CHARTER TOWNSHIP OF OSCODA

CLEAN WATER
STATE REVOLVING FUND (SRF)
PROJECT PLAN

Charter Township of Oscoda
110 South State Street
Oscoda, Michigan 48750

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RAZD Consulting Project No. 01100044

EXECUTIVE SUMMARY

This Project Plan was completed to qualify for a loan through the State Revolving Fund (SRF) to finance wastewater treatment system improvements that are required at the Oscoda Township WWTP. The Project Plan presents limited sanitary sewer collection system improvements that are under evaluation by the Charter Township of Oscoda and that may be included within the Stormwater, Asset Management and Wastewater (SAW) Grant program scope of work. The SRF loan program assists municipalities in financing utility improvement projects over a 20-year term at favorable interest rates that typically range between 1.875% and 2.5%. An SRF Loan funded project will generally reflect the long-term needs of the community. The Township has prepared this SRF Project Plan with financial assistance received through the S2 Grant program and reserves the option of ultimately financing the required wastewater treatment system improvements using other means including selling bonds or obtaining a SAW Loan.

This State Revolving Fund Project Plan is the first step in an application process for SRF loan financing of the necessary wastewater treatment facility improvements. The report presents the engineering and scientific evaluation results required to define the need for the project, develop plausible alternatives to remedy the identified issues and define the scope of the selected facility improvement alternative. This planning document will provide background information on the existing wastewater collection and treatment infrastructure and define a set of reasonable alternative improvement projects that would provide for the Township's wastewater treatment facility needs over a 20-year life cycle. Principal alternatives are then evaluated and compared with respect to financial and technical feasibility as well as the ability to implement the proposed scope of improvements at this unique project location.

The Charter Township of Oscoda is located in eastern Iosco County, Michigan. The Township owns and operates a sanitary sewage collection system and a wastewater treatment facility that serves the unincorporated communities of Oscoda and Au Sable. Construction of the sewer system dates to 1970 and consists of gravity collection sewers and numerous raw sewage lift or pump stations. The Oscoda Township WWTP is a three-cell aerated lagoon treatment system that discharges to groundwater and which originally served the Wurtsmith Air Force Base. In 2003 the former mechanical treatment plant serving the Township was abandoned and the Wurtsmith Air Force Base lagoon system was renovated and placed back into operation to serve the Township's sewer district including the existing U.S. Air Force Base property. The Township terminated their former NPDES permit which authorized a surface water discharge to the Au Sable River and obtained a Rule 2218 groundwater discharge permit for the renovated lagoon treatment system. The new complete-mix aeration equipment installed in 2003 largely failed within 2 years of operation and several components of the existing treatment facility are still in service that date to the original construction of the lagoon system by the U.S. Air Force in 1984.

On July 6, 2010, the Groundwater Permits Unit, Michigan Department of Environmental Quality (MDEQ) issued the first groundwater discharge permit renewal incorporating a stringent new ammonia nitrogen limitation of 2.0 mg/L in the groundwater. No nitrogen limitations were in the original permit issued in 2003 for this facility. A petition for a contested case hearing was filed by the Township objecting to the terms of the newly issued discharge permit. Beginning in September 2010, negotiations between the MDEQ and Oscoda Township regarding the new permit terms and limitations began and continued until the discharge permit was modified first on June 16, 2011, and in final form on October 29, 2012. The content of this SRF Project Plan reflects an advancement of the planning efforts originally presented in the Facility Improvement Work Plan prepared by RAZD Consulting, LLC and submitted to the MDEQ by the Township on December 14, 2011, and which presented a set of primary facility improvements intended to satisfy conditions established within Part I, Section 4 – Schedule of Compliance of groundwater discharge permit GW1810213 modified on June 16, 2011, and potentially deferred needs.

The major capital improvements defined in this Project Plan include replacing the existing failed lagoon cell aeration system diffusers and original existing air supply blowers, providing effluent discharge flow measurement, installing new distribution piping within the rapid infiltration basins utilized for treated effluent disposal to groundwater, chemical feed provisions and lagoon piping modifications at the Oscoda Township WWTP. In addition to the wastewater treatment facility compliance upgrades, sanitary sewer collection system improvements that include structural renovation of Lift Station #25 and the installation of odor/corrosion control technology at this final wastewater pumping station are discussed. Upon future study and evaluation, these and other collection system improvements will be addressed separately within the Township's Capital Improvements Plan.

Several alternatives were developed to address the facility improvements identified in this plan. Two principal alternatives were identified as being both realistic and feasible for addressing the major project component of replacing the existing aeration system and restoring efficient biological treatment. The feasible alternatives are identified as Alternatives No. 4 and No. 5, respectively. After review and discussion with the Township Board of Trustees on November 11, 2013, Alternative No. 4 was selected for implementation using the State Revolving Fund program as a potential funding source in the Fiscal Year 2015 schedule as agreed upon with the MDEQ pursuant to Part I, Section 4 – Schedule of Compliance of groundwater discharge permit GW1810213 modified on October 29, 2012. Alternative No. 4 incorporates "Green Energy" based elements of the overall project which would significantly reduce the current electrical costs of operating the existing system through the installation of new, more efficient air supply blowers, controls and aeration diffuser system equipment.

The User Charges for Alternative No. 4 are anticipated to range from $1.85 to $2.70 per month for residential customers in the Township using 6,000 gallons per month. This estimated increase to the Township's current sanitary sewer user rates does not consider the potential "principal forgiveness" award that may be obtained through the Green Project Reserve program and/or the opportunity that Engineering Design and User Charge development costs can be funded through the new SAW Grant program. If the Township is fortunate to receive an award of principal forgiveness through the Green Project Reserve and/or a SAW Grant for Engineering costs, the resulting User Charge for the selected Alternative No. 4 would decrease. In each case, the sewer rates will remain below the upper limit of affordability as determined by USDA to be 1.5% of Median Household Income.

I. INTRODUCTION

The Charter Township of Oscoda provides wastewater treatment for their customers utilizing a three-cell aerated lagoon system that was reclaimed and renovated at the former Wurtsmith Air Force Base (AFB) located west of the town center. The Oscoda Township sewer service area is located entirely within Iosco County and includes a small portion of Au Sable Township. The disposal of treated effluent to groundwater is accomplished utilizing rapid sand infiltration basins that are located adjacent to and west of the lagoon treatment cells. The site layout and process flow diagram for the existing lagoon wastewater treatment facility are provided in Appendix A. The Oscoda Township wastewater treatment plant (WWTP) has been in operation since the fall of 2003 serving a mixed residential, commercial and industrial customer base. F&V Operations and Resource Management, Inc. is retained by the Charter Township of Oscoda to provide daily operations, facility maintenance and compliance monitoring services for both the water and wastewater treatment infrastructure supporting the community. The Township continues to maintain the reliability of wastewater services by carrying out periodic evaluation of its facilities and equipment as part of routine contract operations.

Since reclaiming the Wurtsmith AFB lagoon treatment system and starting fresh at the new site, the Oscoda Township WWTP has now been in service for about 10 years. At this time, the existing treatment facility is not performing at 100% capacity due to a failing aeration system. This was the heart of biological treatment within the original design premise and the facility is now unable to consistently produce treated effluent at a quality consistent with the original project intent. The Charter Township of Oscoda is also under obligation to address additional facility upgrades required to satisfy Part I, Section 4 – Schedule of Compliance of groundwater discharge permit GW1810213 issued for the Oscoda Township WWTP on July 6, 2010, and subsequently modified June 16, 2011, and October 29, 2012, by the Groundwater Permits Unit, Michigan Department of Environmental Quality (MDEQ). A copy of the current discharge permit is included in Appendix B. An overview of the facility background leading up to the MDEQ discharge permit related compliance action driving this wastewater treatment improvement project is provided in the following section.

The Oscoda Township WWTP is relatively new to be facing major facility improvements that are both costly to implement and premature when considering the long-term objectives that resulted in construction of the existing system in the first place. The Township recently invested nearly $2.3 million and received a $1.15 million Economic Development Administration (EDA) grant to allow this major infrastructure project to occur. This situation presents significant economic challenges for the Township as it continues to respond in good faith to the MDEQ compliance expectations established through issuance of the modified groundwater discharge permit. As part of the process to evaluate viable funding alternatives that will allow realization of the facility upgrades required by the MDEQ, securing a State Revolving Fund (SRF) low interest rate loan is a serious consideration for the Township. To assist the Charter Township of Oscoda in the planning process, financial assistance through the S2 Grant Program was awarded in October 2012 to help support the facility improvement planning efforts culminating in development of this SRF Project Plan document.

The primary purpose of this Project Plan is to fulfill the requirements identified in the State Law (MCL 324.5303) and attendant rules (Michigan Administrative Code R323.952) governing the State Revolving Fund (SRF) and Strategic Water Quality Initiatives Fund (SWQIF) programs. In addition, this Project Plan provides a basis for ranking the Township's proposed wastewater system improvements in comparison to other wastewater facility projects that are proposed by other municipalities in a project priority listing for a low-interest SRF loan. This is a financially attractive program where municipalities across Michigan compete for limited funds based on the relative merits of their proposed projects. The scope of this Project Plan includes a summary of current issues with the Oscoda Township wastewater treatment system, a collection system evaluation and the development of projected population growth and the wastewater needs of the

service area for the 20-year planning period. The Project Plan identifies principal alternatives to meet the current and future wastewater needs and evaluates the environmental impacts of the selected alternative when implemented by the Township.

The SRF Project Plan presents projected user costs that are necessary to operate the sanitary sewer collection system and wastewater treatment facility and repay the low-interest rate loan for the selected alternative. A draft SRF Project Plan was presented and discussed before the Charter Township of Oscoda Board of Trustees on November 11, 2013. The regularly scheduled board meetings are also broadcast on TV. The availability of the final SRF Project Plan for public review and comment was advertised in the *Iosco County News-Herald and Oscoda Press,* a widely distributed local newspaper on May 15, 2014. A copy of this advertisement is provided in Appendix G. In addition, the final Project Plan was placed on public display at the Charter Township of Oscoda municipal offices for a minimum period of 31 days prior to holding the formal Public Hearing to receive input from the community related to the proposed Oscoda Township WWTP improvements.

The format of this document follows the project planning guidelines for Clean Water Revolving Funds (SRF and SWQIF) prepared by the Revolving Loan Section, Michigan Department of Environmental Quality dated July 2012. Section II presents extensive background information including a description of the sanitary sewer service area community, the unique study area characteristics, existing wastewater treatment capacity and the need for the proposed project. Section III presents alternatives for resolution of the identified MDEQ facility compliance and improvement needs while Sections IV, V and VI further evaluate the selected alternative pursuant to the current MDEQ guidance for SRF Loan qualification.

II. PROJECT BACKGROUND

From a regulatory perspective, the wastewater treatment and effluent disposal system serving the Charter Township of Oscoda (known as the Oscoda Township WWTP) is under the sole jurisdiction of the Michigan Department of Environmental Quality (MDEQ). The authorization to discharge treated effluent to the groundwater is issued by the Groundwater Permits Unit (GPU), MDEQ in Lansing. Compliance oversight of the Oscoda Township WWTP for discharge permit compliance and facility condition is now the responsibility of the Gaylord Field Office, MDEQ with engineering plan review and Part 41 permit issuance being performed by the Saginaw Bay District Office, MDEQ. The Oscoda Township WWTP is subject to both the general standards and specific permit requirements established pursuant to the Part 22 Groundwater Quality Rules. The State of Michigan has primacy for implementing these rules. Within this regulatory framework a project background for the Oscoda Township WWTP is presented in this section.

The former Wurtsmith Air Force Base (WAFB) was originally served by a trickling filter sewage treatment plant. The existing rapid infiltration basins (called seepage lagoons then) were used for disposal of treated effluent generated by the trickling filter plant. In 1974, the USEPA issued the U.S. Air Force NPDES discharge permit MI0021784 for an emergency bypass of treated wastewater from this treatment plant to Van Etten Creek since, at that time, a groundwater discharge permit authorizing effluent disposal to the seepage beds was not required. The existing three (3) cell lagoon system was originally constructed by the U.S. Air Force in 1977 to receive and process only sanitary sewage generated by the base occupants and to replace their existing trickling filter treatment plant that was hydraulically overloaded and not performing effectively. An NDPES discharge permit was subsequently maintained by the U.S. Air Force for the separate environmental remediation system discharge of TCE contaminated groundwater.

The original groundwater discharge permit M00640 for this treated sanitary effluent disposal site was issued in 1983 to the Department of the Air Force by the Water Resources Commission. When the lagoon cells were first placed in service by the U.S. Air Force, they did not hold water due to excessive leakage. The individual lagoon cell compacted clay liners were eventually reconstructed so that the system could function properly and it was placed in service as an aerated lagoon system in 1984. The original groundwater discharge permit M00640 authorized a daily maximum flow of 625,000 gpd with effluent limits of 1 ug/L for TCE and 2.0 mg/L for dissolved oxygen, respectively. At this time, the Michigan Department of Natural Resources (MDNR) staff viewed that the aquifer receiving the treated effluent was practically an unusable aquifer from a public health and use standpoint but that monitoring for the historical TCE contamination previously documented at the Wurtsmith AFB was environmentally appropriate.

The Oscoda Township sewer district, excepting the WAFB property, was originally served by a mechanical wastewater treatment plant that discharged to Van Etten Creek near the stream's confluence of the Au Sable River in accordance with an NPDES surface water discharge permit. The concept to abandon the aging mechanical treatment plant then serving the Township and renovate the lagoon system that formerly served the closing AFB was first recommended by the MDEQ district compliance staff during the mid-1990's. The primary reasons for the MDEQ encouraging this approach were expectations that the renovated lagoons would offer both a lower life cycle cost to the Township due to significantly reduced treatment system complexity and operations expense as well as provide increased capacity for the planned future growth. The Township's engineering consultant at the time, Earth Tech, provided a concept to the MDEQ district and discharge permitting staff for review and approval in support of relocating wastewater treatment from the mechanical plant site to the AFB lagoons that included installing aeration and circulation, discharging the treated effluent to the existing rapid infiltration basins and then capturing the comingled effluent-groundwater for final discharge to the wetlands south of the lagoon facility site under coverage of a new NPDES permit.

The direct discharge of treated effluent to the wetlands required an NPDES permit with input from the Surface Water Assessment Section (SWAS), Surface Water Quality Division, MDEQ concerning the potential impact to the wetland resources as a result of the proposed discharge. The recommendation at this time from SWAS to the NDPES Permits Section was that of Advanced Waste Treatment (AWT) for the conventional pollutants of dissolved oxygen, ammonia, and carbonaceous biological oxygen demand. In addition, the Groundwater Permits Unit (GPU), MDEQ required that the Township demonstrate complete capture of the treated effluent by the proposed groundwater recovery system to avoid requiring that the Township also secure a groundwater discharge permit issued pursuant to the Part 22 Groundwater Quality Rules. Based on MDEQ technical staff review, the initial Earth Tech engineering study could not demonstrate 100% effluent capture by the groundwater recovery system. Therefore, the project direction then focused on rapidly securing a Part 22 groundwater discharge authorization instead of an NPDES surface water discharge permit so that the Township could preserve a $1.15 million EDA grant essential to realize the infrastructure improvement project.

The MDEQ was in agreement with the Township's engineering consultant that local site and environmental conditions demonstrated that the treated lagoon effluent discharged to the rapid infiltration basins eventually vented to the Au Sable River and wetlands adjacent to the site. Given this situation, if the Township could obtain a restrictive deed covenant from the United States Forest Service (USFS) to prevent the installation of public water supply wells on the land south of the facility, the GPU would process the discharge permit such that groundwater quality standards including a total inorganic nitrogen limitation of 5.0 mg/L consistent with Rule 2222 would not be required for this facility. The Township was able to secure confirmation that the deed restriction would be granted from the USFS and the GPU then issued groundwater discharge permit GW183500103 on January 10, 2003, granting authorization for a daily maximum of 1.5 million gallons per day (MGD) and an annual volume of 365 million gallons per year (MGY). Besides daily discharge volume, the only additional permit limitation was 1.0 mg/L for total phosphorus in the treated effluent and future groundwater monitoring wells.

The Township filed a timely discharge permit renewal application in July 2007. As part of the renewal process, the GPU prepared technical referrals to the SWAS to evaluate the potential impact of the existing venting discharge on the wetlands. A technical referral was not prepared or submitted to the SWAS by the GPU for the Township's original 2003 permit. The 2008 GPU referral included the previous permit's maximum daily flow of 1.5 MGD as the discharge volume venting to the adjacent wetlands. The SWAS response memos in May of 2008 document the MDEQ's acceptance of a total phosphorus limit of 1.0 mg/L but again recommended stringent AWT limits for carbonaceous biological oxygen demand, ammonia and dissolved oxygen at the venting location consistent with the original direct surface water discharge petition. A second referral to SWAS was prepared by GPU in response to the initial AWT response with the result being that the SWAS confirmed the initial AWT recommendation in a November 2009 memo. The Township and United Water as the Township's contract operator presented their concerns with the draft permit that was prepared for review by the GPU and dialogue regarding the issues of concern occurred intermittently up until the permit was issued on July 6, 2010, with limitations taking into consideration the AWT recommendations for venting groundwater quality provided by the SWAS.

Shortly after issuance, a petition for a contested case hearing was filed by the Township objecting to the terms of the newly issued permit including the significant reduction in the daily discharge flow and a stringent new ammonia nitrogen limitation of 2.0 mg/L in the groundwater. Beginning in September 2010, negotiations between the MDEQ and the Charter Township of Oscoda regarding the appropriateness of the new permit limits for this particular facility began and continued with gradual success until a discharge permit modification was issued on June 16, 2011. The contested case petition was then withdrawn by Oscoda Township. Since this time technical and planning efforts have focused on several interrelated facility assessment initiatives that are necessary to realize improvements to the Oscoda Township WWTP and

comply with the discharge permit requirements. In accordance with the Part I, Section 4 – Schedule of Compliance conditions established in the groundwater discharge permit GW1810213 modified June 16, 2011, a Facility Improvement Work Plan was submitted to the MDEQ by the Township on December 14, 2011. The content of this SRF Project Plan advances the general facility planning efforts that were first presented in the Facility Improvement Work Plan document and presents a focused set of facility improvements that are intended to satisfy conditions established within Part I, Section 4 – Schedule of Compliance of groundwater discharge permit GW1810213 last modified October 29, 2012.

