

N. Continue Development of RVSDS Asset Management Plan

Work tasks include:

1. Update GIS-based mapping of the RVSDS system to include all relevant survey and other data for the RVSDS collected under the Phase 1 activities
2. Continue to enhance the GIS-based mapping of the RVSDS system components, focusing on additional attributes that define critical O&M strategies for specific system components, such as:
    i. Need for frequent monitoring/inspection (i.e. siphons)
    ii. Need for frequent maintenance (i.e. siphons, critical junctions)
    iii. Manhole inundation frequency (recurrence interval) for those manholes in the floodplain that need to be part of the ongoing river inflow identification program.
3. Add regulators to the GIS geodatabase and include operational status (including vortex type/size and other key dimensions/elevations)
4. Schedule and cost estimates for ongoing system cleaning and televising
5. Schedule and cost estimates for ongoing inspection of key system controls (regulators, gates, diversions, stop logs, etc.)
6. Long-term deterioration forecasting and estimates of annual system rehabilitation/replacement costs to sustain adequate structural and I/I characteristics

Deliverables: Updated GIS Geodatabase (electronic submittal)
Summary Report: Long-Term RVSDS O&M and Rehabilitation Strategy

Schedule: Updated GIS Geodatabase submitted on September 25, 2015
Summary Report: RVSDS O&M and Rehab Strategy: May 30, 2017 (end of Phase I)
Ongoing Asset Management Enhancements – Phase 2 and Ongoing

PHASE 2 ACTIVITIES (Begins June 1, 2017; through June 29, 2019)

A. Flow Metering

Work tasks include:

1. Continue the Middle Rouge interceptor flow meter program. This program is proposed to be extended to allow for the evaluation of wet weather response after the implementation of Phase 1 projects. System venting, floodplain manhole retrofits, and junction retrofits are intended to partially or fully restore the interceptor to its intended design capacity, so this extended metering period will be critical in order to determine the level of success of the targeted Phase 1 projects.

Deliverables: Ongoing data collection (assumed to be performed as part of a separate contract)
Technical Memoranda – Meter Data Evaluation
Flow Meter / Depth Sensor removal (anticipated in July 2017)

Schedule: Remove additional flow meters on or around July 1, 2017

B. Update RVSDS Hydrologic/Hydraulic Model

The RVSDS model updates will begin in Phase 1 with the additional survey (Task B) and work related to the junction chamber evaluation (Task D). However, the re-calibrated model that will be used to identify Phase 2 capital projects will not be completed until the end of the flow metering period (mid-2017).

Phase 2 Goals:

Design and implement capital projects to address SSOs that remain after Phase 1 projects

Continue floodplain manhole inspection and improvement program

Work tasks include:

1. Update the RVSDS hydraulic model with all survey and other data collected under Phase 1 (to be completed as data are collected in Phase 1).
2. Using flow meter data collected during and immediately following Phase 1 activities, complete the hydrologic and hydraulic calibration of the RVSDS model. This calibration will focus on enhancements to the Middle Rouge interceptor that could not be resolved prior to Phase 1.
3. Using the updated model, determine the location and severity of remaining SSO locations in the RVSDS service area. This model will be used for the Phase 2 Alternatives Analysis.

Deliverables: Updated EPA SWMM Model
Model-Predicted SSOs (Table)

Schedule: June 1, 2017 – August 31, 2017

C. Phase 2 Project Evaluation and Alternatives Analysis

Work tasks include:

1. Using the updated RVSDS EPA SWMM model, evaluate and prepare planning-level cost estimates for system improvements intended to address SSOs. These alternatives will likely be more capital-intensive than those projects defined in Phase 1, given that there will be increased confidence in the hydrologic and hydraulic models.
2. Potential projects may include:
    i. Enhanced flow conveyance
    ii. Wet weather storage and pumping
    iii. Regulator modifications (based on preliminary recommendations in Phase 1, adjusted based on specific capital improvement needs along the interceptors)
    iv. Larger-scale upgrades to LS1A that were not implemented in Phase 1, including the potential for the following improvements:
        1. Upgrading pumps/impellers for enhanced solids handling
        2. Adding mechanically screened bar racks to SL-1 and SL-2 or in the wet well (existing bar racks have 2-5/8 inch openings)
3. Prepare for and attend RVSDS Community meetings to discuss alternative projects and seek local consensus and buy-in for these improvements.
4. Coordinate with MDEQ staff on recommended alternatives (2 meetings anticipated)

Deliverables: Alternatives Summaries, Schematics, and Planning-Level Cost Estimates
RVSDS Community Meeting Summaries

Schedule: September 1, 2017 – July 31, 2018 (Alternatives Analysis)
September 30, 2017 – March 31, 2018 (RVSDS Community Meetings and Approvals)