The Charter Township of Oscoda Board of Trustees desires to cost effectively address the MDEQ compliance and infrastructure improvement issues related to the wastewater treatment system before these problems become critical and affect the reliability of the wastewater utility service. In support of this objective, the Township has been working with RAZD Consulting, LLC to identify potential issues primarily related to the wastewater treatment system. F&V Operations and Resource Management, Inc. (FVOP) in their role as the Township's licensed contract operations firm are closely involved in the wastewater infrastructure evaluation and improvement recommendations process. In addition, Oscoda Township recently engaged Spicer Group, Inc. to prepare a SAW Grant application requesting financial assistance to develop a comprehensive Asset Management Plan and assist with the detailed engineering design services that will be necessary to realize the required improvements to the Oscoda Township WWTP. The SAW Grant process may identify additional collection system and/or WWTP improvements necessary to provide reliable wastewater service to the customer communities and assure continued protection of public health and the environment. The results of this collective facility improvement planning work are the driving force for the initiation of this SRF Project Plan.

A. Study Area Characteristics

1. Delineation of Study Area

The Oscoda Township WWTP service area consists of a mixed residential, commercial and industrial customer base within the greater Oscoda community. The residential and commercial area includes the business district of Oscoda and a small portion of Au Sable Township directly south of Oscoda that essentially serves the small business district and unincorporated town of Au Sable. The industrial customer base is primarily centered at the former Wurtsmith AFB which is one of Northern Michigan's largest industrial parks and offers significant opportunity for drawing new industry to the area. Au Sable Township also has an industrial park.

There is not currently a formal sewer service area or district boundary established so the extent of the existing sanitary sewer collection system infrastructure basically defines the municipal sewer service district for the Oscoda Township WWTP. Developing a comprehensive and up to date sanitary sewer system plan set in digital format will be an item included in the forthcoming SAW Grant application submitted by the Township. A general map of the Oscoda Township WWTP site location and the existing community sanitary sewer service area is provided as Figure 1 – Project Location and Sewer Service Area in Appendix A to this report. The sewer service area is essentially limited to the unincorporated towns of Oscoda and Au Sable along the U.S. 23 highway and the residential areas adjacent to this corridor. The former Wurtsmith AFB property was incorporated into municipal authority control and consists of a large industrial air park and a residential area that was converted to private residences from the U.S. Air Force government housing at the time that the base closed in 1995. The Wurtsmith AFB property is also in the Oscoda Township WWTP sanitary sewer service area.

The existing Oscoda Township WWTP is located approximately 2 miles west-northwest of the Oscoda town center, directly south of the WAFB and adjacent to the Au Sable River as shown in Figure 1 – Project Location and Sewer Service Area in Appendix A. Treated wastewater is

continuously discharged to groundwater through surface application of effluent to rapid sand infiltration basins west of the lagoon cells. Shallow groundwater underlying the effluent disposal site vents to the Au Sable River generally south-southeast of the facility. With the wastewater treatment relocation project completed in 2003, the Oscoda Township WWTP was originally designed to process up to an annual average of 1.0 million gallons per day (MGD) and a daily maximum flow of 1.5 MGD. The current daily average flow received by the Oscoda Township WWTP in the maximum flow month of July is approximately 0.3 MGD. The annual daily average flow received by this facility is approximately 0.25 MGD. Both of these representative influent wastewater flow values have been fairly consistent over the last several years of operation.

2. Land Use in Study Area

Growth and development within the Oscoda Township WWTP service area historically occurred along the U.S. 23 highway and waterfront areas with residential areas expanding adjacent to this corridor. The central business district includes a mix of residential, commercial and industrial customers. A significant growth pattern for additional residential and/or commercial land use has not occurred to date along the main transportation route of U.S. 23. The former Wurtsmith AFB property represents one of Northern Michigan's largest industrial parks offering significant opportunity for drawing new industry to the area. A large expansion to an existing aircraft service and maintenance business is planned for this fall. At this time, approximately 50% of the planned industrial park incorporated into municipal authority control remains available for future conversion to new industrial use. The land use within the Oscoda Township WWTP service area is represented in the official Zoning Maps prepared for Oscoda and Au Sable Township and included for review in Appendix A. The approximate existing land use distribution including residential, commercial and industrial development is shown in Table 1 below.

Table 1 – Existing Land Use

Land Use Category	Percent (%)
Residential	40
Vacant	20
Industrial	20
Commercial/Light Industrial	10
Major Institutional	4
Open Space/Recreation	3
Railroad/Right-of-Way	2
Mixed Use	1

3. Surface and Ground Waters

There is no designated groundwater use near the Oscoda Township WWTP. Municipal water is supplied to the area by the Huron Shore Regional Utility Authority surface water treatment plant located in East Tawas, Michigan. The Huron Shore facility was first constructed in 1992 and subsequently expanded in 1996 to supply water to additional service areas north of the regional water treatment plant including the Charter Township's of Oscoda and Au Sable. At present, the Township continues to exercise and maintain two (2) former groundwater water supply wells that were physically disconnected from the Township's water distribution system when the regional water supply service arrived. Use of the existing groundwater supply wells in a potable water capacity is considered remote but the Township has elected to maintain the ability for these

wells to provide an emergency source of supply in the event that something unforeseen occurs with the Huron Shore Regional Utility Authority treatment plant and/or transmission main.

Treated wastewater discharged to the rapid infiltration basins or sand beds located adjacent to the lagoon treatment system comingles with the shallow groundwater and eventually vents to the Au Sable River south of the Oscoda Township WWTP site. As part of the original Rule 2218 groundwater discharge permit authorization process supporting the Township's wastewater treatment relocation project, the Township secured a restrictive deed covenant from the United States Forest Service (USFS) as the down-gradient property owner to prevent the installation of private or public water supply wells on the USFS owned land south of the Oscoda Township WWTP and effluent disposal system. The USFS owns the land adjacent and south of the Oscoda Township WWTP to the Au Sable River. Since the comingled groundwater/effluent plume eventually vents to the Au Sable River, the potential impact to local groundwater supply wells resulting from the discharge of treated wastewater effluent generated by the Oscoda Township WWTP is effectively mitigated through this perpetual restrictive deed covenant granted to the Charter Township of Oscoda by the USFS.

The Au Sable River is the major watercourse through the service area and it flows through the center of the unincorporated communities of Oscoda and Au Sable and the business district along the U.S. 23 corridor. The Au Sable River drains an extensive watershed in the northeast portion of the lower peninsula of Michigan. The river generally flows in an easterly direction and discharges into Lake Huron. The Old Au Sable River and Van Etten Creek, which is the controlled outlet from Van Etten Lake, are notable surface water courses that drain into the Au Sable River and that are within the general study area. Wetlands are located adjacent to the Oscoda Township WWTP site and a 100-year floodplain is mapped for the Au Sable River near the facility beginning east or downstream of Foote Dam Pond. The natural features within the Oscoda Township WWTP service area are represented in Figure 2 – Natural Features in Appendix A. As presented earlier in this document, the NPDES surface water discharge permit previously authorizing the discharge of treated effluent generated from the former mechanical WWTP at the confluence of Van Etten Creek with the Au Sable River has been terminated since 2003. Therefore, the direct loading of pollutants to the Au Sable River was mitigated through the wastewater treatment plant relocation project completed by the Township in 2003. The planned improvements to the Oscoda Township WWTP as presented in this SRF Project Plan will help to preserve the pristine water quality of the Au Sable River for all designated uses.

Van Etten Lake and Cedar Lake lie north of the Oscoda Township WWTP and are attractive surface water natural resources. At this time, the primarily residential land use surrounding these lakes is not provided with municipal sanitary sewer service. Consideration to extending municipal sewer service was evaluated by the Township including development of conceptual sewer extension plans and preliminary costs on two separate occasions. While local interest in the study area of this potential project was present, the property assessment and sewer service costs estimated to obtain the environmental benefit that would be realized by installing municipal sewer was not supported by the majority. Therefore, the homes located on Van Etten Lake and Cedar Lake predominantly utilize existing onsite sewage or septic systems that are approved and regulated by the Iosco County Health Department. At this point in time, the Township is not aware of significant issues of concern related to the potential public health and environmental impacts from onsite sewage systems that are not adequately performing in this area. Further presentation of local conditions is provided within Item 3 – Water Quality Problems in Section D – Need for Project.

B. Economic Characteristics

The local economy within Oscoda Township suffered a significant setback when the Wurtsmith AFB closed. While ample diversity remains, the economic conditions are challenging but are improving. A mix of job types is present, ranging from retail to industrial and from service to

professional. Table 2 below presents the major employment classifications of Oscoda Township residents in 2000, as published by the U.S. Census Bureau.

Table 2 – Oscoda Employment Classifications

Employment Classifications/Occupations	% of Employed Population
Management, Business, Science and Arts	17.2
Service Related	30.3
Sales and Office Occupations	20.8
Natural Resource, Construction and Maintenance	13.2
Production, Transportation and Material Moving	18.5

Median income statistics obtained from the U.S. Census Bureau over the period of 2007 to 2011 indicate that median household income levels for Oscoda residents are on-par or slightly above those of the neighboring community Au Sable Charter Township and Iosco County but below the State of Michigan. The per capita income and percent of persons below the poverty level are also presented. The U.S. Census Bureau American Community Survey data is collected on an annual basis and the reporting format is based on the size of the community. For small communities, the data is reported over a 5 year period. Table 3 below shows the median income comparison for Oscoda Township and the surrounding area of Au Sable Township.

Table 3 – Median Income Statistics (U.S. Census Data 2007-2011)

Study Area	Per Capita Income	Household Income	% Below Poverty Level
Oscoda Township	$19,865	$36,571	22.9%
Au Sable Township	$23,298	$34,313	15.7%
Iosco County	$21,303	$36,445	19.2%
State of Michigan	$25,482	$48,669	15.7%

C. Existing Facilities

1. Collection System

The existing wastewater collection system for the Charter Township of Oscoda service district consists of gravity sanitary sewers. There currently are no pressure sewer collection networks in the service district. A relatively large number of sewage lift stations of various sizes are located throughout the collection sewer network to direct the raw wastewater generated within localized areas of the service area to the primary gravity sewer collection mains. According to Township records, there are approximately 63 miles of gravity sanitary sewer ranging in size from 8-inch to 18-inch diameter pipe and force mains from the wastewater lift stations. The total length of gravity sewer and force main infrastructure is currently not known with great confidence. As such, this issue will be addressed as part of the Township's SAW Grant application. Combined sewers, retention or flow equalization basins or by-pass locations are not present within the Township's collection system. This section will present an overview of the available sewer system record information for this component of the Township's wastewater infrastructure.

A single detailed map of the entire sanitary sewer collection system currently does not exist and there is no formal service area boundary designated at this time. The extent of the existing sanitary sewer collection system basically defines the municipal sewer district for the Oscoda Township WWTP. The service area is essentially limited to the Oscoda and Au Sable business districts along the U.S. 23 highway and the predominantly residential areas that are adjacent to and west of this main corridor. The sanitary sewer collection network for the Wurtsmith AFB was originally constructed and maintained separate from the town of Oscoda sewer network. When the base closed in 1993, the Wurtsmith AFB property was eventually incorporated into municipal authority control and wastewater was then directed to the Township thus combining the sanitary sewer collection system under single control for management and maintenance. The overall collection system is best viewed as infrastructure that was installed for the unincorporated towns of Oscoda/Au Sable and the former Wurtsmith AFB property. The pertinent information is available as a number of separate engineering plan sheets that detail the various phases of sewer collection system installation. A brief description of the entire sewer collection system referencing the available record plans is provided in this section consistent with the Township's S2 Grant application.

Oscoda Township was originally served by a mechanical wastewater treatment plant that discharged to Van Etten Creek near the confluence of the Au Sable River. The original phases of gravity sewer conveyed raw wastewater to Lift station #4 located east of the former treatment plant. Lift station #4 is the final lift station within the town of Oscoda collection system and now conveys wastewater to Lift Station #25 that is located on the former Wurtsmith AFB. The Lift Station #25 location is adjacent to the site of the trickling filter treatment plant that originally served the base. While this plant was in service, Lift Station #25 directed treated effluent to the rapid infiltration basin site for disposal to groundwater. When the trickling filter plant was abandoned in favor of the aerated lagoon system in 1977, Lift Station #25 was converted to conveying raw wastewater generated by the Wurtsmith AFB and directing this to the newly constructed lagoon treatment cells. Currently, sewage received from the town of Oscoda via Lift Station #4 is directed to a wet well connected to Lift Station #25 that also receives wastewater generated by the industrial, commercial and residential customers located at the base. From Lift Station #25, the combined town and air force base property wastewater is pumped at a rate of 600 gallons per minute via 2.5 miles of 14-inch diameter force main to the Oscoda Township WWTP facility site.

The sanitary sewer collection network serving the Wurtsmith AFB property is available on record plan sheets obtained from the U.S. Air Force and identified in the title block as Master Plan Sanitary Sewage System, Tab G-2, Sheet 1 of 3 and Sheet 2 of 3, respectively. Record Sheet 1 of 3 defines the primary residential dwelling service area of the Wurtsmith AFB property south of Perimeter Road with additional residences to the north. Sheet 1 of 3 includes the location of Lift Station #25 and the existing 14-inch diameter force main is shown as being directed to the rapid infiltration basins consistent with the operating condition at the time the plan is dated in 1975. Within this portion of the collection system, there are a total of seven (7) raw sewage lift stations. Record Sheet 2 of 3 provides the sanitary collection system infrastructure supporting primarily industrial land use. The sanitary sewer network is limited in comparison to that shown on Sheet 1 of 3 with total of six (6) raw sewage lift stations serving this area.

The sanitary sewer collection network within the Oscoda Township WWTP district excepting the Wurtsmith AFB property is presented on a number of record plan sheets obtained from the Township's archives. Reproductions of the available sewer record plan sheets were previously included for reference in Appendix C of the S2 Grant Program application submitted to the Revolving Loan Section, MDEQ in March 2012. The plan sheets are presented to begin at the southern extent of the Township's collection system and progress to the north. The record plan sheets are itemized for reference as follows:

Sheet 1 – Au Sable Township Area – Illegible Title Block

Sheet 2 – Central Oscoda Area – Index Sheet 1974 As-Built

Sheet 3 – Northern Oscoda Area – Index Sheet with Illegible Title Block

Sheet 4 – Western Oscoda Area – 1974 Index Map

Sheet 5 – Van Ettan Lake Area – 1975 Marked Record Plan

Also available are the record plans detailing the new 14-inch diameter force main that was installed from Lift Station #4 to redirect wastewater collected within the above service area to Lift Station #25 located on the Wurtsmith AFB property. This project was necessary to allow the force main from Lift Station #25 that conveyed the base wastewater flows to the Township's former mechanical plant via Lift Station #4 to remain in service during the concurrent lagoon treatment system renovation project. Once the former AFB lagoon site work was complete, the wastewater flows received at Lift Station #4 from the town of Oscoda and the flows generated by the base were both directed to Lift Station #25. The combined town and base flow was then directed from Lift Station #25 via the existing 14-inch force main to the renovated sewage lagoon treatment facility.

In our review of the available record plans and discussions with the Township's operations staff, we understand that the age of the sewer collection system piping for both the Wurtsmith AFB district and the unincorporated towns of Oscoda and Au Sable is approximately 40 years old. The majority of this infrastructure was installed during the significant expansion of the Wurtsmith AFB to a Strategic Air Command base. It is our understanding that the overall condition of the sewer collection infrastructure is fair to good with no significant problems identified for short-term correction as part of this SRF loan application process. With that baseline condition as a basic starting point, Spicer Group, Inc. will be reviewing the sanitary sewer collection system within the scope of the SAW Grant program for developing the Township's wastewater Asset Management Plan.

2. Lift Stations

A total of 28 lift stations are used throughout the wastewater collection system. Of this total, there are 13 raw sewage lift stations located within the sanitary sewer collection network serving the Wurtsmith AFB property. In addition to final Lift Station #25, wastewater pump stations 18, 19, 20, 21, 23 and 24 are located on the U.S. Air Force record Sheet 1 of 3. Lift stations 18 through 21 serve the primary residential service area south of Perimeter Road while stations 23 and 24 are located north of Perimeter Road and serve a mixed use area. Record Sheet 2 of 3 identifies sewage pump stations 13, 14, 15, 16, 17 and 22. Lift Station #16 receives all of the wastewater generated in the Sheet 2 of 3 industrial service area and directs this flow to the gravity sewer collection network that is defined on Sheet 1 of 3.

There are a total of 15 wastewater lift stations located within the Township's sewer collection network not including the Wurtsmith AFB property. This includes the portion of Au Sable Township that is in the Oscoda Township WWTP service area. The respective wastewater lift stations as located on the record plan sheets are listed by their identification number assigned by the Township as follows:

Sheet 1 – Au Sable Township Area – Stations 10, 11, 12 and 26

Sheet 2 – Central Oscoda Area – Stations 1 through 5

Sheet 3 – Northern Oscoda Area – Station 9

Sheet 4 – Western Oscoda Area – Stations 6, 7 and 27 (not shown)

Sheet 5 – Van Ettan Lake Area – Station 8

The 15 sewage lift stations are identified on the record plans based on their respective number that was assigned by the engineering firm at the time that the construction plan was prepared. Therefore, the above station identification numbers assigned by the Township generally are not consistent with the original plan sheet and the current designation has been noted on the plans to aid in referencing the respective lift stations.