D. SRF Project Plan for Phase 2 Projects

Work tasks include:

1. Prepare and submit an SRF Project Plan for the recommended Phase 2 improvements.

Deliverables: Draft SRF Project Plan
Final SRF Project Plan

Schedule: June 29, 2019 (delivery of final SRF Project Plan)

E. Ongoing Floodplain Manhole Improvements

Work tasks include:

1. Continue floodplain manhole inspections that were commenced during Phase 1. Focus on the Medium Priority manholes for this inspection period. Track the locations of inspections and inspection results.
2. Repair manholes that are not adequately sealed. These repairs may include the installation of waterproof frame and covers, venting, raising the elevation of the manhole, and other modifications to the upper portion of manholes as deemed necessary.

Deliverables: Updated manhole inspection and repair tables.

Schedule: Manhole repairs: ongoing (HIGH Priority in summer 2017, Remaining Manholes in 2018)

F. Design, Finance, and Construct Phase 2 Projects

The County will proceed with the design and construction of Phase 2 Projects based on the schedule in the approved SRF Project Plan. The timing of project design and construction will depend on the established financing and plan submittal schedule as approved by the MDEQ.

ONGOING ACTIVITIES

Wet Weather Flow Metering / Monitoring

Work tasks include:

1. Continue metering flows in the RVSDS according to the most recent version of the RVSDS System Monitoring Plan. It is anticipated that there will be a defined monitoring period after completion of Phase 2 to demonstrate regulatory compliance. Temporary meters installed as part of Phases 1 and 2 will likely be removed. Wayne County may periodically update the System Monitoring Plan for the RVSDS, including but not limited to changing the locations of meters throughout the RVSDS.

Deliverables: Continued quarterly and annual reports summarizing data and system analysis conducted under the System Monitoring Plan for the RVSDS

Schedule: Ongoing

Floodplain Manhole Improvements (Ongoing Annual Program)

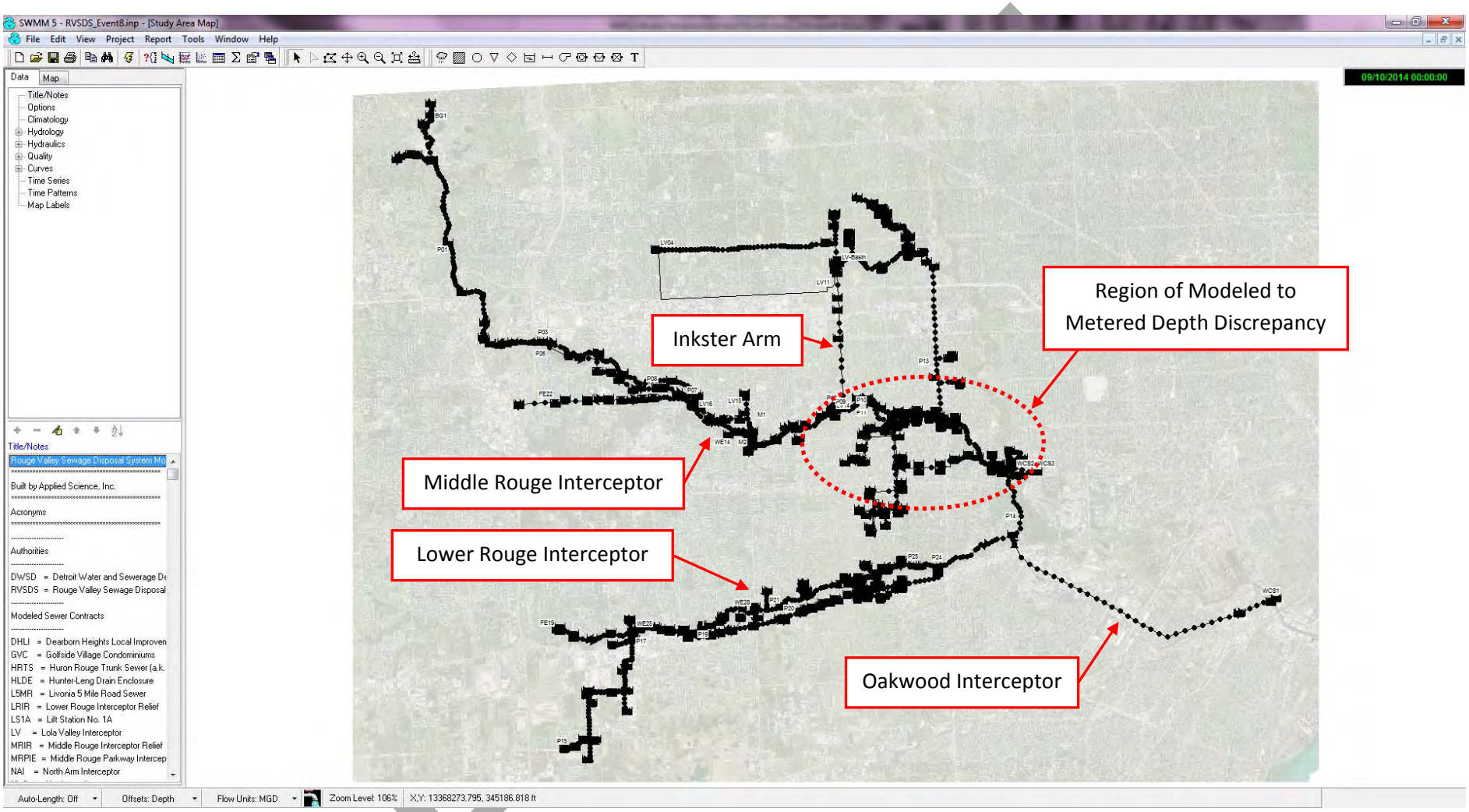
Work tasks include:

2. Manholes within the floodplain will be subject to deterioration and will require regular inspection and maintenance so as to reduce the potential of river inflow. Continue floodplain manhole inspections on an annual basis and track the locations of inspections.
3. Retrofit and/or repair manholes that are not adequately sealed. These retrofits may include the installation of waterproof frame and covers, venting, raising the elevation of the manhole, and other modifications to the upper portion of manholes as deemed necessary.

Deliverables: Annually-updated manhole inspection and retrofit table.

Schedule: Ongoing (annual) inspection program.

Figure 1. Screenshot of RVSDS SWMM5 Model



Redford Twp

Schoolcraft Road

Livonia

Westland

Warren Road

Dearborn Heights

Garden City

Ford Road

Dearborn

Inkster Road

Beech Daly Road

Telegraph Road

Outer Drive

JC3-37

Existing Meters P9, P10 P11

Existing USGS River Gage

JC2-36

New Interceptor Meters

Lefler-Ready Relief Sewer

Red Run Sanitary Sewer

New Interceptor Meters

Area 13 Sewers

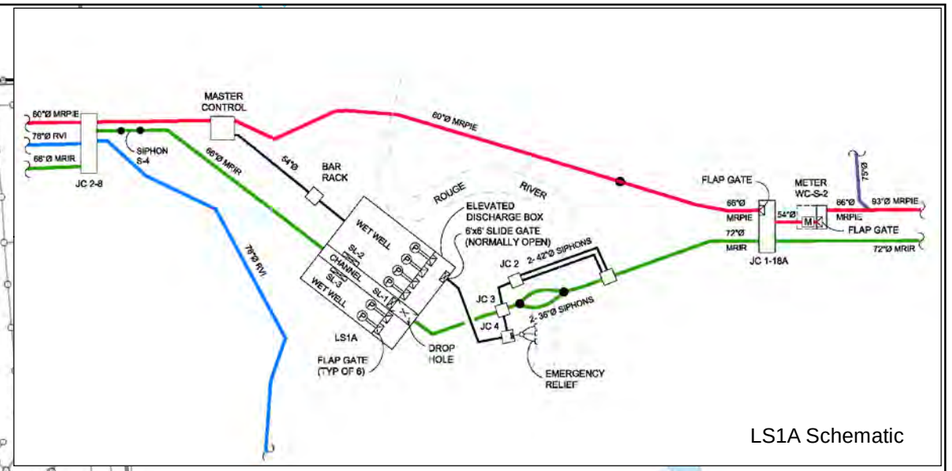
Lefler-Ready Sewer

Master Control

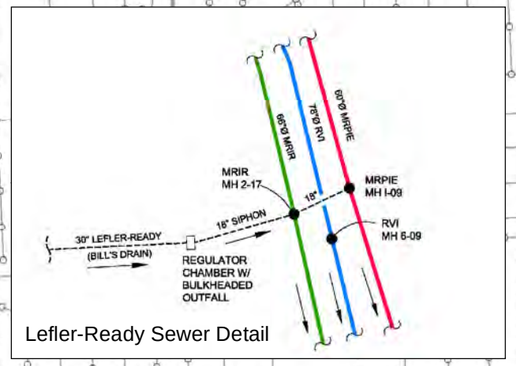
JC2-8

Reinstate USGS River Gage

LS1A



LS1A Schematic



Lefler-Ready Sewer Detail

H:\20131315 -- Wayne County LTCAP Project Plan\GIS\Figure 1 - Next Steps.mxd

N W E S

0 300 600 1,200 1,800 2,400 Feet

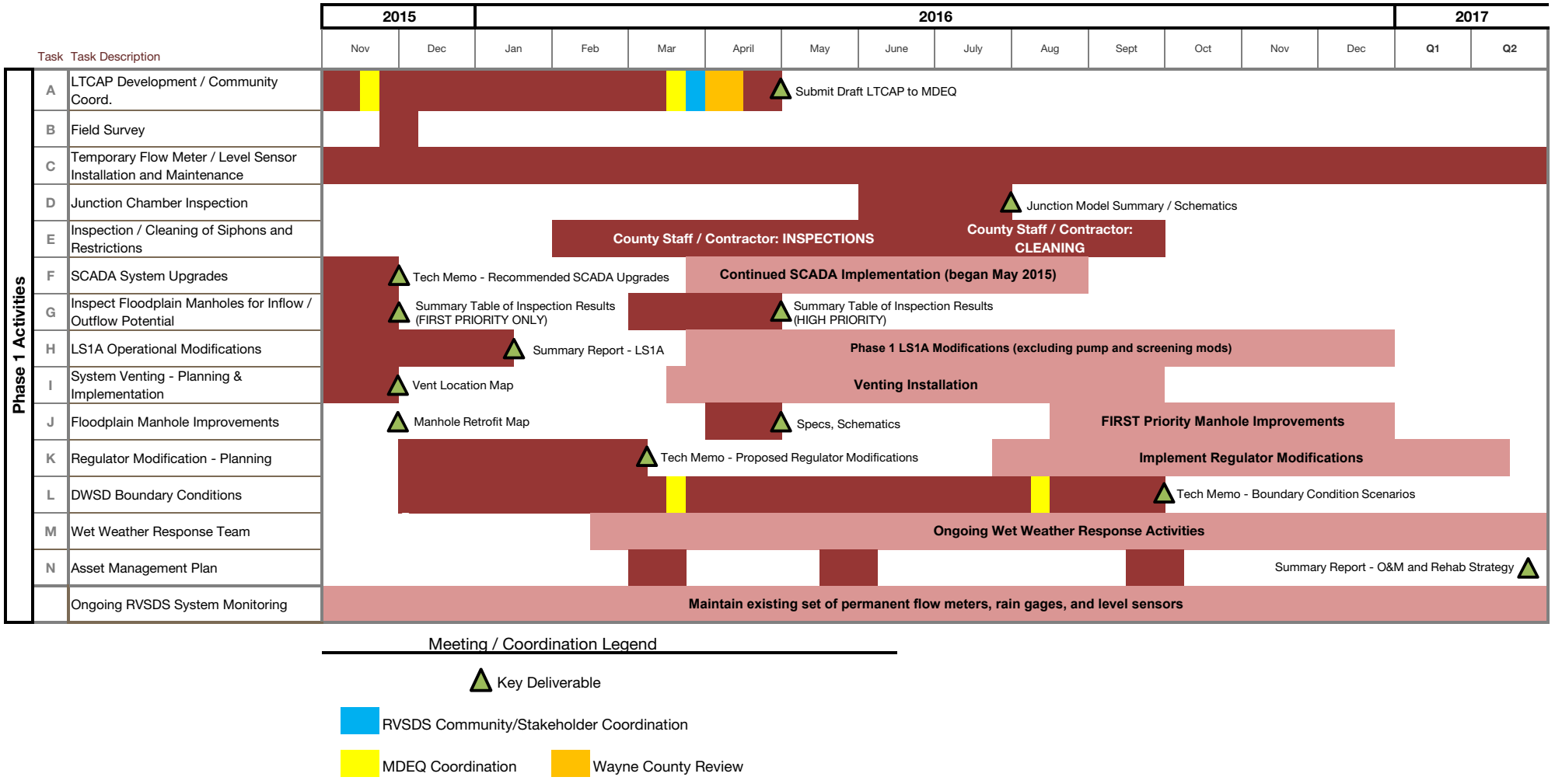
Figure 2 - Phase 1 Area of Concentration

Applied Science, Inc.