There are a total of 28 wastewater pump stations in the Oscoda Township WWTP service area. According to the Township, the 13 sewage lift stations serving the base property as well as the 15 stations in the remaining district are approximately 40 years old. A reference compiled by United Water entitled Oscoda Township Lift Station Pump Drawdowns was included in Appendix C of the Township's S2 Grant program application. Since this time, the F&V Operations and Resource Management team performed a baseline assessment of the 28 wastewater lift stations in the Oscoda Township service area. A binder report compiling the results of this review summarizing the pump capacities from available record information along with data that is pertinent to the location, configuration, efficiency and construction for each lift station using their current numerical designation is included as part of the Township' infrastructure records and will serve as a baseline for development of the future Asset Management Plan. There are a limited number of lift stations where original design or pump record information is not available and where it would be prudent to obtain this information so that the table is complete and up to date moving forward.

At this point in time, the overall condition of the 28 pump stations that are located throughout the entire municipal service area is best categorized as fair. Given the age of this collection system infrastructure, there are several stations that are scheduled to receive controls upgrades and/or pump replacements as part of routine and proactive lift station maintenance performed by the Township with funding for these needs provided through the Annual Maintenance Allowance or the Capital Improvements Plan. This situation is common practice and will continue as part of responsible collection system oversight and infrastructure management. There are currently no lift stations that are known to lack the required pump capacity to convey the average or peak wastewater flows received at the wet well structure. However, further detailed evaluation is recommended. Pump stations where structural rehabilitation or equipment replacement is necessary to continue performing in an effective manner are either not fully identified or are included as part of the current Capital Improvements Plan prepared for the sanitary sewer infrastructure. In recent discussions with F&V Operations and Resource Management and the Township, we understand that there are very few issues of concern or known problems within the existing collection system network which includes manhole structures, gravity sewer main and the numerous lift station force mains.

As presented in the Township's S2 Grant application, potential solutions for both odor control and hydrogen sulfide (H_2S) control at the main base Lift Station #25 are under consideration. Relatively strong raw sewage odors have been observed at the Lift Station #25 location. This issue historically has caused routine complaints from the community and the condition continues to persist. In general, community complaints related to lift station odors are sporadic within the remainder of the Township's sanitary sewer collection system. As such, an extensive sewage odor control program is not considered necessary within the sewer service district. The new 14-inch diameter force main installed from Lift Station #4 to redirect wastewater collected within the Oscoda/Au Sable service area to Lift Station #25 located on the Wurtsmith AFB property was necessary to allow the original Lift Station #25 force main to convey base wastewater flows to the Township's former mechanical plant during the lagoon system renovation project. Once the former WAFB lagoon site work was complete, the wastewater flows received at Lift Station #4 from the town of Oscoda and the flows generated by the base were both directed to Lift Station #25. The combined town and base flow is directed from Lift Station #25 via a 14-inch force main to the Oscoda Township WWTP.

The 14-inch force main from Lift Station #4 at the former mechanical treatment plant location to Lift Station #25 has a long raw sewage detention time resulting in the release of hydrogen sulfide and other odor generating compounds at Lift Station #25. An existing active forced-air carbon canister is present at Lift Station #25 but has not been maintained in operational status due to the fact that the unit is undersized and ineffective at odor control. Due to the apparent high levels H_2S, the carbon media becomes exhausted in a relatively short period of time so the cost to replace the carbon on an annual basis to control odors generated at the station does not make financial sense. If odor control is desired by the Township at Lift Station #25, a more cost effective solution is recommended. At this time, limited data is available regarding the actual H_2S concentrations and/or the levels of other odor producing compounds generated at Lift Station #25. Monitoring was performed by an interested odor control product vendor in October 2012. A continuous H_2S monitoring and recording unit was installed in the Lift Station #25 wet well in the existing passive vent condition without carbon canister operation. Results from this third-party monitoring event document H_2S concentrations averaging approximately 260 mg/L with a maximum of 500 mg/L observed over the 7-day monitoring period. The Township's operations staff also performed periodic H_2S concentration monitoring at this station utilizing a handheld meter lowered into the wet well. The upper limit of the handheld unit of 100 mg/L was routinely exceeded during these monitoring events.

While a robust data set is currently not available, there is significant sulfide-induced corrosion evident throughout the Lift Station #25 wet well structure. The station was installed in 2003 but the concrete corrosion and physical deterioration is severe enough to warrant planning for structural rehabilitation. It is well known that high levels of hydrogen sulfide can lead to structural failure and collapse of sanitary sewers. The physical condition of the Lift Station #25 wet well and the strong raw sewage odors persisting at this location support the limited H_2S monitoring data that is currently available for this station. Further damage should be anticipated where the H_2S concentrations exceed threshold activity levels and structural rehabilitation of the Lift Station #25 wet well is recommended as a short-term need. The rehabilitation work would require isolation and influent flow by-pass of Lift Station #25 for a period of approximately 48 hours. Structural rehabilitation considers the use of SpectraShield technology which is a multi-layer polymeric concrete liner system. To utilize this restoration solution, the wet well structure would first need to be conditioned by high pressure "hydro-blasting" and the cleaning process debris and residual wastewater material would be removed and properly disposed. The interior structure concrete surface is air-dried and a primer having a high affinity for water is applied. The SpectraShield proprietary liner system consisting of a silicone-modified polyurea layer, a polyurethane foam layer and a final barrier layer of silicone-modified polyurea is then applied. Once the material is applied and sets in accordance with the SpectraShield liner system criteria, the Lift Station #25 wet well will be placed back into service. The SpectraShield liner system comes with a 10-year warranty. The specific rehabilitation approach will be further evaluated and defined by the Township to complete as part of the 2014 Capital Improvement Plan.

The Township is currently considering installing odor control equipment at Lift Station #25 and which will be further evaluated as part of the structural rehabilitation project. This general issue has received attention in recent years and the timing for possible implementation will be determined based on the interrelated merits of the SAW Grant program. For the purposes of this document, the use of improved odor control at this pump station is desirable but not necessary. The Township does experience complaints. However, this condition is costly to address with the size of the station and strength of H_2S concentrations received at Lift Station #25 due to the long force main from Lift Station #4. At this point, the preferred approach would consider using a biofilter which uses microorganisms to remove pollution from the air stream directed to the filter. The air flows through a packed bed and the pollutant transfers into a thin biofilm that grows and sustains on the surface of the packing material. Microorganisms are immobilized within the biofilm and continue to degrade the target air pollutants when the proper

conditions in the biofilter are maintained including proper moisture throughout the system. The inlet feed air is normally humidified before it enters the media bed with a spray watering system. Properly maintained, a natural, organic packing media like mulch, bark or wood chips may last for several years but engineered, combined natural organic and synthetic component packing materials will generally last much longer (10 years) and maintenance costs are significantly reduced.

The solution recommended for additional study considers utilizing a proprietary biofilter. There are a number of proprietary biofilter manufactures in the marketplace and additional evaluation of competing technologies would occur prior to final selection and design of the system. The industry options for this type of solution typically utilize a skid-mounted two-stage biofilter that incorporates permanent media having the advantages of providing high surface loading rates, media longevity, improved process control and a compact footprint over biofilters using natural media such as stone or mulch. Based on the limited available data, a skid-mounted model would utilize the treatment design parameters of 6 air changes per hour of the Lift Station #25 wet well structure and the maximum/average H_2S concentration data for removal of H_2S and other odor causing compounds. The operations and monitoring requirements of the system are minimal but important and include drain water pH, media wetting water and unit feed air flow, temperature and the influent H_2S concentration.

The lift station electrical and pump control systems are generally old and worn. While there are a number of lift stations that are relatively new and this infrastructure component is not a short-term concern, there are also multiple wastewater pump stations having control systems with obsolete equipment which will need to be upgraded or replaced in the near future. A significant issue relates to lift station alarms. Only the Oscoda town center Lift Station #4 and the main Wurtsmith AFB Lift Station #25 have dialer alarm systems. All other stations are equipped with a light and/or audio horn alarms only. At these lift stations, a sign is visible indicating the on-call operations telephone number to call if the light is on and/or audio horn is operating. In the case of a mechanical, operational or power failure at a lift station that does not have a dialer alarm system, the Township would be notified only if the light/horn worked and then someone saw the light/horn and called the number listed at the station. This may or may not happen depending on location the lift station, light/horn operation and time of day that the failure occurs. There is a reasonable chance at any of these lift stations that notification does not occur soon enough for responsive action to occur which could expose the Township to liability for property damage or environmental harm that occurs as a result of the lift station failure and the delayed response to address the situation. It is important to note here that significant portions of the Township's sewer district have homes or building structures that do not have basements. In this case, the potential for sewage backups or overflows having a more immediate impact to public health or direct human exposure are limited. The priority lift stations should be equipped with radio and/or phone line telemetry based alarms that notify the licensed contract operator and Township immediately upon a prescribed set of system failure modes so that proper emergency response can be assured.

Within the scope of the SAW Grant program, the Township will perform a comprehensive review of the sewage lift station infrastructure serving the community. Based on the results of this detailed assessment, it is possible that additional improvements beyond those that are currently under evaluation by the Township within the MDEQ compliance framework will be identified and addressed as part of the future Asset Management Plan development or the Township's Capital Improvements Plan. This effort may include further research and technical analysis for viable alternatives to economically address the impact of corrosive gas that is received at the main base Lift Station #25 from the final Oscoda town Lift Station #4. In addition, there are a number of sewage lift stations that need further evaluation of their physical integrity due to evident metal and/or concrete corrosion and a more detailed electrical/controls and pump performance validation is recommended. As an example, the final Oscoda town Lift Station #4 has a single access riser to the rectangular concrete wet well structure. This original construction limits the

ability to effectively clean the entire wet well structure. While this situation has not presented an immediate operational or reliability concern for this lift station, providing improved access or a more effective way of fully cleaning the wet well structure would be prudent to develop within the context of a long-term Asset Management program. In cases where the wet well structure condition is acceptable or good, the internal components, access risers, lids, slide rails, anchors and pump supports are worn or partially deteriorated and may need replacement in the near future. Equipping the 26 lift stations with radio and/or phone line telemetry based alarms is another aspect that will be further evaluated by the Township. The review and prioritization of the particular needs at the individual stations will be developed by the Township with support by FVOP and Spicer Group, Inc. as defined in the Township's SAW Grant application for future development and implementation of an Asset Management program.

3. Wastewater Treatment System

Wastewater generated within the Charter Township of Oscoda service district is collected by gravity sanitary sewers and numerous raw sewage lift stations located throughout the collection system. Lift station #4 is the final lift station within the unincorporated town of Oscoda which conveys raw wastewater to Lift Station #25 that is located on the former Wurtsmith AFB. At Lift Station #25, the sewage received from the town of Oscoda service area is directed to a wet well that also receives wastewater generated by the industrial/commercial customers located at the Wurtsmith AFB. From Lift Station #25, the combined Oscoda/Au Sable town and air force base property wastewater is pumped at an average rate of approximately 600 gpm via 2.5 miles of 14-inch diameter force main to the Oscoda Township WWTP lagoon treatment and groundwater disposal site. A series of figures based on the existing record plans are provided for reference in Appendix A to show the existing wastewater treatment system. Figure 3 –Oscoda Township WWTP provides the existing facility conditions and a basic process flow diagram. Figure 4 – Effluent Disposal System presents the existing rapid infiltration basins based on the available plans of record from the wastewater treatment relocation and former AFB lagoon cell renovation project completed in 2003. These figures can be referenced in the following description of the existing wastewater treatment facility.

Raw wastewater under pressure flow conditions first enters a concrete influent/effluent control structure and then flows by gravity to a three (3) cell lagoon treatment system. The raw influent enters vertically and flows over a weir into a separate sub-chamber for gravity flow to lagoon Cell #1. This chamber has been known to accumulate a fine floating sludge material over time that develops into a cake-like material over the surface of the chamber. The Township's contract operations staff will periodically remove this material using the sewer vactor truck. The material is not consistently observed throughout the year and does not appear that it would lend well to typical raw influent coarse screening. The rather fine floating organic material will accumulate to the point of covering the chamber when it is then removed by the operations staff as often as every 3-4 days per week to once every 2-3 months depending on the time of year. There does not appear to be a pattern or predictability to the presence and accumulation of this material. At this time, further consideration to influent screening is deemed unnecessary due to the significant capital and increased operations costs associated with this process element and the fact that this material may not be effectively screened using coarse screen technology. The Township operations team will continue to manage this organic material using the sewer vactor truck.

Based on the available record plans for this wastewater treatment system, the currently aerated square Cell #1 has a surface area of 1.0 acre and a gross volume of 3.0 million gallons (MG). The MDEQ approved design basis intended this cell to be aerated under "complete-mix" design conditions using a grid of aeration diffuser laterals anchored to the bottom of the lagoon cell. However, the bottom cell aeration equipment that was initially installed with the lagoon system renovation plan essentially failed for basic physical and/or mechanical reasons within the first 2 years of service. During the initial poor performance condition evaluation, Lagoon Cell #1 was

drained and the air supply headers, diffuser laterals and associated system components were reviewed by the product manufacture. Any improvements made at this time were not sustained and the system reverted to the current level of substandard performance. While the air supply system is still in operation, the aeration equipment is performing at approximately 10-20% or less of the original system treatment design capacity. An Isco composite sampler is utilized to draw 24-hour time based raw influent samples from the rectangular inlet chamber of the concrete influent/effluent control structure.

WWTP service buildings are located adjacent to Cell #2 and house the positive displacement blowers in the north or original building and the alum chemical feed system equipment is located in the south building constructed in 2003. Ferric Chloride is currently dosed on a continuous feed rate at the influent end of Cell #2 located approximately 30-40 feet from the west shore near the gravity flow inlet from Cell #1 and at the position of the shore power SolarBee vertical draft chute. There are three (3) centrifugal blowers dedicated for the lagoon aeration system. Two (2) blowers are equipped with a 60 Hp motor and Gardner Denver blowers. One (1) blower is equipped with a 75 Hp motor and Kaeser two-lobe blower. The aeration supply blowers can deliver approximately 2,000 cubic feet per minute (cfm) of air to the bottom cell aeration equipment currently installed in Cell #1. The blowers were intended to deliver the total amount of oxygen required to support the aerobic microorganisms performing wastewater treatment in Cell #1 and provide enough air to realize a “complete-mix” regime in the aerobic treatment cell. The two existing 60 Hp blowers are original to the former aerated lagoon system constructed by the U.S. Air Force in 1984 and their respective motors have been replaced or rebuilt. Currently, the single 75 Hp blower is operated to provide oxygen and mixing in Cell #1 as it is the most reliable and energy efficient unit. The two existing 60 Hp blowers are nearly 30 years old and are at the end of their useful life. One original 60 Hp blower/motor failed and was replaced with the 75 Hp unit in 2008. While replacement parts are available, the existing 2008 Kaeser two-lobe blower is no longer produced in favor of the new tri-lobe design.

Partially aerated wastewater next enters the largest rectangular Cell #2 with a surface area of 4.1 acres and a gross volume of approximately 14.4 MG. There are currently two (2) SolarBee patented floating water circulation mixers that are normally in operation throughout most of the year and centrally located in the lagoon cell. One unit is located approximately 40 feet from the hydraulic influent end of lagoon Cell #2 near the west shoreline and alum chemical injection feed point. The second unit is placed about 40 feet from the effluent end prior to flow entering the final Cell #3 through the mid-point cross-over pipe. The influent position SolarBee unit is equipped with a shore power supply provision while the effluent location unit is strictly solar powered. The shore power system allows the influent SolarBee to operate 24 hours per day regardless of weather conditions whereas the remaining units require adequate sunlight for operation. Other than the SolarBee units that simply circulate lagoon cell water, no active aeration equipment is provided in this lagoon treatment cell. The MDEQ approved design included a curtain baffle that cordoned off the influent end of Cell #2 where liquid alum was fed to promote settling and total phosphorus removal. The system was operated in this manner until excessive precipitated solids accumulated in the small influent sub-cell and the baffle curtain was removed by the previous contract operator. At this time, the baffle curtain is restored to the approximate original position by FVOP.

Partially treated lagoon wastewater flows from Cell #2 into the third and final rectangular Cell #3 having a surface area of 3.5 acres and a gross volume of approximately 12.8 MG. A third centrally located SolarBee circulator is positioned approximately 40 feet from the hydraulic inlet to this cell and is also not equipped with shore power. As with Cell #2, no active aeration equipment is provided in Cell #3 besides the single SolarBee unit. Treated final effluent from lagoon Cell #3 enters the main influent/effluent concrete control structure through a single vertical telescopic valve and then flows by gravity from the effluent compartment of this structure via 14-inch ductile iron piping to the rapid infiltration basin system for disposal to groundwater via surface application of effluent to the infiltration basins. The lagoon cells were re-constructed

in strict accordance with the Part 22 Rules. Based on the record plans, a composite liner system was installed within the existing lagoon cell excavations consisting of a geo-synthetic clay liner and flexible membrane liner covered with 12-inches of sand. The GCL-FML liner system is believed to be in sound condition based on the existing ability to review the interior lagoon cell berms. However, excessive vegetation growth and control efforts and wind-wave action have worn the 12-inch sand soil cover layer with sloughing and limited erosion damage evident in certain areas. A future evaluation of the interior lagoon cell berm integrity is recommended.

In accordance with the MDEQ groundwater discharge permit requirements, final effluent grab samples are obtained by F&V Operations and Resource Management from the telescopic valve flow stream in the effluent chamber of the influent/effluent concrete control structure. The grab sampling is performed on a weekly basis for the nitrogen series parameters (ammonia, nitrite and nitrate) and monthly for sodium, chloride, dissolved oxygen, $CBOD_5$ and total phosphorus. The lagoon treatment system is designed to operate in a continuous discharge mode whereby the raw wastewater flow entering Cell #1 is discharged to the disposal beds as treated effluent from Cell #3. The rapid infiltration disposal system consists of eight (8) basins that receive treated effluent by manual valve operation of the individual cells by F&V Operations and Resource Management at two (2) flow diverter manhole structures. Typical daily operations practice directs treated effluent for disposal on two (2) to four (4) of the basins at a time with routine cell rotation being managed by the contract operations team based on discharge site performance and seasonal conditions.

4. Biosolids Management and Disposal

Biosolids and sludge management performance is primarily measured in terms of total pathogen reduction, vector attraction reduction and cost containment under the USEPA 40CFR Part 503, Class B guidelines. Digested, adequately stabilized Class B biosolids are desired as a valuable fertilizer by local farmers. This material is typically land applied to agricultural land utilizing subsurface injection in the spring and fall of each year. For lagoon treatment systems, biosolids management and disposal is generally a long-term planning issue. Aerated lagoon systems may produce more sludge than facultative lagoon systems over time but the removal and management horizon is still measured in years rather than months so that it is not a crucial component of treatment facility design or the day-to-day operations duties. However, in this particular case biosolids management and sludge disposal is integral to the overall objectives of the Project Plan as presented in this section.

Under the current operating configuration, raw wastewater enters the Oscoda Township WWTP at the concrete influent/effluent control structure and then flows by gravity to the square Cell #1. The MDEQ approved construction plans and design calculations intended that this 3.0 MG cell be aerated under “complete-mix” conditions. There were no special design or construction provisions to retain the inert and/or biological solids produced within Cell #1 for more contained management. Within the first years of service the large network of aeration equipment originally installed as part of the lagoon treatment system renovation plan substantially failed and is now operating at significantly less than the original design capacity. In a separate WWTP service building located adjacent to Cell #2, a chemical storage and feed system is provided where liquid ferric chloride is currently dosed to the influent end of Cell #2 at a continuous feed rate set by the contract operator. This chemical feed system was provided to precipitate and settle out total phosphorus that is present in the partially treated wastewater entering Cell #2 from the aerated Cell #1 and allow this facility to comply with the total phosphorus effluent limitation of 1.0 mg/L as established in the original groundwater discharge permit issued as part of the Wurtsmith AFB lagoon renovation and wastewater treatment relocation project.

Due to several factors associated with the existing design concept, a large volume of sludge has accumulated in the first half of Cell #2. Within the first years of operation, the full length curtain

baffle originally located at the influent end of Cell #2 had to be removed by United Water because the volume of sludge had basically filled up the small sub-cell settling zone that was created by the baffle and was posing system operational problems. At this time we understand that United Water performed physical efforts to redistribute this concentrated sludge mass within the former sub-cell toward the center of Cell #2 using a large flow submersible pump. Since removing the baffle, chemical feed of liquid alum, and recently ferric chloride, has remained in service on a continuous basis to assure discharge permit compliance for total phosphorus. The necessary application of liquid alum when combined with the deteriorated condition of the existing aeration system, resulting in the relatively poor organic treatment performance within Cell #1, have served to exacerbate the problem and the volume of sludge within Cell #2 has continued to increase over the past several years. F&V Operations has recently re-installed the curtain baffle in Cell #2 and switched to ferric chloride chemical feed in an effort to better achieve compliance with the 1.0 mg/L total phosphorus effluent limitation.

Sludge depth evaluations of the lagoon treatment system were previously performed by United Water and Synagro. F&V Operations and Resource Management, Inc. recently completed a third evaluation. These assessments have collectively confirmed that a significant volume of sludge is present in the western 200-300 feet of existing lagoon Cell #2. The majority of this total sludge volume is located west of the cell baffle where the depth reaches up to 10 feet. The depth of material generally increases as you move from the western third of the cell toward the WWTP service buildings. The eastern two thirds of lagoon Cell #2 have approximately 1 to 1.5 feet of sludge present based on the recent FVOP assessment. A preliminary cost estimate to remove and dispose of the deeper sludge in Cell #2 was previously developed by Synagro based on their independent volume assessment work and the assumption that this material is classified as acceptable for disposal via land application to agricultural land in accordance with MDEQ Class B biosolids regulations. Cell #1 is also believed to have a considerable volume of sludge. Lagoon sludge depth review, characterization sampling and laboratory testing will be performed by the Township to confirm the expected disposal method and develop a current cost estimate prior to beginning the detailed design process.

Sludge removal by the selected biosolids land application contractor can be accomplished in a number of ways and the preferred approach is under review. At this time, sludge removal would most likely be accomplished using a floating hydraulic dredge with the dredge operator generally working from the western third location of lagoon Cell #2 toward the WWTP service buildings. Prior to sludge removal, the existing baffle would be located to best contain the deeper sludge in the target removal zone of the lagoon cell. The dredge would be mobilized to the lagoon system site on a flatbed trailer truck and a crane would be used to remove the dredge from the trailer and place it into lagoon Cell #2. Anchors are placed on the lagoon sides and a cable runs from anchor to anchor to serve as a guide or controlling method for the dredge to travel back and forth across the surface of the lagoon. The floating dredge is equipped with a submerged horizontal sludge intake head/auger and a transfer pump system. The dredge head enters the biosolids layer, taking care not to contact the lagoon cell liner, auguring with the pump continuously transferring solids through a floating 8-inch diameter dredge pipe to a large tanker truck positioned on the shoreline for transport. Biosolids are transported to local farmland where it would be injected into the soil at agronomic rates as specified in a Residuals Management Plan reviewed and approved by the MDEQ.

Alternate approaches to sludge removal include taking Cell #2 out of service, substantially transferring the liquid content and then allowing the remaining sludge to dry beginning in the spring with removal of the dried material occurring in the fall. This would entail periodic sludge material management activities in Cell #2 to turn the sludge, assure optimum drying conditions are maintained and excessive odors are controlled. Another option considers utilizing a floating hydraulic dredge for sludge removal with the submersible transfer pump system discharging to large geotextile bags. A polymer would be injected into the sludge stream discharged from the lagoon cell into the geotextile bags for dewatering over the next calendar year. The dried sludge

is significantly reduced in volume using this approach and can be transported to a landfill or land applied at agronomic rates defined in a Residuals Management Plan approved by the MDEQ. In this case, the dewatering process generates a sludge supernatant that must be contained and directed to the lagoon system for treatment. This liquid supernatant is typically high in nutrients including ammonia/total nitrogen and phosphorus. In all cases, care would need to be exercised to preserve the integrity of the composite liner system.

An additional measure to accomplish sludge reduction that is worth further evaluation during the detailed design phase considers the use of proprietary bacteria that are introduced directly into the sludge layer during the spring and summer prior to installing the new aeration equipment. This approach to sludge management is often viewed skeptically but certain products have been demonstrated to be quite effective at reducing lagoon sludge at a very reasonable cost. The total volume of sludge that currently exists in lagoon Cell #2 that will not be removed as well as the volume present in Cell #3 could be inoculated with *ECOPROBIOTICS™* of the Bacta-Pur® System which are beneficial communities of natural bacteria selected for their synergistic ability to biodegrade pollutants and to improve water quality. Bacta-Pur® XLG contains a community of natural beneficial and non-pathogenic microorganisms selected for their ability to biodegrade FOGs (fats, oils and greases), proteins, carbohydrates, certain hydrocarbons and other organic components typically found in organic waste. Bacta-Pur® XLG is used for a variety of purposes within the areas of water quality improvement, such as grease and fats removal, organic sludge degradation, and BOD reduction. The product's quality assurance and control program would assure a high visual cell count (1011/mL) and the presence of specific strains of only Class I bacteria (non-pathogenic) in the final products. This multi-application product approach has the legitimate potential of reducing 30-50% of the 1.0-1.5 feet depth of sludge present in lagoon Cell #2 and #3 over the warm summer season and prior to new aeration equipment installation.

Lagoon system sludge management is normally a long-term operation and maintenance issue and not an item presented in a facility improvement plan. For the majority of lagoon treatment systems, sludge accumulates slowly (greater than 20 years) and prudent operations planning can adequately address this long-term cost. However, in this particular case the sludge in Cell #2 poses difficulties that are best resolved as part of the overall improvement plan. The substantial volume of sludge that is present in Cell #2 is detrimental to the overall performance of the Oscoda Township WWTP for several reasons. First and foremost, an appreciable amount of wastewater treatment capacity is eliminated with this corresponding volume of sludge. At the current average daily flows, the estimated volume of sludge in Cell #2 alone significantly reduces the theoretical residence time in the system during the difficult winter treatment months which does not even consider any additional short-circuiting that may result from the presence of this material. As an equally important factor, the large volume of sludge present in Cell #2 effectively precludes the opportunity to provide treatment improvements that are considered necessary for efficient performance of the system as a whole. Since it simply doesn't make a lot of sense to work the preferred long-term approach to improving treatment around this liability, the removal of sludge is proposed as a portion of this Project Plan.

While harder to quantify the impact, the sludge in Cell #2 is subject to seasonal environmental changes such as temperature fluctuations which may result in the uncontrolled release of ammonia nitrogen and phosphorus nutrients that are often stored in the sludge and which may then lead to MDEQ permit compliance issues. It is quite possible that this is currently occurring. In general, this material has the legitimate potential to cause odor and nuisance conditions and reduce the overall treatment efficiency of the system in a number of ways. The volume of sludge present in Cell #2 will not naturally reduce over time and with the tightening trend in biosolids regulations the cost to remove and dispose of this material will likely only increase if it were to be deferred. Taken collectively, it is necessary that the sludge be removed from Cell #2 as part of the overall lagoon treatment facility improvement plan. The fine-bubble disk aeration modules integral to restoring biological treatment have very thin razor slits in the tubing that an

extreme depth of sludge would have the high potential to foul. As such, the improvement effort will require the removal of this material prior to installation or the aeration disk units will simply not function. Since leaving the sludge will negatively affect the future effluent quality, locating new aeration equipment outside of this material is not advised and would likely not be supported by the MDEQ Part 41 plan review process. When considering that the interior lagoon berm assessment/rehabilitation component and potential installation of rip-rap is under consideration for a Township capital improvements plan project, it will be necessary to remove this material to effectively accomplish the primary MDEQ compliance aspects of the SRF Project Plan and install the new aeration diffuser disk equipment. This work is very similar to the existing aeration equipment and sludge removal that must take place in Lagoon Cell #1 to convert this to a phosphorus settling and effluent polishing and discharge cell. The staging of this aspect of the project is also an important consideration as the removal and land application of lagoon sludge in the spring can be difficult with weather and agricultural field conditions more variable than in the fall season. This will require close control and oversight as part of the project implementation phase.

5. Discharge Facilities

The effluent disposal system serving the Oscoda Township WWTP consists of eight (8) rapid infiltration basins located directly west of the wastewater lagoon treatment cells. These basins were originally constructed as “seepage lagoons” and designed to receive sanitary effluent generated by a trickling filter treatment plant then serving the former Wurtsmith AFB. At the time of their construction, a groundwater discharge permit was not required. The existing rapid infiltration basins are constructed over a glacial-fluvial sand and gravel layer that begins at existing grade and ranges from 45-62 feet thick. Beneath this sand and gravel formation a thick clay layer (up to 225 feet thick) is present that overlies bedrock. Groundwater in the sand and gravel aquifer beneath the Oscoda Township WWTP site flows in a south to southeasterly direction toward the wetlands that are contiguous with the Au Sable River. The eight (8) effluent disposal basins have been in service at this site on a continuous year-round basis since the early 1970’s or over 40 years. The existing treated effluent disposal area is depicted in Figure 4 – Effluent Disposal System of Appendix A.

Currently, the lagoon treatment system is designed to operate in a continuous discharge mode. The raw influent flow to the lagoon treatment system occurs throughout the day based on the operational cycles of Lift Station #25. During the periods of higher flows in the service district and at the WAFB property, this station may have many cycles and/or run for longer periods of time under VFD control. During the lower flow periods of the day there will be less pump cycles and shorter pump run times. The relatively large volume of water in the three lagoon treatment cells and the long retention time dampens the influent flow cycles so that the rate of treated effluent discharged to the rapid infiltration basins does not occur at exactly the same rate as the raw wastewater flow entering Cell #1. In addition, the vertical telescopic valve serves to restrict the discharge to a more uniform flow based on the controlled outlet design. Under this hydraulic condition, treated effluent from lagoon Cell #3 enters the influent/effluent control structure through a single vertical telescopic valve and then flows from the effluent compartment of the structure to the rapid infiltration basins via a 14-inch diameter ductile iron gravity outfall pipe. Effluent grab samples are collected by FVOP from the vertical telescopic valve flow stream in accordance with the groundwater discharge permit sampling requirements.

With the decision to reclaim and renovate the WAFB lagoon treatment system, the MDEQ approved engineering plans basically define reusing the main elements of the existing lagoon infrastructure that were previously utilized by the U.S. Air Force to serve the base. The existing 14-inch diameter gravity outfall pipe from the effluent chamber of the control structure transmits effluent to a central location within the infiltration basin footprint. At this point, the 14-inch line terminates at a tee fitting where treated effluent is directed by manual gate valve operation to

either the East or West group of four (4) disposal basins, respectively. Near the center of each group of disposal beds is a concrete flow diverter manhole structure where effluent flows by gravity up to the base of the structure and then over the structure floor to one (1) of four (4) vertical outlet pipes that then convey effluent by gravity to each of the four (4) disposal basins in that respective group. Each vertical outlet pipe is provided with a fitted metal cover that allows the operator to select the basin(s) that are to be in service by removing the cover for that outlet like opening a valve. The single gravity line from the flow diverter manhole structure terminates vertically upward at a concrete splash pad at the interior berm corner of the basin. From this location, treated wastewater effluent simply flows by gravity over the surface of the selected basin until the water infiltrates into the permeable native grayling sand and gravel soils. The operations program with respect to effluent disposal is consistent year-round. While winter conditions in Northern Michigan can be harsh, the disposal site has adequately functioned to effectively assimilate treated lagoon effluent discharged on a continuous basis during the winter with no significant issues.

In response to the July 2007 groundwater discharge permit renewal application submitted by the Township, the Groundwater Permits Unit soil scientist technical review identified deficiencies and concerns with respect to how the discharge of treated effluent was being managed at this site. The primary issue relates to the fact that the existing infrastructure is not equipped to allow treated effluent that is currently being discharged from Cell #3 to be dosed or distributed over the surface of the selected disposal basin(s) in a more uniform way. There are several basic interrelated factors that affect this situation including the current daily average effluent discharge volume, size of the basins and the highly permeable soils at the site. The lower the volume of treated wastewater discharged and the higher the native soil permeability, the more difficult it is to cost effectively dose the entire surface of a relatively large rapid infiltration basin. This is especially true for disposal sites in northern climates where freezing can wreak havoc on more artful methods of effluent dosing. Operations experience at this site has shown that it is typically not possible to achieve uniform distribution of treated effluent with the existing disposal system as it is currently constructed. In response to this specific concern presented by the MDEQ staff, the Township's previous operator United Water completed limited physical improvements that were intended to better transmit treated effluent within the basins. The work consisted of installing shallow trenches/swales in the bottom of several basins from the gravity inlet line at the concrete splash pad out toward the center of the basin. This action had limited success due largely to the high permeability of the native sand soils at the site and low discharge volume.

Based on the GPU soil scientist technical review of the available soils data in the USDA Soil Survey and the subsurface conditions documented at the Oscoda Township WWTP site, there is no concern with respect to the long-term hydraulic capability of the disposal site to accept the current daily volume of treated wastewater or the planned ultimate daily average design flow of 1.0 MGD. This desktop analysis is reinforced by the real world performance of the system as observed through routine facility operation and maintenance conducted by the Township's contract operator. The content presented within Section B. Description of Improvements, Part IV: Selected Alternative, of the Project Plan will offer recommendations to provide more uniform distribution of treated effluent over the surface of the infiltration basins and satisfactorily address the MDEQ objectives originally established by Item a) of Part I, Section 4 – Schedule of Compliance in the groundwater discharge permit modified June 16, 2011, and presented as a potential deferred improvement for the Oscoda Township WWTP in the December 14, 2011, Facility Improvement Work Plan approved by the MDEQ.

6. Current Wastewater Flows

Monthly Average Influent Flow

In accordance with groundwater discharge permit GW1810213, the Oscoda Township WWTP is authorized to discharge a maximum flow of 625,000 gallons per day (gpd) and a total annual

volume of 228,125,000 gallons per year. These current discharge flow authorizations were significantly reduced by the MDEQ from the daily maximum of 1.5 MGD and annual volume of 365 MGY established in the original groundwater discharge permit issued to the Township on January 10, 2003. The MDEQ "de-rated" or reduced the authorized daily discharge volume primarily due to the significantly lower existing influent wastewater flows received at the Oscoda Township WWTP and the overall condition of the facility's biological treatment infrastructure at the time of the permit renewal stage. An increase or decrease to the daily maximum discharge volume authorized by groundwater discharge permit GW1810213 for the Oscoda Township WWTP facility can be realized through a request for a "minor" modification to the existing permit. A minor modification to the discharge permit does not require public notice and is generally a relatively straightforward process working with the Groundwater Permits Unit, MDEQ.