Date: 6/24/2015

Exhibit 1
Schedule

RVSDS LTCAP Work Plan - Phase 1 Project Schedule



RVSDS LTCAP Work Plan - Phase 2 Project Schedule

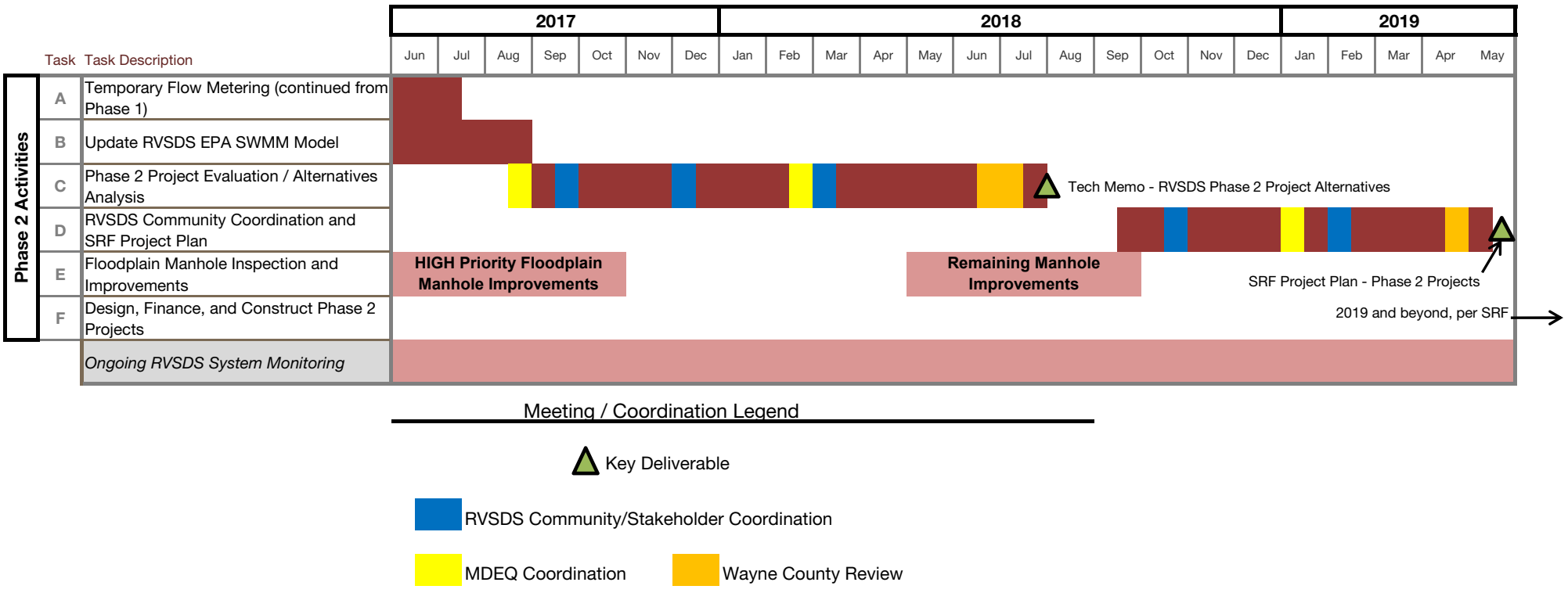


Exhibit 2

Special Structures and Siphons

(including location map)