As the MDEQ licensed operator for the facility, F&V Operations and Resource Management monitors daily influent flow to the lagoon treatment system utilizing an electronic flow meter installed on the Lift Station #25 force main from where the combined town and AFB property wastewater is pumped to the Oscoda Township WWTP. Since this wastewater treatment facility is configured to discharge continuously, the Township reports the daily effluent discharge flow to the MDEQ based on the raw influent flow meter readings obtained at Lift Station #25. In general, monthly average wastewater flows received at this facility are fairly consistent within the normal seasonal variation. Higher influent flows are observed in the summer and lower flows generally occur during the winter months. Based on a review of the Compliance Monitoring Report (CMR) forms that are submitted to the MDEQ Gaylord district compliance office, the following data represent current monthly average day flows received at the Oscoda Township WWTP and reported as discharged to the rapid infiltration basins in million gallons per day (MGD):

Table 4 – Monthly Average Wastewater Flows (MGD)

Month	2010	2011	2012	2013
January	0.279	0.209	0.227	0.227
February	0.265	0.217	0.223	0.217
March	0.223	0.213	0.245	0.228
April	0.225	0.235	0.238	0.251
May	0.239	0.299	0.253	0.262
June	0.268	0.291	0.255	0.281
July	0.310	0.307	0.283	0.302
August	0.295	0.293	0.273	0.263
September	0.272	0.265	0.254	0.260
October	0.248	0.259	0.234	0.246
November	0.220	0.249	0.218	0.225
December	0.215	0.230	0.210	0.221

Historical wastewater flow analysis (2007-2013) indicates that the Oscoda Township WWTP received an annual average daily wastewater flow of 0.245 MGD. This is approximately 24% of the daily design flow that the 2003 wastewater relocation project was based on for the biological treatment system infrastructure. The total annual average flow that is contributed to the facility by Au Sable Township and/or the individual wastewater lift stations is currently not extensively

documented. Using the total annual average wastewater flow of 0.245 MGD contributed to the Oscoda Township WWTP, which includes institutional, commercial and industrial users, results in approximately 54 gallons per capita per day (gpcd). A review of the Oscoda Township WWTP customer listing through a recent survey conducted pursuant to the Township's Sewer Use Ordinance indicates that there are not any Significant Industrial Users or Categorical Industrial Users in the Oscoda Township WWTP service area.

Wet Weather Flow – Infiltration and Inflow Screening

An infiltration and inflow (I/I) screening was performed to determine if a substantial amount of clean water is entering the collection system. Infiltration refers to that amount of clean water that enters the collection system indirectly due to sustained elevated groundwater levels. Inflow is generally defined as the clean/storm water that enters a collection system directly during a precipitation event. Most wastewater treatment plants experience increased raw influent flows during high groundwater and/or high precipitation periods. Substantial I/I is defined using SRF threshold flow rates in gallons per capita per day (gpcd). The SRF threshold flow for infiltration is 120 gpcd. For inflow, the threshold flow rate is 275 gpcd.

In discussions with the Township's existing long-term operations staff and previous staff from United Water, we understand that excessive inflow and/or infiltration is not experienced at this facility. United Water was the contract operator for the wastewater treatment system and the sanitary sewer collection system maintenance provider for nearly 30 years. In this capacity, United Water operated the original mechanical treatment plant that served only the town of Oscoda area and then accepted flow from the Wurtsmith AFB for a number of years before this plant was abandoned and all sewage flow was redirected back to the renovated Oscoda Township WWTP lagoon treatment system. Throughout this history, it is our understanding that daily influent wastewater flows received at the treatment facility do not significantly increase in response to precipitation events and/or during normal periods of seasonal high groundwater.

As part of the S2 Grant Program application submitted by the Township, an assessment of excessive infiltration and/or inflow was performed to evaluate if the influent wastewater flow is greater than 120 gallons per capita per day (gpcd) during conditions of high groundwater and/or greater than 275 gpdc during the design storm event. The high groundwater condition is reviewed during non-precipitation days over the spring months of March, April and May and the fall months of September, October and November, respectively. In a review of the daily raw influent wastewater flows over the 2010 through 2013 operating years, the maximum flow event was 380,000 gpd. The next largest daily flow event was 341,000 gpd. The daily average flows during the high groundwater condition months over the past 2 years are about 246,000 gpd. Using the sewer service area population estimate of 4,737 people as presented in Section 1 – Study/Service Area Information of the S2 Grant application, the resulting calculations yield 80 gpcd during the maximum flow condition recorded and 52 gpcd during the normally high groundwater months. These results are far below the respective SRF threshold values that would warrant additional investigation with respect to excessive inflow/infiltration into the collection system.

Influent Wastewater Characteristics

Beginning in September 2010 as part of compliance negotiations with the Groundwater Permits Unit, MDEQ, the Township began collecting samples to evaluate and confirm the raw influent wastewater characteristics received at the Oscoda Township WWTP lagoon treatment system. An existing Isco composite sampler was set up at the concrete influent/effluent control structure and 24 hour time based composite samples were analyzed at the Township's facility laboratory and an outside certified laboratory for several parameters. Since the lagoon system was put into service, very little, if any, raw influent sewage data other than total phosphorus had previously

been collected. This was largely due to the fact that influent monitoring was not required in the groundwater discharge permit and the facility effluent data was respectable for organic or BOD removal. With the only compliance limit established for total phosphorus, influent or process control sampling previously focused on this parameter. The raw sewage influent data obtained to date generally conform to characteristics typical of municipal waste strength with one notable exception. The Total Kjeldahl Nitrogen (TKN) and ammonia data are both variable and have been observed to consistently and significantly exceed normal domestic sewage with influent values reaching up to 80 mg/L. As a comparison, ammonia concentrations are normally about 25-30 mg/L for a domestic sewage customer dominated municipal sewer system. This information suggests that industrial or commercial customers may be contributing to this influent wastewater condition. Based on raw influent data that has been obtained to date by the Township, the following Table 5 presents a summary of the wastewater characteristics typically utilized for treatment process performance evaluation and biological treatment equipment design.

Table 5 – Influent Wastewater Characteristics

Raw Influent Parameter	Average Concentration	High Concentration
$CBOD_5$	195 mg/L	306 mg/L
Ammonia Nitrogen	45 mg/L	88 mg/L
Total Phosphorus	5.6 mg/L	7.9 mg/L
Alkalinity	269 mg/L	290 mg/L
pH	7.3 S.U.	7.5 S.U.

The raw influent wastewater characterization initiative is extremely important to form the basis for making sound facility improvement decisions and assuring long-term MDEQ groundwater discharge permit compliance. As such, the Township will continue to collect raw wastewater samples at the concrete influent structure to the lagoon treatment system. The current minimum monitoring frequency of weekly for ammonia and monthly for $CBOD_5$ may be modified based on the collective data pool obtained for each wastewater parameter of interest so that a reasonably robust data set is obtained and utilized in the facility improvement planning and design process.

D. Need for the Project

As briefly presented in the PROJECT BACKGROUND section of this Project Plan, the MDEQ issued a new groundwater discharge permit on July 6, 2010, with water quality limitations that were based on stringent AWT standards. Since this was a dramatic departure from the original Rule 2218 discharge permit limits that were issued in 2003, a petition for a contested case hearing was filed by the Charter Township of Oscoda. This action was ultimately resolved through negotiations with the Groundwater Permits Unit and MDEQ District Compliance staff resulting in the issuance of modified groundwater discharge permit GW1810213 on June 16, 2011. Within the modified permit, the Township was required to address a number of conditions established in Part I, Section 4 – Schedule of Compliance of the permit including treated effluent disposal site investigation activities and preliminary lagoon treatment system evaluation efforts to document the potential need and scope of necessary facility improvements. The need for this project stems directly from the MDEQ discharge permit and facility compliance requirements as well as the fact that essential wastewater lagoon treatment infrastructure including the diffused aeration and mixing equipment installed in 2003 is significantly compromised. Also contributing to the need for this project is the overall condition of the Oscoda Township WWTP including the

reality that several primary components of the treatment facility are still in service that date to the original lagoon system construction by the U.S. Air Force in 1984.

A portion of the information presented herein was previously assembled to form the basis for requesting S2 Grant Program assistance that would allow the Charter Township of Oscoda to perform the detailed planning activities necessary to prepare a comprehensive SRF Project Plan for the Oscoda Township WWTP. An SRF Project Plan approved by the MDEQ would position the Township to consider a low interest rate loan that would help to pay for improvements to this facility. Integral to the planning process will be communication and acceptance by the MDEQ District Compliance and Groundwater Permits Unit staff that the proposed treatment facility improvements are adequate to meet the long-term needs of the community. Limited collection system improvements identified to ensure reliable wastewater service to sewer customers are discussed in this SRF Project Plan but they are currently not included in the overall project. As presented on Page 2 of this report, these sewer collection system needs would be addressed in the Township's capital improvements plan or through development of the Asset Management Plan. Pursuant to the S2 Grant Program, an SRF Loan is only one method of financing the required improvements. Other means of funding the necessary facility upgrades to the Oscoda Township WWTP remain available to the Township.

1. Compliance Status

Treated effluent characteristics are obtained by F&V Operations and Resource Management in accordance with the water quality sampling and monitoring requirements established in Part I, Section 1 – Effluent Limitations on Page 3 of groundwater discharge permit GW1810213 modified on October 29, 2012. A copy of the current discharge permit is included in Appendix B. Due to the site specific conditions associated with this treated effluent disposal system, the permit contains effluent limitations for the daily maximum discharge flow and total phosphorus of 1.0 mg/L. All other water quality parameters monitored in the treated effluent are (report) only. All water quality parameters established in the down-gradient groundwater compliance monitoring wells MW-7, MW-11 and MW-12 are similarly (report) only. Total phosphorus was the only effluent limitation established in the original groundwater discharge permit issued for this facility in 2003. The reason for the single effluent parameter limitation established by the MDEQ is primarily due to the fact that treated wastewater is discharged to groundwater which ultimately vents to the Au Sable River. A groundwater discharge that vents to a surface water body does not need to meet total inorganic nitrogen standards and the phosphorus limit of 1.0 mg/L is considered by the Surface Water Assessment, MDEQ to be protective of the surface water resources receiving the comingled groundwater/effluent plume.

Based on the treated effluent sampling results previously reported by United Water, the Oscoda Township WWTP consistently complies with the total phosphorus limitation. While the historical data do indicate sampling events where phosphorus in the effluent slightly exceeds 1.0 mg/L, these events are only occasional and typically are related to the existing chemical feed system and to a lesser extent the natural variability in lagoon cell process control. The treated effluent characteristics for the remaining parameters that are sampled in accordance with the discharge permit are all reasonably good and the results do not indicate any potential environmental impact with the possible exception of ammonia. Sodium and chloride levels are relatively low. The results for $CBOD_5$ indicate that even with marginal aeration equipment the lagoon treatment cells can accomplish acceptable organic loading reduction at the current flows primarily due to the long retention time in the system. The Oscoda Township WWTP has recently exceeded the effluent limitation for total phosphorus of 1.0 mg/L on a more consistent basis. The permit non-compliance events are not chronic and the effluent values reported are generally close to the 1.0 mg/L limitation. Nonetheless, these are discharge permit violations and the conditions present in the existing lagoon treatment system are not conducive to achieving adequate long-term process control for total phosphorus removal at levels consistently below the 1.0 mg/L limitation.

This has led to efforts to switch from alum to ferric chloride chemical feed as allowed by the current discharge permit.

With respect to the nitrogen parameters, treated effluent sampling results indicate that the Oscoda Township WWTP routinely achieves a lower reduction of ammonia nitrogen than what is reasonably anticipated when this system is compared to more consistently effective aerated lagoon systems in Michigan. There are a number of interrelated reasons for this condition. The first considers the fact that raw wastewater received at the facility has shown periods of time where influent ammonia is consistently elevated with values up to 80 mg/L determined by composite sampling. By comparison, ammonia levels are normally 25-30 mg/L for a domestic customer dominated municipal sewer system of this age and condition. This information suggests that existing industrial and/or commercial sewer customers may be contributing to this condition. The second important factor is that the existing aeration system is only marginally effective for nitrification of wastewater with the primary aeration system basically failed. When these two conditions are combined, the existing treatment facility continues to underperform with respect to meeting a desirable reduction in ammonia nitrogen that is reasonably consistent with the original design premise for the aerated lagoon system reclamation project that was proposed in support of the original groundwater discharge permit and eventually completed in 2003.

The Groundwater Permits Unit, MDEQ issued the Charter Township of Oscoda a modified groundwater discharge permit GW1810213 on June 16, 2011, that incorporated a Schedule of Compliance with several facility evaluation items that were established during the contested case permit negotiations. The Township performed the required treated effluent disposal site investigation activities and preliminary lagoon treatment system evaluation efforts resulting in the Groundwater Permits Unit issuing modified groundwater discharge permit GW1810213 on October 29, 2012. Within the latest modified groundwater discharge authorization, the Charter Township of Oscoda is required to address a number of conditions as established in Part I, Section 4 – Schedule of Compliance. In particular, Item d) stipulates that *"On or before 90 days after the issuance of this permit, the permittee shall submit for review and approval a proposed implementation schedule for the planned WWTP improvements as proposed in the approved Facility Improvement Work Plan submitted to the Department on December 12, 2011."*

In addition to the Schedule of Compliance items, Part I, Section 9 – General Conditions, Item e) stipulates that *"The permittee shall complete the wastewater treatment plant upgrades per the Department approved schedule of implementation [as required in Part I, Section 4(d) of this permit]. All improvements shall be completed as proposed in the Department approved work plan for treatment plant improvements (December 14, 2011, and updated 9/28/12) per the approved Part 41 plans."*

In accordance with the Schedule of Compliance, an updated Facility Improvement Work Plan incorporating an Implementation Schedule was submitted by the Township to the Gaylord Field Office, MDEQ. Following MDEQ approval the updated work plan and Implementation Schedule, the Township's contract operator, United Water, decided to terminate services in the area. This ultimately led to an extension being granted by the Gaylord Field Office, MDEQ for the submittal of a draft SRF Project Plan to November 15, 2013. The Township prepared this document to comply with this initial facility improvement project milestone defined in the MDEQ approved Implementation Schedule. A completed Project Priority List (PPL) Scoring Data Form that takes into account the current MDEQ compliance/enforcement action through the modified groundwater discharge permit is included for review in Appendix C.

2. Orders

The Oscoda Township WWTP does experience intermittent non-compliance sampling events for total phosphorus monitored at the treated effluent sampling location as presented above. In addition, the Township is obligated to address MDEQ compliance expectations as established

within the framework of the Implementation Schedule developed pursuant to the Schedule of Compliance in the latest discharge permit modification issued on October 29, 2012. However, there are no MDEQ or EPA/Federal orders issued for the Oscoda Township WWTP.

3. Water Quality Problems

At this time, there are no identified major point sources or non-point sources of pollution from on-site systems, storm water runoff, industries or agriculture within the Township's current sanitary sewer service area. As presented in the Township's S2 Grant application regarding the study area information, there are a total of 2,153 sanitary sewer customers in the Oscoda Township WWTP service district. Based on information obtained from F&V Operations and Resource Management, there are currently a total of 1,522 customers in Oscoda Township that receive municipal water service only and that are not connected to the public sewer system. While there are municipal water customers who do not require sewer service, a significant portion of these water service only customers are currently served by an on-site septic system. The extent of problems with respect to the existing septic systems in the areas where municipal water service is provided is currently not well documented. Additional investigation would be needed to better understand this issue in the context of proposing to include extending sanitary sewer to these areas in the future.

The areas within Oscoda Township where water service is provided and on-site septic systems are prevalent are fairly well known. They consist of relatively higher density residential areas that are just north of the town of Oscoda along Van Etten Lake and the U.S. 23 highway corridor along the Lake Huron shoreline. We understand that the Township desired providing municipal sanitary sewer service to these higher density residential locations and has previously investigated the potential to initiate a project on two separate occasions. However, while there was support for the extension of sewer the majority of the affected residents did not respond in favor of the project. Interest surveys and feedback obtained during public outreach efforts indicated that the majority of residents in these areas are not interested in the additional cost necessary to receive the environmental benefit provided by municipal sewer service installation. In discussions with the Township about the current climate with respect to community support for this potential long-term initiative, it has been determined that the construction of new sewers to expand the existing Oscoda Township WWTP service area is not included in this SRF Project Plan.

With respect to septage management, the Charter Township of Oscoda previously evaluated the potential of reclaiming the former mechanical wastewater treatment plant by converting this abandoned infrastructure to a septage receiving station. The evaluation was performed by Fleis & Vandenbrink Engineering. In short, the results of this study found that there was already adequate and cost-effective means of septage management and disposal in the Oscoda area. The septage acceptance fees that the Township would need to charge potential customers to adequately support the major investment costs of a new septage receiving station were not cost effective when compared with the already existing septage management and disposal options available in the study area. Therefore, the Township does not currently have plans to receive and process septage at the Oscoda Township WWTP and this former infrastructure is slated for proper abandonment in the near future.

4. Projected Needs

The Oscoda Township WWTP serves a mixed customer base for the Oscoda and Au Sable community. As such, sanitary sewer flow projections are not necessarily straightforward and inherently have some degree of uncertainty when compared to a small community that is more residential dwelling dominated. This is primarily due to the industrial wastewater component of total flow that may be generated by the former Wurtsmith AFB. This is one of the area's largest industrial parks and there is a tremendous potential associated with this property. A primary

long-term economic development objective of the Township is to attract new industries that want to locate their business in the Wurtsmith industrial park. This would stimulate the local economy and lead to increased job opportunities in the combined Oscoda and Au Sable community area.

There are a wide variety of potential industries that may decide to invest in the Wurtsmith industrial park and the wastewater flow and characteristics that are generated can also vary to a significant degree. A new industry is anticipated to also result in an increase in domestic wastewater flow as a result of additional transient employees and attracting new residents to live in the communities of Oscoda and Au Sable. However, the type and size of new industry and business locating in the Wurtsmith industrial park will impact how proportionate this industrial to domestic wastewater flow and characteristic relationship actually is. Another factor considers an aging sewer collection system that may reasonably be expected to see at least a limited degree of increase in clear/storm water flows due to inflow and/or infiltration, even though there does not appear to be an significant issue related to this condition at the present time. Therefore, the future wastewater flow estimates are presented considering the maximum month flow received during the month of July while also using reasonable expectations for the potential industrial-commercial flow component that may occur in the future related to the Oscoda-Wurtsmith airport and industrial park. The actual flows will be approximately 20-30% lower during the normally lower flow months of the year. Project wastewater flows are presented in million gallons per day (MGD) in Table 6 below:

Table 6 – Projected Future Wastewater Flows (MGD)

Year	Service Area Population	Maximum Monthly Flow
2010	4,737	0.310
2015	4,737	0.310
2020	4,796	0.325
2025	4,855	0.340
2030	4,916	0.365
2035	4,976	0.385

The projected 20-year wastewater flows in the table above assume a modest increase in the population growth within the Oscoda community service area while attempting to consider an increase in flow generated by new industries or businesses that are planned for the Wurtsmith AFB industrial park. The realization of new industrial growth would generate additional flow from the industry/business based on the goods or services provided as well as sewage flow from new residents that would be living in the Oscoda Township WWTP service area as a result of the new industrial growth. In this case, a projection of new industrial growth over the next 20 years is difficult to develop with a strong level of confidence. The flow values in the table represent the average daily flow in MGD for the maximum flow month which has typically been July when local tourism is highest. The population growth projections developed by the Township were utilized with existing per capita wastewater flows based on the maximum month. If a wastewater flow value of 70 gallons per capita per day as referenced in the MDEQ SRF Project Plan Preparation Guidance is used, the resulting daily average flow for the maximum flow month is approximately 0.35 MGD at the 20 year horizon. The additional flow of 0.035 MGD considers new wastewater flow generated by the potential new industry and/or businesses that may be attracted to Oscoda.

The Oscoda Township WWTP is currently authorized in accordance with groundwater discharge permit GW1810213 to discharge a total maximum daily flow of 0.625 MGD. This flow value was negotiated with the Groundwater Permits Unit, MDEQ during the recent permit modification process. The design basis for the renovated lagoon treatment system utilized daily average and

daily maximum raw influent wastewater flows received at the facility of 1.0 MGD and 1.5 MGD, respectively. In this light, the projected future wastewater flows are substantially less than both the existing groundwater discharge permit authorization and the original design basis for the lagoon treatment facility. The facility improvement planning process will utilize a daily average raw influent wastewater flow of 1.0 MGD as the ultimate design flow though this may not be realized during the current 20-year planning horizon. The preliminary design and planning efforts reflected in this document consider a long-term phased approach whereby Phase I for biological treatment of wastewater is 0.5 MGD and Phase II is at the original influent wastewater flow of 1.0 MGD. Details regarding the service area population projections are found in the forthcoming Section E, Part 2, Service Population.

5. Future Environment without Proposed Project

The Oscoda Township WWTP has infrastructure essential for adequate treatment of wastewater that has either poorly performing or is at the end of its useful life. It is reasonable to expect that the aeration system will continue to degrade with time to the point where the Township will not be able to provide reliable wastewater treatment for their customers. Without this proposed project, the deteriorating performance of the wastewater treatment lagoons would result in increased pollutant loading to the watershed as a result of the discharge. This situation has the potential of adversely affecting the pristine resources that the groundwater ultimately vents to including the Au Sable River, arguably the most important natural resource in the community. The Township intends to proactively address this situation so that negative environmental impact does not occur.

E. Population Data

The study area population consists of the municipal sanitary sewer service area for the Oscoda Township WWTP that includes the unincorporated towns of Oscoda and Au Sable located in Iosco County, Michigan. Local and regional population projections are presented herein.

1. Population Projections

A future population estimate for the Oscoda Township WWTP service area was recently performed by Mr. Robert Owen, Zoning Administrator for the Charter Township of Oscoda. A copy of the Population Estimate memo previously included in the Township's S2 Grant application is provided in Appendix D of this Project Plan. The result of this evaluation is that the Township plans to realize a 2.5% growth in population per decade over the period beginning in 2015 through the 20-year facility planning period to 2035. Given the current economic conditions, the Township is not planning to see any growth occurring until 2015. As referenced above, the existing sanitary sewer collection system serves only a portion of Oscoda Township. The total population currently served by the Oscoda Township WWTP is anticipated to increase following the same projections utilized for the entire Township. The following table presents the population increase projections for the Township and the municipal sewer service area:

Table 7 – Future Population Estimates

Year	Oscoda Township	WWTP Service Area
2010	6,997	4,737
2015	6,997	4,737
2020	7,085	4,796
2025	7,172	4,855
2030	7,262	4,916

2035	7,351	4,976

The East Michigan Council of Governments (EMCOG), also known as the Region 7 Planning Commission, is one of Michigan's 14 regional planning organizations. The EMCOG was organized in 1968 under Michigan's Regional Planning Act (P.A. 281 of 1945, as amended). EMCOG serves the regional community of Arenac, Bay, Clare, Gladwin, Gratiot, Huron, Iosco, Isabella, Midland, Ogemaw, Roscommon, Saginaw, Sanilac and Tuscola Counties and the Saginaw Chippewa Indian Tribe of Michigan. As a designated depository for U.S. Census information, EMCOG receives the latest population updates of county and sub-county entities as they become available. Based on the latest estimates, the Commission develops an official set of population projections made available at the EMCOG website. Table 8 below summarizes the population of Oscoda Township and Iosco County based on the available 1980 Census through the 2010 Census data. In the 2013 update to the Comprehensive Economic Development Strategy, EMCOG projects a net -0.04% annual growth rate over the period 2010-2040 for Region 7-B which includes Oscoda Township.

Table 8 – Population Data 1980-2010

Area	Population Trends			
	1980	1990	2000	2010
Oscoda Township	11,386	11,958	7,248	6,997
Iosco County	28,349	30,209	27,339	25,887

2. Service Population

The existing and projected population data for Oscoda Township and the Oscoda Township WWTP service district are presented in Table 8 above. The Oscoda Township WWTP does not serve the entire population residing in each customer community. Based on the best available data for each community, there are approximately 2,153 sanitary sewer customers in the Oscoda Township WWTP service district. This connected customer base corresponds to approximately 5,598 persons on an equivalent population basis.

F. Environmental Setting

1. Cultural Resources

The Oscoda Township WWTP service area is located on the "Sunrise Side" of Michigan where the opportunities for recreation and relaxation naturally abound. Set peacefully along the shores of beautiful Lake Huron and the mighty AuSable River, Oscoda offers more than 120 square miles of pure Michigan. From canoeing to sunbathing, the natural destinations of the community provide a variety of activities for water enthusiasts. Oscoda's downtown district includes an assortment of eclectic shopping and renown restaurants. And lovers of history and the outdoors alike know Oscoda as the home of the famous Lumberman's Monument located in the Lake Huron National Forest.

Oscoda's natural resources have always played an important role in the community, even as local industry has changed over the years. This provides both recreational opportunities and aesthetic beauty for the community. The Au Sable River and Lake Huron have always played a central role in the Township's unique character and history. The area was first settled in the late 1860s. Originally named, AuSable, the town was renamed based on the writings of Henry Schoolcraft, who named it after the American Indian words "Ossim" and "Muscoda," meaning

"Pebbly Prairie." Oscoda played a major role in the distribution of lumber on the Great Lakes during the lumbering era. Today, the primary industry is tourism thanks to the abundance of year-round recreational activities available to residents and visitors, such as camping, fishing, hunting, cross country skiing, snowmobiling and more.

In addition to the abundance of natural resources, the Robert B. Parks Public Library, Oscoda Township Community Center and several Township parks are important cultural resources in the community. Recreational land use offering a variety of recreational activities is provided in the developed parks of Billy McQuaig Park, Fireman's Park, Piety Hill, Oscoda Huron Sunrise Park, the Oscoda Riverbank Park, Furtaw Field, Ken Ratliff Memorial Park and the Oscoda Township Beach Park with a regionally popular sand beach and newly constructed boardwalk and fishing pier. A detailed presentation of the recreational and cultural resources is available for review in the 2011 Parks and Recreation Master Plan at the Township's website.

A search of the Michigan Historical Center website identified several state registered historical sites in Oscoda including the Edward A. Brackenridge House, the Dock Reserve Informational Site and the Green Pack House. Lumberman's Memorial and the Cooke Hydroelectric Plant are two historical sites located in Oscoda Township. The Louis Chevalier Claim information site is located in the adjacent unincorporated town of Au Sable.

A letter requesting review with respect to impacts to known historical and archeological sites was sent to the State Historic Preservation Office (SHPO). A response will be provided in the final SRF Project Plan regarding the results of the required Section 106 review. Due primarily to the remote location and isolated area of construction activity, it is anticipated that this agency review will confirm that no historic properties would be affected as part of the Oscoda Township WWTP improvement project. A copy of the request letter and completed Section 106 application form is included for completeness in Appendix E. Similarly, letters requesting agency review of the proposed project with respect to impacts on tribally important cultural or religious sites will be sent to the Native American tribes associated with Iosco County including the Grand River Band of Ottawa Indians, the Nottawaseppi Band of Huron Potawatomi and the Saginaw Chippewa Indian Tribe of Michigan. Response letters that are received from the respective contacted agencies will be included in the final Project Plan.

2. Natural Environment

- **Climate**

  The average January climatic conditions for Iosco County include minimum temperatures of 8.5°F and a maximum temperature of 28°F. Average July climatic conditions have a minimum temperature of 56°F and maximum temperature of 81°F. The average annual precipitation is 28.1 inches and the average annual snowfall is 50.2 inches in Iosco County.

  The local climate conditions in the winter including designated frost levels would have an equal design and construction impact on all of the principal alternatives under review in this project plan. Due to the nature of this project, the construction season duration for all alternatives would be equally affected. The existing lagoon treatment cells require work to be performed within the cells by lowering the water level and/or installing equipment into the cell at the normal water elevation. This is not practicable or possible during the winter months since the lagoon treatment cells are not aerated and will be covered in ice. As such, the planned improvement project construction window considers a 2nd or 3rd Quarter construction start milestone.

- **Air Quality**

  Air quality impacts due to construction dust and emissions in the area due to construction equipment would be temporary and similar for all principal alternatives.

- **Wetlands**

  Regulated wetlands contiguous to the Au Sable River are located directly south of the Oscoda Township WWTP facility site. The planned improvements to the rapid infiltration basins and lagoon treatment system will occur at an appreciable lateral distance and at a significantly higher ground surface elevation than the wetlands south of the site. The appropriate control and mitigation measures will be implemented as part of this facility improvement construction project. Therefore, potential impacts to wetland resources will be adequately addressed and MDEQ wetlands disturbance permits will not be required.

- **Coastal Zones**

  The unincorporated towns of Oscoda and Au Sable are on the coast of Lake Huron. The Oscoda Township WWTP sewer district service waterfront properties including Township owned facilities. The Au Sable River drains a large watershed in northeast Michigan to Lake Huron and is a significant natural resource and a defining feature central to the Au Sable and Oscoda communities. The Lake Huron coast in this area is predominantly a sand shoreline including the 1,000 feet of public sand beach and the newly constructed boardwalk and fishing pier within the regionally popular Oscoda Township Beach Park. The mouth of the Au Sable River at Lake Huron offers a marina and fishing pier as well.

- **Floodplains**

  The Au Sable River floodplain is regulated under the Floodplain Regulatory Authority of Part 31, Water Resources of the NREPA. Based on a review of the FEMA issued Flood Insurance Rate Maps (FIRM) for the Au Sable River south of the Oscoda Township WWTP site, the proposed wastewater treatment and disposal system improvements lie outside the “Zone A” mapped area. As with the wetlands review presented above, the planned improvements to the rapid infiltration basins and lagoon treatment system will occur at an appreciable lateral distance and at a significantly higher ground surface elevation than the 100-year floodplain mapped elevation. Therefore, potential impacts to the Au Sable River due to filling, grading, installation of pipelines or structures within the floodplain will be adequately addressed.

- **Natural or Wild & Scenic Rivers**

  The Au Sable River is designated within Michigan’s Natural River System and is listed as a federally designated Wild and Scenic River. At the closest point of measurement, the Au Sable River is located approximately 2,200 feet from the southern perimeter of the effluent disposal basins. Due to the significant lateral distance and higher ground surface elevation than the Au Sable River, the planned improvements to the rapid infiltration basins and lagoon treatment system will be adequately isolated from this Natural River.

- **Major Surface Waters**

  There are several major surface waters located within or adjacent to the Oscoda Township WWTP service area. Most significant and notable are Lake Huron and the Au Sable River. Both Van Etten Lake and Cedar Lake lie north of the Township’s WWTP and the Foote Dam Pond is just west and upstream the facility. The other surface water feature of note is Clark’s Marsh located east of the site. Clark’s Marsh was originally created by several beaver damns that were built within the natural watershed drainage course to the Au Sable River. The USFS recently performed manmade control structure improvements to these already present beaver damns. The main body of Clark’s Marsh is located about 2,000 feet east of the treated effluent disposal beds.

- **Recreational Facilities**

There are several developed parks available for recreational use within the Township: Billy McQuaig Park, Fireman's Park, Piety Hill, Oscoda Huron Sunrise Park, the Oscoda Riverbank Park, Furtaw Field, Ken Ratliff Memorial Park and the Oscoda Township Beach Park. There are also the Township leased properties of Old Orchard Park and Foote Site Park. The locations of the Oscoda Township owned parks are defined within the 2011 Parks and Recreation Master Plan at the Township's website.

- **Topography and Geology**

  A review of available USGS topographic maps indicates that land within the Township's sewer district ranges from elevation 625 at the Wurtsmith AFB and Oscoda Township WWTP site to approximately 578 at the Lake Huron shoreline. The Au Sable River is dominant feature with respect to shaping the terrain and impacting the sewer collection system layout. Figure 2 – Natural Features in Appendix A provides topography data from the USGS topographic map reflected by the Foote Site Village and Oscoda Quadrangles covering the Oscoda Township WWTP improvement project area.

- **Soils**

  A review of the general soils mapping for the Charter Township of Oscoda service area as available from the Soil Survey of Iosco County, Michigan, prepared by the USDA Soil Conservation Service was performed. Based on this review, the soils located within the Township's sanitary sewer service area are many and varied with the greater percentage made up of the Udipsamments-Urban Land complex or Grayling sands. The limited area of the project is confined to generally sandy surface soils. Based on this review, there are no areas where adverse soil conditions are expected during construction.

- **Agricultural Resources**

  Review of the Zoning Map for the Charter Township of Oscoda concluded that there are no agricultural lands within the study area. If necessary, a letter can be submitted to the U.S. Department of Agriculture, Natural Resources Conservation Service to confirm that no prime, unique statewide or locally important farmlands are located within the proposed project area. A separate review by the Michigan Department of Agriculture, Farmland and Open Space Preservation Program could also be requested to confirm that there are no Farmland Development Rights Agreements on property within the project boundaries and there will be no project impacts on land enrolled in this program.

- **Fauna and Flora**

  A letter was sent to the East Lansing Field Office, U.S. Fish and Wildlife Service to request a review by this agency related to environmentally sensitive habitats and/or any species that are currently listed as threatened or endangered. A copy of this review request letter is included in Appendix E.

- **Unique Features**

  A letter was sent to the Michigan Department of Natural Resources for review of potential impacts to rare species and/or unique natural features in accordance with the Michigan Natural Features Inventory (MNFI) listing. A copy of this review request letter is included in Appendix E.

III. ANALYSIS OF ALTERNATIVES

A. Identification of Potential Alternatives

Improvements to the Oscoda Township WWTP are necessary to satisfy the MDEQ compliance expectations established within Part I, Section 4 – Schedule of Compliance and Section 9 – General Conditions of groundwater discharge permit GW1810213 last modified October 29, 2012. The content of this SRF Project Plan reflects an advancement of the preliminary planning efforts that were originally presented in the Facility Improvement Work Plan prepared by RAZD Consulting, LLC and submitted to the MDEQ on behalf of the Township on December 14, 2011. This section presents alternatives in support of the proposed wastewater treatment system improvements following the Project Plan Preparation Guidance document available from the Revolving Loan Section, MDEQ. The set of alternatives developed were evaluated based on their respective ability to meet the scope of the wastewater treatment improvement project goals, satisfy the MDEQ compliance mandate and remain within a set of reasonable financial, regulatory and technical constraints. The primary objectives of this project include:

- Cost-effectively satisfy the MDEQ compliance upgrade expectations.
- Replace the nearly failed lagoon treatment system aeration equipment.
- Ensure reliable wastewater treatment service for the Township's customers.
- Address general facility improvements required over a 20-year planning horizon.
- Restore wastewater treatment capable of consistent discharge permit compliance.
- Minimize the additional financial burden to the Township's sewer rate payers.
- Effectively minimize environmental impact from construction of facility improvements.
- Minimize the long-term environmental impact from the Oscoda Township WWTP.

Five alternatives were developed for the Oscoda Township WWTP improvement project:

1. No Action.
2. Optimize Existing Operations.
3. Regional Alternative Consideration.
4. Improve Lagoon Treatment System – Fine-Bubble Aeration.
5. Improve Lagoon Treatment System – Surface Aeration

Each alternative was initially screened based on effectiveness, ease of implementation and the respective improvement project financial requirements. Feasible alternatives were subjected to a comprehensive evaluation with attention to detailed economic, technical, environmental and public concerns pursuant to the MDEQ Project Plan Preparation Guidance document. The financial analysis of feasible alternatives followed a present worth methodology for a 20-year planning horizon. Initial project capital costs, the respective alternative operations, maintenance and replacement costs and salvage values are determined separately and discounted back to present value. The sum of these costs represents the net present worth of the wastewater treatment system improvement project for objective comparison with the remaining alternatives that are under evaluation for implementation at this site.

1. No Action

The "no action" alternative is primarily relevant where a wastewater treatment facility is in full compliance with MDEQ discharge permit limitations or where no facility currently exists. In this particular case, the No Action alternative considers maintaining the current status of wastewater treatment and disposal operations with no significant improvements being completed at the Oscoda Township WWTP. With this alternative, the Township would continue to operate a compromised facility that is not performing at a level necessary to meet the long-term treatment

needs of the community. More importantly, the No Action alternative would lead to escalated regulatory enforcement by the MDEQ for violation of the Schedule of Compliance established in the current discharge permit. The situation would eventually lead to an MDEQ compliance order and subject the Township to fines and stipulated penalties for neglecting the need for sewage treatment system improvements as previously agreed with the regulatory agency.