Rouge Valley Sewage Disposal System

Special Restrictions

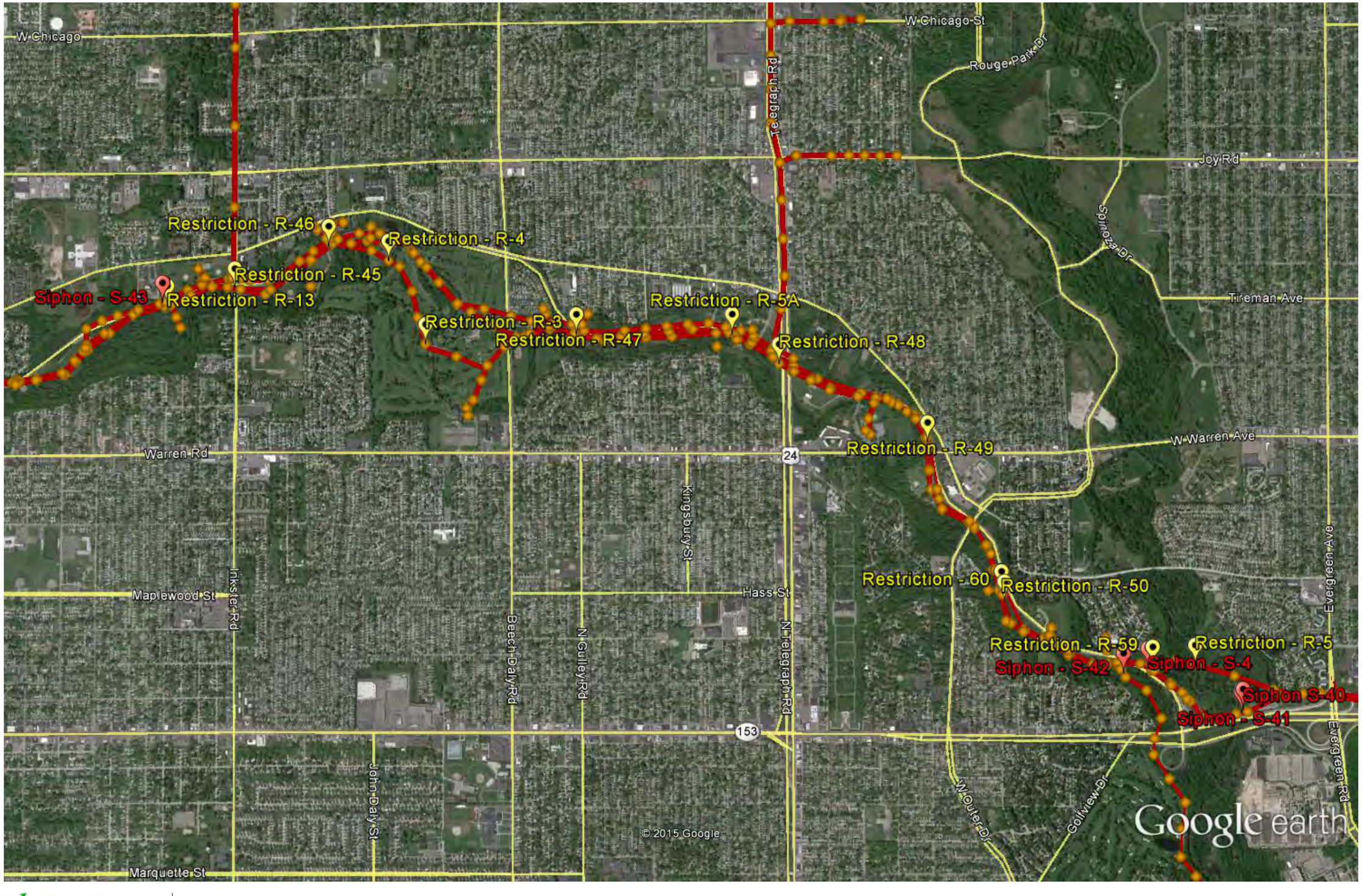
County Restriction ID	U/S GIS Manhole ID	D/S GIS Manhole ID	Description	Percent of Incoming Sewer Height Blocked	Distance of Crossing to Closest Access Point
R 1	RVI 3-15	RVI 3-15A	60" sanitary sewer crossing via special structure	29.5%	Just U/S of RVI 3-15A
R 2	RVI 4-23	Missing from GIS	102" sewer and 24" sewer crossing via special structure	58.3%	30' D/S of RVI 4-23
R 60	RVI 6-09	RVI 6-08	Change in sewer diameter from 78" to 66" for ditch crossing	15.4%	107' U/S of RVI 6-08
R 50	RVI 6-10	RVI 6-09	18" sanitary sewer crossing via C.I. pipe directly through sewer	23.1%	93' U/S of RVI 6-09
R 49	RVI 6-18	RVI 6-17	12" storm sewer crossing via depression in sewer crown	14.0%	84' U/S of RVI 6-17
R 48	RVI 6-26	RVI 6-25	12" sanitary sewer crossing via C.I. pipe directly through sewer	15.4%	Just D/S of RVI 6-26
R 5A	RVI 6-30	RVI 6-29	48" MRPIE sewer crossing via special structure	55.0%	Just U/S of RVI 6-29
R 47	RVI 6-36	RVI 6-35	12" sanitary sewer crossing via depression in sewer crown	15.2%	45' D/S of RVI 6-36
R 46	RVI 6-50	RVI 6-49	42" storm sewer crossing via depression in sewer crown	15.2%	32' U/S of RVI 6-49
R 45	RVI 6-54	RVI 6-53	18" storm sewer crossing via depression in sewer crown	16.7%	57' D/S of RVI 6-54
R 13	Absent from GIS	NHV 6-58	Change from 60" diameter to 24" high box for Livonia drain crossing	40.0%	Entirely between manholes
R 13	Absent from GIS	MR III-2A	Change from 48" diameter to 34" high box for Livonia drain crossing	29.2%	Entirely between manholes
R 39	RVI 7-14A	RVI 7-14	54" storm sewer crossing via special structure	66.7%	Entirely between manholes
R 38	RVI 7-17C	RVI 7-17B	Change in sewer shape from 30" circular to 38" x 24" LO-HED for 12" sanitary sewer, 5" gas, and 8" water main	20.0%	Entirely between manholes
R 51	RVI 8-19	--	15" sanitary sewer crossing via C.I. pipe directly through manhole	25.0%	At RVI 8-19
R 30	RVI 8-24	RVI 8-23A	Change in sewer diameter from 60" to 42" for river crossing	30.0%	Just U/S of RVI 8-23A
R 29	RVI 8-28	RVI 8-27	Change in sewer diameter from 54" to 42" for river crossing	22.2%	Entirely between manholes
R 28	RVI 9-11	RVI 9-10A	20" water main crossing via special structure	48.1%	Just U/S of RVI 9-10A
R 27	RVI 9-13	RVI 9-12	Change in sewer diameter from 54" to 42" for river crossing	22.2%	59' D/S of RVI 9-13
R 61	RVI 12-12	--	42" sanitary sewer crossing via a junction chamber	11.1%	At RVI 12-12
R 12	RVI 12-17	RVI 12-16	Change in sewer shape from 48" circular to 45" x 29" elliptical for two 6" and one 8" gas line	39.5%	114' D/S of RVI 12-17
R 11	RVI 13-04	RVI 13-03	54" storm sewer crossing via depression in sewer crown	16.7%	72' U/S of RVI 13-03
R 10	RVI 13-05	RVI 13-04A	Change in sewer diameter from 60" to 48" for river crossing	20.0%	Entirely between manholes
R 9	RVI 13-09	RVI 13-08	78" x 96" corrugated metal pipe crossing via special structure	33.3%	98' U/S of RVI 13-08