There is a cost to the Township associated with the "No Action" alternative beyond the fines and penalties that would be assessed as a result of escalated MDEQ compliance enforcement. The existing lagoon treatment system aeration equipment will continue to deteriorate so that even the limited aeration and mixing that is now occurring will further diminish to the point of having a marginal impact or proving no benefit at all. Two of the three aeration system blowers are at or beyond their useful life and would need to be replaced in the near future to maintain current treatment operations. As the facility equipment ages and begins to break down, it will need to be replaced or repaired. The replacement/repair costs would be significantly greater than the comparative costs required to maintain new equipment. An estimate of the fines and penalties that would be assessed as a result of an escalated MDEQ compliance enforcement action is difficult to predict but would include the legal and technical support costs to Township necessary to defend against this MDEQ enforcement action. Therefore, the total cost of foregoing required wastewater system improvements has the potential to meet or exceed the cost to upgrade the facility and comply with the MDEQ compliance expectations in a timely manner. Based on these fundamental issues, the "No Action" alternative does not meet the project objectives and will not be evaluated further as a principal alternative.

2. Optimize Existing Operations

This alternative considers making minor modifications and/or operational changes that allow the Oscoda Township WWTP to function more efficiently and satisfy the overall project objectives. Since wastewater treatment at this facility is performed by a relatively simple process, there are limited opportunities to modify the system or institute operational changes that will significantly benefit effluent quality. With the existing aeration equipment nearing a state of failure, effective and efficient biological treatment is not possible without substantial replacement and upgrade of this crucial component of the facility. The F&V Operations and Resource Management team is reviewing minor modifications and/or operational changes that may serve to stabilize further deterioration of treatment performance including the location of the existing lagoon baffle and SolarBee units, chemical feed locations and switching from liquid alum to utilizing ferric chloride for precipitation and settling to meet the only water quality based effluent limitation for total phosphorus. While minor process modifications are possible, they are not solely capable of meeting the key project objective of restoring adequate *long-term* biological treatment and satisfying the MDEQ discharge permit compliance expectations. Therefore, this alternative alone will not substantially ensure reliable wastewater treatment service over a 20-year planning period and is not considered further.

3. Regional Alternative

Evaluation of a potential regional alternative for sanitary sewer service is required as a baseline component of an SRF Project Plan to be reviewed and approved by the Revolving Loan Section and Saginaw/Bay District Office, MDEQ. This alternative would include decommissioning the existing Oscoda Township WWTP and directing the untreated wastewater generated within the Township's existing sanitary sewer service district to another regional POTW via pump stations and new force main.

The closest regional facility to the Oscoda Township WWTP service district is the Tawas Utility Authority WWTP that is located approximately 13 miles south of Oscoda and Au Sable in East Tawas. The next closest regional systems are Alpena and West Branch which are both greater than 30 miles from the current Oscoda Township WWTP service area. The Tawas Utility

Authority WWTP has a design capacity of 2.4 MGD and currently serves the City of Tawas City, the City of East Tawas and Baldwin Township. The existing dry-weather flow is approximately 1.1 MGD. However, the current wet-weather flows can approach the design flow. The originally planned and authorized 1.0 MGD design flow for the Oscoda Township WWTP would significantly exceed the available Tawas Utility Authority WWTP capacity. As such, significant capacity expansion and support structure upgrades to this facility would be required so that it would be capable of processing additional flow from the communities of Oscoda and Au Sable. To physically accomplish this connection, significant existing pump station upgrades and a new 13-mile forcemain would need to be installed to convey wastewater from the Oscoda Township WWTP service area south to the Tawas Utility Authority WWTP.

The total costs to realize this only available regionalization project would easily far surpass the costs to complete the limited set of improvements required to restore the treatment performance and satisfy MDEQ compliance requirements at the Oscoda Township WWTP. At a minimum estimated capital cost of approximately $15.2 million, the regional treatment alternative is clearly not cost effective when compared to the other viable alternatives. The total estimated cost of $8.7 million includes $6.3 million for construction of the conveyance forcemain, $2.4 million for lagoon system abandonment and $4.6 million for the purchase of treatment service capacity from the TUA WWTP. In addition to the capital costs to construct the new sewer line, operating costs are expected to be higher or only slightly less than operating the existing facility even with the potential economy of scale for operations labor associated with treatment at a single, larger facility. Therefore, the regional connection alternative does not meet the financial objectives for this improvement project, and is not considered further as a principal alternative.

4. Improve Lagoon Treatment System – Fine-Bubble Aeration Equipment

This alternative considers implementing the major capital improvements required by the MDEQ in the Schedule of Compliance of the modified groundwater discharge permit. These facility upgrades include replacing the lagoon cell aeration system diffusers with bottom cell equipment, replacing the existing air supply blowers, providing effluent discharge flow measurement and installing treated effluent distribution piping within the rapid infiltration basins. Additional facility improvements include chemical feed modifications and limited general infrastructure needs at the Oscoda Township WWTP. The proposed improvements for this alternative are summarized below:

- Isolate/clean Lagoon Cell #1 and remove the existing bottom cell aeration diffusers.
- Install new bottom cell lagoon treatment aeration diffuser equipment and supply piping.
- Replace the existing lagoon treatment air supply blowers and install VFD units.
- Isolate Lagoon Cell #2 and remove and dispose the accumulated sludge.
- Provide chemical feed injection/mixing modifications and new lagoon cell baffle.
- Install new final effluent discharge flow meter and structure.
- Install treated effluent distribution piping within the rapid infiltration basins.

This alternative meets the project objectives by fully satisfying the MDEQ compliance upgrade expectations established within Part I, Section 4 – Schedule of Compliance of groundwater discharge permit GW1810213 modified October 29, 2012. The set of proposed improvements will allow the Oscoda Township WWTP to efficiently process wastewater generated within the service area and consistently meet long-term discharge permit limitations. Since the existing air supply system has essentially failed, new aeration equipment is required to provide effective biological treatment. There are numerous options available in the aeration industry marketplace to accomplish this objective. This alternative considers providing new “fine-bubble” lagoon treatment system aeration diffuser equipment and supply piping. The new aeration diffuser units are portable and can be installed when the lagoon cell is empty or full. Each diffuser is supplied by a flexible weighted air supply line that connects to the new aeration supply header piping.

The aeration diffusers set on metal support legs on the bottom of the existing lagoon cells and are installed at specific locations based on the final aeration supply design for treatment and mixing objectives.

The overall treatment scheme of the improved Oscoda Township WWTP is based on Partial-Mix lagoon treatment design criteria and the existing flow regime would be reconfigured so that raw influent wastewater is routed through the largest lagoon treatment cell first, into the next largest treatment cell and into the smallest cell that is bisected for phosphorus removal via settling and re-aeration prior to discharge. Figure 5 – Fine-Bubble Aeration Treatment in Appendix A illustrates the proposed Oscoda Township WWTP process flow diagram for Alternative No. 4 that incorporates bottom-cell aeration through installation of fine-bubble disk diffuser modules.

Preliminary construction cost estimates for this improvement alternative total $1,092,444. The annual operations, maintenance and replacement (OM&R) costs are estimated at $653,410 per year which includes reduced electrical consumption to operate new, efficient air supply blowers and reduced operations time, annual equipment replacement funds for the new aeration diffuser units and supply blowers.

5. Improve Lagoon Treatment System – Surface Aeration Equipment

This alternative is similar to Alternative No. 4 by implementing the capital improvements required by the MDEQ in the Schedule of Compliance of the modified groundwater discharge permit. In this alternative, the existing lagoon system aeration equipment would be completely replaced by utilizing new floating mechanical surface aerators. The remaining facility upgrades that include treated effluent flow measurement, sand bed distribution piping, chemical feed modifications and general infrastructure needs will remain consistent with Alternative No. 4. The proposed improvements for this alternative are summarized below:

- Isolate/clean Lagoon Cell #1 and remove the existing bottom cell aeration diffusers.
- Install new surface aeration units and necessary electrical supply provisions.
- Isolate Lagoon Cell #2 and remove and dispose the accumulated sludge.
- Provide chemical feed injection/mixing modifications and new lagoon cell baffle.
- Install new final effluent discharge flow meter and structure.
- Install treated effluent distribution piping within the rapid infiltration basins.

This alternative meets the project objectives by fully satisfying the MDEQ compliance upgrade expectations established within Part I, Section 4 – Schedule of Compliance of groundwater discharge permit GW1810213 modified October 29, 2012. The set of proposed improvements will allow the Oscoda Township WWTP to efficiently process wastewater generated within the service area and consistently meet long-term groundwater discharge permit limitations. This alternative considers employing conventional surface aerators to replace the existing air supply system. Surface aerators provide air and oxygen dispersion to support biological treatment by imparting mechanical energy and mixing in each lagoon treatment cell. New air supply piping is not required but additional electrical supply and local disconnects for each surface aerator will be necessary. The new surface aeration units are relatively portable and can be deployed when the lagoon cell is full of water. Each aerator is anchored to the shore by adjustable steel cables and supplied by a flexible electrical supply line. The aeration units float on the water surface and are installed at specific locations based on the final aeration supply design for biological treatment and lagoon cell mixing objectives.

As with Alternative No. 4, the treatment scheme of the improved Oscoda Township WWTP is based on Partial-Mix lagoon treatment design criteria. The existing process flow regime would be reconfigured so that raw influent wastewater is routed through the largest lagoon cell first, into the next largest treatment cell and into the smallest cell that is bisected for phosphorus removal via settling and re-aeration prior to discharge. The surface aeration design comparison

considers utilizing a total of eight (8) AIRE-O_2 Triton aerator units as manufactured by Aeration Industries, Inc. Each Triton aerator would be equipped with a 20 Hp motor and a 5 Hp air supply regenerative blower that are both field installed and mounted on a five-float support frame to complete the aeration system. The surface aerators are placed within each lagoon cell to meet biological treatment requirements based on the individual lagoon treatment cell water depth, dimensions and influent wastewater characteristics. Since the Oscoda Township WWTP lagoon cells are so large, the system is "mixing-limited" for effective biological treatment and the total horsepower required for this site will remain at the level defined for the 0.5 MGD design flow even with the much lower existing flows and resultant organic loading to assure that adequate biological treatment is accomplished. Figure 6 – Surface Aeration Treatment in Appendix A illustrates the process flow diagram for utilizing conventional surface aerators at the Oscoda Township WWTP as defined in Alternative No. 5 to satisfy the MDEQ compliance expectations.

The pre-engineering cost estimate for this wastewater treatment system improvement alternative totals $1,097,716. The annual operations, maintenance and replacement (OM&R) costs are estimated at $785,318 per year which includes increased electrical consumption to operate the new surface aerators and annual equipment replacement funds for the aeration units.

Table 9 – Summary of Capital and Annual OM&R Costs

Alternative	Total Capital Cost	Annual OM&R
4	$1,092,444	$653,410
5	$1,097,716	$785,318

B. Analysis of Principal Alternatives

The two feasible alternatives developed to meet the project objectives identified as Alternatives No.4 and No. 5, respectively, are analyzed further and summarized in the following sections.

1. Monetary Evaluation

The monetary evaluation incorporates a present worth analysis. This analysis does not identify the source of funds for the project but compares cost uniformly for each alternative over a 20-year planning period. The present worth is the sum which, if invested now at a given interest rate, would provide exactly the same funds required paying all present and future costs. The total present worth, used to compare the principal alternatives, is the sum of the initial capital cost, plus the present worth of OM&R costs, minus the present worth of the salvage value (if any) at the end of the 20-year planning period. The discount rate used in computing the present worth cost is established by the MDEQ and is currently set at 4.5%.

The salvage value is calculated using a straight-line depreciation method at the end of 20 years where portions of the proposed project structures or equipment may have salvage value. The present worth of the 20-year salvage value is then computed using the discount rate of 4.5%. The MDEQ guidance document establishes the estimated life for the project structures and equipment to assess salvage values at a 20-year planning period. The cost of equipment, labor and materials is not escalated over the 20-year life since it assumes any increase in these costs will apply equally to all alternatives that are under consideration. The interest charge during construction (capitalized interest) would not significantly influence the comparison of these particular alternatives and was not included in the cost effective analysis.

To ensure uniformity of the alternative cost comparisons, the following comparison details were specifically addressed and were applied in the present worth analysis per the MDEQ guidance.

- Capital costs were included for all identified improvements.
- Sunk costs were excluded from the present worth cost. Sunk costs for the project include existing land, wastewater treatment and disposal system infrastructure, existing buildings and outstanding bond indebtedness.
- Operation, Maintenance and Replacement (OM&R) costs were included in the net present worth cost.
- The economic comparison is based on a 20-year planning period and a discount interest rate of 4.375% in accordance with the current MDEQ guidance.
- Salvage values were not included in the present worth cost due to the similarity of the two principal alternatives and the relatively low portion of new infrastructure to be constructed having a life expectancy beyond the 20-year life cycle horizon.
- Energy costs escalation was assumed to be equivalent between the alternatives under consideration and therefore are not adjusted over the 20-year period.
- Land purchase/acquisition costs were not applicable to the principal alternatives.
- Total existing and projected user costs for the project are presented.

A detailed breakdown of all identified project costs is included in Appendix F for each principal alternative. Table 10 below compares the two principal alternatives with the net present worth of Alternatives No. 4 and No. 5 estimated at $9.8 million and $11.5 million, respectively.

Table 10 – Net Present Worth Cost Analysis

Alternative	Capital Cost Present Worth	OM&R Present Worth	Net Present Worth
4	$1,092,444	$8,592,300	$9,684,744
5	$1,097,716	$10,327,700	$11,425,416

2. Environmental Evaluation

The major environmental impacts were compared for the principal alternatives. The potential environmental impacts include both beneficial and adverse. The objectives of this comparison are to highlight significantly differing environmental impacts between the project alternatives that are under consideration. Both of the principal alternatives utilize the existing Oscoda Township WWTP site and include improvements to the lagoon treatment cells and rapid infiltration basins. Alternative No. 4 considers fine-bubble or bottom-cell aeration equipment whereas Alternative No. 5 employs mechanical surface aeration. The remaining facility upgrades are essentially the same and would involve the need to perform similar construction activities at the existing site. No significant adverse environmental impacts are anticipated at the existing Oscoda Township WWTP site for either alternative.

Alternative No. 4 is expected to provide an environmental benefit resulting from a significant decrease in electrical use. The new aeration system blowers are equipped with smaller motors and more efficient than the existing blowers that date to the original lagoon system construction completed by the U.S. Air Force. The existing blowers are at the end of their useful life and are not very efficient or considered strongly reliable. The new blowers are sized to meet the more realistic influent wastewater flows that are anticipated to occur over a 20-year planning horizon. In addition, the new aeration supply blowers will be equipped with integral Variable Frequency Drives (VFD). This provides the Township operations personnel more opportunity to reduce electrical costs by optimizing the speed the blower motors are operated under and further control the consumption of electricity during periods of time when oxygen transfer is greater and/or biological treatment is performing more efficiently.

Any finished or permanent structures constructed for both of the principal alternatives would be located above the 100-year floodplain elevations. The mitigation measures will be designed and implemented as required for the construction phase of the project, including dust control and erosion control activities and restoration. These measures would be similar for each principal alternative under consideration. The following Table 11 compares the impacts on various local environmental features for Alternatives No.4 and No. 5.

Table 11 - Environmental Evaluation of Principal Alternatives

Environmental Feature	Alternative No. 4	Alternative No. 5
Agricultural and Open Space Lands	NSI	NSI
Air Quality	T	T
Archeological Historic Sites	NSI	NSI
Drinking Water Supply Source	NSI	NSI
Endangered or Threatened Species	NSI	NSI
Fauna and Flora Communities/Habitat	NSI	NSI
Floodplains	NSI	NSI
Great Lakes Shoreline	NA	NA
Lakes and Streams	NSI	NSI
Parks and Recreational Facilities	NSI	NSI
Unique Features	NA	NA
Wetlands	NSI	NSI
Wild & Scenic Rivers	NSI	NSI

Table 11 Impact Abbreviation Key:

NSI: No Significant Impact

L: Low, But Measurable Impact

SI: Significant Impact

NA: Not Applicable

T: Temporary Impact

B: Beneficial Impact

No substantial differences in indirect, direct and/or cumulative impacts were identified between the principal Alternatives No. 4 and No. 5. As discussed previously, Alternative No. 4 includes beneficial cumulative environmental impacts from reduced electrical use from the new aeration supply system.

3. Implementability and Public Participation

The SRF Project Plan will be placed on display for review by the interested public at the Charter Township of Oscoda Offices following MDEQ review and comment. The SRF Project Plan will be placed on display at least 31 days prior to the scheduled Public Hearing date.

A Public Hearing will be held by the Charter Township of Oscoda at the Township Offices on June 16, 2014, to discuss project alternatives in terms of their respective effectiveness, ease of implementation, project costs, anticipated user rates and environmental Impacts. A copy of the public notice published in the Township's local newspaper, Iosco County News-Herald and Oscoda Press, will be attached in Appendix G. A transcript of the Public Hearing and a copy of

the presentation materials will also be included in Appendix G. At the time of this writing, each of the principal alternatives is considered to be feasible.

4. Technical and Other Considerations

- Infiltration and Inflow (I/I) Removal

An infiltration and inflow (I/I) screening analysis was performed as part of the Township's S2 Grant Program application. Using the sewer service area population and daily flow data compiled by the Township, the evaluation determined wet weather flow at 80 gpcd during the maximum flow condition and 52 gpcd during the normally high groundwater months reflective of the infiltration condition. These results are far below the respective SRF criteria for "significant" that would warrant additional investigation with respect to excessive inflow/infiltration into the collection system. Therefore, the removal of I/I is not an objective of this wastewater treatment improvement project.