R 6	RVI 13-26	RVI 13-25	Change in sewer diameter from 60" to 48" for river crossing	20.0%	Just U/S of RVI 13-25
R 7	RVI 14-01	RVI 13-27	Change in sewer diameter from 60" to 48" for river crossing	20.0%	Just U/S of RVI 13-27
R 8	WI E-17	WI E-16	60" sanitary sewer crossing via special structure	44.7%	At WI E-17
R 44	RVI 14-21	--	18" sanitary sewer crossing via C.I. pipe directly through manhole	0.0%	At RVI 14-21
R 43	RVI 14-24	RVI 14-23	36" storm sewer crossing via depression in sewer crown	18.5%	98' D/S of RVI 14-24
R 26	RVI 15-05	RVI 15-04	60" storm sewer crossing via special structure	64.8%	41' D/S of RVI 15-05
R 21	RVI 15-19	RVI 15-18A	36" and 18" sewer crossing via depression in sewer crown	33.3%	Just U/S of RVI 15-18A
R 42	RVI 15-20A	--	30" sewer crossing via special structure	11.1%	At RVI 15-20A
R 22	RVI 16-05	RVI 16-04A	Change in sewer diameter from 54" to 36" for river crossing	33.3%	Entirely between manholes
R 23	RVI 16-07	RVI 16-06	Change in sewer diameter from 54" to 42" for river crossing	22.2%	Just U/S of RVI 16-06
R 52	RVI 16-10A	--	30" sanitary sewer crossing via C.I. pipe directly through manhole	0.0%	At RVI 16-10A
R 53	RVI 16-10B (JC17)	--	27" sewer crossing via junction chamber	20.8%	At RVI 16-10B (JC17)
R 24	RVI 16-16	RVI 16-15A	Change in sewer diameter from 48" to 36" for river crossing	25.0%	Just U/S of RVI 16-15A
R 25	RVI 16-20	RVI 16-19	Change in sewer diameter from 48" to (3) 20" for storm sewer crossing	58.3%	Manhole at structure
R 5	MR I-05	MR I-04	Change in sewer diameter from 60" to three 36" for river crossing	40.0%	Entirely between manholes
R 3	MR II-12	MR II-11	Change in sewer diameter from 48" to 36" for river crossing	25.0%	136' D/S of MR II-11
R 4	MR II-15A	MR II-15	Change in sewer diameter from 48" to 36" for river crossing	25.0%	Just D/S of MR II-15A
R 31	MR III-22	MR III-20	Change in sewer diameter from 42" to 30" for river crossing	28.6%	Just U/S of MR III-20
R 32	PWI 1A-01	MR III-24	Change in sewer diameter from 42" to 30" for river crossing	28.6%	128' U/S of MR III-24
R 54	MR VI-02	MR VI-01	Change in sewer diameter from 48" to 36" for river crossing	25.0%	70' D/S of MR VI-02
R 55	MR VII-02	MR VII-01	Change in sewer diameter from 42" to 30" for Shaw drain crossing	28.6%	151' U/S of MR VII-01
R 56	MR VII-05	MR VII-04	Change in sewer diameter from 42" to 30" for Blue drain crossing	28.6%	110' U/S of MR VII-04
R 57	Missing from GIS	MR VII-23	Change in sewer diameter from 36" to 30" for Bell drain crossing	16.7%	Just U/S of MR VII-23
R 41	NHV 6-15	NHV 6-14	Change in sewer shape from 48" circular to 38" x 60" rectangular for road crossing	20.8%	Entirely between manholes
R 59	NHV 1A-04 (JC)	NHV 1A-03	Change in sewer shape from 54" circular to 43" x 68" horizontal ellipse for river crossing	20.4%	Entirely between manholes
R 40	NAI 1-02	NAI 1-01A	Change in sewer shape from 42" circular to 34" x 53" horizontal ellipse for 33" x 49" CMP storm sewer crossing	19.1%	Entirely between manholes

Rouge Valley Sewage Disposal System

Interceptor System Siphons

County Siphon ID	U/S GIS Manhole ID	D/S GIS Manhole ID	Upstream Pipe Size	Siphon Pipe Sizes	Downstream Pipe Size	Notes
S 5	RVI 1-SMC (WC1)	RVI RISER	102"	(1) 78"	153"	WCS1
S 6	RVI 2-S1C	RVI 2-S1D	102"	(2) 78"	102"	
S 1	RVI 5-15S	RVI 5-15N	30"	(2) 20"	36"	
S 3	RVI 5-12B	RVI 5-12A	60"	(1) 30", (1) 36"	60"	
S 2	RVI 5-13B	RVI 5-13A	60"	(1) 30", (1) 36"	60"	
S 7	RVI 13-9B	RVI 13-9A	60"	(1) 30", (1) 36"	60"	
S 8	RVI 13-17B	RVI 13-17A	60"	(2) 36"	60"	
S 25	RVI 15-WC	RVI 15-EC	48"	(1) 30", (1) 36"	48"	
S 61	WI X-17	WI X-16	30"	(1) 8", (1) 12", (1) 16"	30"	
S 62	WI X-19	WI X-18	30"	(1) 8", (1) 12", (1) 16"	30"	
S 63	WI X-23	WI X-22	30"	(1) 8", (1) 12", (1) 16"	30"	
S 26	RVI 16-09B	RVI 16-09A	54"	(2) 30"	54"	
S 27	NHV 9-16	NHV 9-15	30"	(1) 14", (1) 16"	30"	
--	NHV 1-01C	NHV 1-01A	72"	(1) 48"	(3) 48"	WCS3
--	NHV 1-18A (JC)	MR IA-C2	66", 72"	(1) 54"	66"	WCS2
S 41	NHV 2-02	NHV 2-01	54"	(2) 36"	60"	LS1A
S 40	Missing from GIS	Missing from GIS	72"	(2) 42"	60"	LS1A (STCAP)
S 22	MR VII-20	MR VII-19	12"	(1) 12", (1) 8"	12"	
S 4	NHV 2-07	NHV 2-06	66"	(1) 66"	66"	
S 42	RVI 4-16C	RVI 4-16 B	78"	(2) 78"	78"	
S 43	NHV 4A-04	NHV 4A-03	24"	(1) 12", (1) 16"	24"	
S 44	NHV 4A-29	NHV 4A-28	30"	(1) 16", (1) 18"	30"	
S 45	NHV 5A-05	NHV 5A-04	48"	(1) 24", (1) 30"	48"	
S 23	PWI 1A-14	PWI 1A-13	48"H x 32"W egg	(1) 16", (1) 24"	42"	
S 24	RVI 9-18B	RVI 9-18A	48"	(2) 30"	54"	
S 46	NHV 5A-16	NHV 5A-15	48"	(1) 24", (1) 30"	48"	
S 47	NHV 5A-33	NHV 5A-32	48"	(1) 24", (1) 30"	48"	
S 48	NHV 5A-48	NHV 5A-47	48"	(1) 24", (1) 30"	48"	
S 49	NHV 5C-03	NHV 5C-02	36"	(1) 20", (1) 30"	36"	
S 50	NHV 6-03	NHV 6-02	48"	(2) 30"	48"	
S 51	NHV 6-05B	NHV 6-05A	48"	(2) 30"	48"	
S 52	NHV 6-10	NHV 6-09	48"	(2) 30"	48"	
S 9	RVI 12-18B	RVI 12-18A	48"	(2) 30"	48"	
S 10	RVI 12-12B	RVI 12-12A	54"	(1) 24", (1) 36"	54"	
S 19	MR VI-19	MR VI-06	30"	(1) 16", (1) 24"	48"	
S 20	RVI 7-00A	RVI 7-00	30"	(1) 24"	48"	
S 21	LVI 1-15	LVI 1-12	24"	(1) 8", (1) 16"	24"	
S 18	RVI 7-18A	RVI 7-18	30"	(2) 18"	30"	

Rouge Valley Sewage Disposal System - Restrictions and Siphons along Middle Rouge between Inkster Road and JC2-8



Google earth

miles 4
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