- Sludge and Residuals

Biological processes in aerated lagoon systems generate residuals that settle out in the treatment cells. There will be no major difference in the quantity or quality of the sludge and residuals between Alternatives No.4 and No.5. Both alternatives utilize a partial-mix aerated lagoon design for biological treatment. However, a large volume of sludge has accumulated in the first half of Cell #2 due primarily to several factors associated with the existing design concept. Sludge depth evaluations of the system have confirmed a significant volume of accumulated sludge in Cell #2. The majority of this total sludge volume is located in the western half of the cell where the depth of material generally increases as you move from the midpoint of the cell toward the WWTP service buildings. To successfully install the new aeration equipment, it will be necessary to isolate Lagoon Cell #2 and remove the existing sludge and isolate Lagoon Cell #1 to remove sludge and the existing failed aeration equipment. In this particular case, biosolids management and sludge disposal is integral to the overall objectives of the Project Plan.

- Industrial Pretreatment Program (IPP)

The Charter Township of Oscoda does not currently maintain an Industrial Pre-treatment Program. Based on a recent evaluation of responses obtained from the sanitary sewer customer base to a Commercial User Survey, there are no Significant Industrial Users (SIU) or Categorical Industrial Users in the Oscoda Township WWTP service district and a formal Michigan IPP regulated by the MDEQ is not required. At this point, the Township will address contributions of non-domestic wastewater from customers that potentially exceed the characteristics defined by domestic sanitary sewage through the Township's existing Sewer Use Ordinance. A summary of major water users and their water usage based on 2012 flows is maintained by the Township.

As previously presented in the Facility Improvement Work Plan and the Township's S2 Grant application, the raw influent data received at the Oscoda Township WWTP since September 2010 indicate periods of sustained elevated concentrations of ammonia when compared to raw influent sewage received at lagoon systems serving most small communities. With 24-hour composite sampling values up to 80 mg/L, and the current annual average at approximately 45 mg/L, the influent ammonia levels are significantly higher than the "normal" range of approximately 25-30 mg/L for a domestic customer based municipal sanitary sewer system. The raw influent composite sampling program performed by F&V Operations will continue at the Oscoda Township WWTP at a minimum frequency of once per week. A greater frequency is under consideration so that a fairly robust data set can be obtained and used for making facility improvement design decisions. Raw influent wastewater sampling and monitoring at the existing

influent control structure will remain a crucial portion of the overall facility operations and management plan.

In addition to the raw influent sampling program, the Township is working together with Spicer Group, Inc. and F&V Operations to evaluate potential sources of high ammonia, or other potentially detrimental/interfering compounds, that may contribute to the Oscoda Township WWTP facility from industrial and/or commercial customers. Targeted sampling at select locations in a limited portion of the service district has been performed and the analytical results obtained to date have identified potential high ammonia concentration customers. While the concentrations at certain locations have been relatively high, the overall impact on ammonia loading at the lagoon treatment facility remains under assessment. The information obtained to date has been helpful but it is only the beginning of a long-term effort to perform a thorough customer and sewer-shed evaluation and determine if additional sampling at target locations in the collection system is warranted. For example, the gravity sewer influent line from the Wurtsmith AFB sewer network to the final collection system Lift Station #25 may be routinely sampled along with other industrial and commercial input customers within the base site plan and other areas within the collection system.

As presented previously in this document, the raw sewage influent data obtained to date generally conforms to typical municipal waste strength characteristics with the notable exception of TKN and ammonia. It is precisely this parameter that was at the heart of the recent contested case petition filed by Oscoda Township in response to a stringent permit limitation of 2.0 mg/L as established in the groundwater for this facility. With an emphasis on providing facility upgrades to improve nitrification in the recently modified discharge permit, any proposed treatment system improvements must utilize reasonably conservative design values considering the actual raw influent data. Therefore, any appreciable reduction of influent ammonia concentrations would be a benefit to facility upgrades, long-term operations costs, treatment capacity expansion, and preserving long-term MDEQ discharge permit compliance. The Township will continue proactively evaluating approaches within the existing municipal sanitary sewer use ordinance for identifying and reducing influent ammonia nitrogen levels received at the Oscoda Township WWTP. The goal would be to obtain a significant reduction of ammonia so that influent waste strength approaches the accepted average ammonia design values for domestic sewage over a reasonable period of time. Efforts initiated by the Township to identify and limit sources of elevated ammonia may affect the ultimate configuration of wastewater treatment infrastructure required for maximum design flows.

- Growth Capacity

The principal alternatives were designed to meet the existing and 20-year wastewater treatment needs. The population growth rate for the Charter Township of Oscoda service area was estimated using the best available information including the U.S. Census data, EMCOG projections and population growth estimates developed by the local planning professional. As discussed previously, the 20-year design wastewater flow rates for the Oscoda Township WWTP are developed based primarily on a nominal growth rate for the unincorporated communities of Oscoda and Au Sable and establishing a reasonable allocation for future industrial/commercial wastewater that may be generated within the Wurtsmith AFB industrial park.

- Reliability

Each principal alternative was evaluated with improvements to have the same reliability to consistently meet the limitations currently established in the modified groundwater discharge permit throughout the useful life of the project.

- Alternative Sites and Routings

No new sanitary sewers, forcemains or conveyance lines are proposed in the Principal Alternatives. While technically an alternate routing of wastewater flow, the new piping to provide improved distribution of treated effluent at the rapid infiltration basins will be installed within the confines of the existing Oscoda Township WWTP site. The future Lift Station #25 wet well structure rehabilitation work mentioned previously but not included within the proposed SRF project and/or other lift station improvements would be carried out within the existing sanitary sewer or utility right-of-way. The current plan defines that all wastewater treatment facility improvement construction activities will be performed at the existing Oscoda Township WWTP site.

- Contamination at the Project Site

The Oscoda Township WWTP site is located within the former Wurtsmith AFB which is a documented environmentally impacted site. As such, construction activities at the existing lagoon treatment system and effluent disposal network locations have the potential to encounter subsurface contamination. However, based on a review of the existing record plan information, the previous lagoon system site closure work performed by the U.S. Air Force, this limited potential is not anticipated to occur. Upon further evaluation during the detailed design process, the construction plans and specifications will outline the proper procedures for working in potential areas of contamination and minimizing the potential environmental impact in the event that contaminated soils and/or groundwater is encountered.

IV. SELECTED ALTERNATIVE

A. Description of the Selected Alternative

Improvements to the Oscoda Township WWTP were evaluated with respect to their relative strengths and shortcomings to satisfy the MDEQ compliance upgrade expectations established within Part I, Section 4 – Schedule of Compliance of groundwater discharge permit GW1810213 last modified October 29, 2012. The alternatives were developed in accordance with the MDEQ Project Plan Preparation Guidance document and evaluated based on their respective ability to meet the scope of the project and remain within reasonable financial, regulatory and technical constraints. The stated project objectives are:

- Cost-effectively satisfy the MDEQ compliance upgrade expectations.
- Replace the nearly failed lagoon treatment system aeration equipment.
- Ensure reliable wastewater treatment service for the Township's customers.
- Address general facility improvements required over the 20-year planning horizon.
- Restore wastewater treatment capable of consistent discharge permit compliance.
- Minimize the additional financial burden to the Township's residents.
- Effectively minimize environmental impact from construction of facility improvements.
- Minimize the long-term environmental impact from the Oscoda Township WWTP.

Development of this Project Plan identified five alternatives for the Charter Township of Oscoda to consider for making improvements to the Oscoda Township WWTP. Of these, two options are considered feasible and warrant further evaluation as principal alternatives that meet the above stated project objectives. The principal alternatives were then reviewed for effectiveness, reliability, implementation ability, environmental impacts and overall cost effectiveness. The present worth analysis determined that Alternative No. 5 had an appreciably higher 20-year life cycle cost than Alternative No. 4, even though the capital costs were very similar. In addition to a lower net present worth, Alternative No. 4 has a significant environmental benefit compared to Alternative No. 5 based on reduced electrical consumption. This "green energy" component allows the project to qualify for debt forgiveness pursuant to the Green Project Reserve program making this the most attractive alternative. Therefore, Alternative No. 4 is recommended as the selected alternative with additional discussion presented in this section of the Project Plan.

B. Description of Improvements

a. Wastewater Treatment System Improvements

The wastewater treatment system improvements planned for the Oscoda Township WWTP defined in selected Alternative No. 4 are intended to satisfy the MDEQ permit compliance expectations. These collective upgrades include replacing the lagoon cell aeration system diffusers and existing air supply blowers, providing effluent discharge flow measurement, installing treated effluent distribution piping within the existing rapid infiltration basins, chemical feed provisions and lagoon piping modifications necessary at the Oscoda Township WWTP. Sanitary sewer collection system improvements including the structural renovation of Lift Station #25 and the installation of odor/corrosion control technology at this wastewater pumping station will undergo further review and be addressed within the Township's capital improvement plan. However, at this time the proposed scope of work is focused only on those treatment facility improvements required by the MDEQ permit compliance action.

Specifically, the proposed Oscoda Township WWTP improvements include the following:

- Improve the existing concrete influent/effluent control structure by installing new flow isolation valves and a new telescoping control valve to manage effluent discharge from existing Lagoon Cell #1.
- Isolate Lagoon Cell #1, transfer influent wastewater flow, remove the existing bottom cell aeration diffuser equipment and anchoring, clean the lagoon cell by removing accumulated sludge and debris. Complete new inlet/discharge piping modifications and install a new lagoon cell curtain baffle and limited fine-bubble aeration diffuser disks and air supply piping.
- Isolate Lagoon Cell #2, relocate the existing SolarBee unit, reroute chemical feed piping, remove and land apply the majority of accumulated sludge and debris and evaluate the lagoon cell liner integrity. Install new fine-bubble aeration disk diffuser equipment at the bottom of the new primary lagoon treatment cell and install the associated air supply header and diffuser unit manifold piping.
- Replace the existing lagoon treatment air supply blowers with new blowers with integral starters and VFD units. Connect to the existing interior building piping and install new air supply piping.
- Install new lagoon transfer piping and a treated concrete chemical feed mixing structure for metal salt addition to precipitate phosphorus. Install new chemical feed injection delivery piping and mechanical mixer compatible for ferric chloride.
- Install a new concrete metering structure to accommodate a new magnetic flow meter and remote read device to measure the final effluent discharge flow rate, daily volume and totalized discharge volume.
- Install new treated effluent distribution piping and individual cell isolation/control valves within each of the eight (8) existing rapid infiltration basins. Chisel plow/rotor till the infiltration basins, remove existing vegetation and restore level basin surface elevations.

The planned improvements to the Oscoda Township WWTP in the selected Alternative No. 4 as defined above are further summarized herein based on the major project elements. This summary updates the December 14, 2011, Facility Improvement Work Plan submitted to the MDEQ as necessary to satisfy the interim compliance milestones. It is important to stress that the goal of this project is to provide simple, cost effective solutions that will significantly improve performance over the existing conditions. The foundation of these improvements will be further refined by the Township during the detailed design process and may entertain alternative approaches for aeration diffuser configuration and lagoon cell flow regimes. Figure 5 – Fine-Bubble Aeration in Appendix A illustrates the proposed Oscoda Township WWTP process flow diagram for the Alternative No. 4 treatment approach that incorporates bottom-cell aeration through installation of new fine-bubble disk diffuser modules.

Treatment Design Modifications

The existing system is configured where raw wastewater first enters the square aerated Cell #1, flows by gravity to the largest rectangular Cell #2 (south cell) and then on to Cell #3 for final treatment. The discharge of treated effluent from Cell #3 is currently regulated by a telescopic valve in the system's main concrete control structure. As raw influent flows into Cell #1 from Lift Station #25, treated water flows by gravity or static head differential out of Cell #3, through the telescopic valve and on to the rapid infiltration basins for final disposal. The original MDEQ approved design intended that Cell #1 be aerated under "complete-mix" conditions to accomplish biological treatment in this cell with an organic removal efficiency of

at least 90%. Unfortunately, the ability of Lagoon Cell #1 to achieve the stated design goals for treatment was never realized in part due to the rapid deterioration of the current diffused aeration equipment and supply piping. From Cell #1, treated wastewater was to flow into a small sub-cell of Cell #2 for chemical addition of liquid alum and total phosphorus removal. After the curtain baffle, there were two (2) SolarBee water circulation mixers in the remainder of Cell #2 and one SolarBee unit in Cell #3 that were apparently intended to facilitate some additional degree of treatment by introducing water currents into the large lagoon cells.

The selected Alternative No. 4 would modify the existing facility to provide an aerated lagoon system that is designed in accordance with "partial-mix" design criteria. This concept would re-configure the current flow pattern so that raw influent wastewater would be directed from the main concrete control structure to the influent end of existing Cell #2 rather than to Cell #1. This would be accomplished using the existing piping and control valve structures and the lagoon cells would be re-numbered to correspond to the new design intent as shown in Figure 5 – Fine-Bubble Aeration in Appendix A. After the sludge is removed from the south Cell #1 (former Cell #2), modern fine-bubble aeration equipment would be installed at the base throughout the entire length of the lagoon cell to accomplish biological treatment of the organic loading. The total number of disk aeration units and their exact placement in the bottom of new Cell #1 would be finalized during the detailed design process based on the project design flows, influent wastewater characteristics, the type of aeration equipment specified and treatment goals. The existing SolarBee water circulation units are proposed to remain in service with their respective placement based on further evaluation during the detailed design process. It is likely that the existing unit equipped with the AC power supply box will either remain in relative close proximity to the existing location or the effluent end of new Lagoon Cell #2 (former Cell #3). The remaining 2 solar powered unit will be placed near a new diffuser disk to best reduce the prospect of freezing that current conditions allow and thereby assuring year-round operation and supplemental mixing within the large lagoon treatment cells. Upon further analysis, the SolarBee units may allow some refinement of the design aeration requirements though the current approach conservatively assumes that there is not a benefit to biological treatment.

Partially treated wastewater exiting the new primary Lagoon Cell #1 would then flow through the existing piping into the east end of Lagoon Cell #2 where the same type of aeration disk equipment would be employed to complete the organic load reduction and allow more optimal conditions to begin the nitrification process. Again, the total number of aeration units and their respective location in Cell #2 is subject to the design flow/loading, equipment and treatment requirements. In the last portion of Cell #2, piping modifications would direct flow to a new treated concrete chemical feed and mixing structure. The existing chemical feed pump system would remain in service and the delivery piping would be replaced to switch from liquid alum use to ferric chloride. The mixing structure would provide a mechanical mixer to provide a "rapid-mix" regime for injection of ferric chloride to the wastewater flow stream that is directed from Cell #2 to new Cell #3 (former Cell #1). Once the old aeration equipment is removed and Cell #3 is fully cleaned, a new full length curtain baffle would be installed to establish a quiescent zone for the precipitation and settling of total phosphorus in the south half of Cell #3. New inlet distribution piping would be installed at the southeast end of Cell #3 to allow treated water to enter Cell #3 from the chemical feed and mixing structure and promote coagulation and settling in the new quiescent zone. In the north half of Cell #3, a small number of new aeration units would then be installed for final effluent polishing, algae control and discharge management. The existing concrete influent/effluent control structure would receive grating improvements, valve modifications and installation of a new telescopic valve to control final effluent disposal to the rapid infiltration basins from the new square Cell #3. The existing telescopic valve would remain to preserve the current lagoon treatment system discharge ability from Lagoon Cell #2 and retain overall system operational flexibility.

There are several fundamental reasons to depart from the current treatment process flow configuration. The main point is that a partial-mix design employed at the Oscoda Township WWTP will accomplish an equivalent degree of biological treatment when compared to a complete-mix design but at a far reduced capital and operating cost to the customers. This issue becomes more important as the system approaches the ultimate design capacity of 1.0 MGD. For example, a traditional complete-mix aeration design for existing Lagoon Cell #1 that incorporates limited aeration in the remaining cells would require 20-40% more aeration diffuser units and air supply blowers that are sized at 2-3 times the capacity as those required based on a partial-mix design. With raw influent wastewater directed to the largest treatment Cell #2, equipped with aeration throughout the length of the cell, the total volume of sludge produced is expected to be less with some degree of anaerobic digestion occurring that would not be possible in a complete-mix environment. Our experience with similar facilities has found that the resulting accumulation over time is very slow when raw wastewater is first directed to a large aerated cell. A partial-mix design offers greater flexibility with respect to accomplishing biological organic reduction throughout the three lagoon treatment cells and enhancing the nitrification potential of the system. In addition, this approach is consistent with both the aerated lagoon system operated by the U.S. Air Force at this site for over 20 years and the partial-mix design concept submitted by Earth Tech and used as the treatment basis of design by the Groundwater Permits Unit, MDEQ in support of the original Rule 2218 groundwater discharge permit issued to the Charter Township of Oscoda for the facility relocation and lagoon reclamation project completed in 2003.

Aeration System Improvements

Throughout the first two years of operation, the AerResearch, Inc. bottom cell ballasted diffused aeration equipment that was initially installed in Cell #1 deteriorated near to the point of complete failure. Although the aeration system remains in operation, overall effectiveness is greatly diminished and replacement aeration is considered necessary to provide adequate biological treatment at this facility. For the reasons presented in the preceding paragraphs, it is proposed to install minor piping changes and modify the hydraulic flow pattern through the existing lagoon treatment cells. In combination with the replacement aeration equipment objectives, this modification would convert the biological treatment premise to a conventional partial-mix design and would significantly enhance the ability of the Oscoda Township WWTP to accomplish nitrification as noted in Item b) of Part I, Section 4 – Schedule of Compliance in the groundwater discharge permit modified June 16, 2011.

As an integral component of the lagoon treatment facility improvements, an aeration product manufactured by Triplepoint Water Technologies was proposed for consideration at this site within the December 14, 2011, Facility Improvement Work Plan. The MARS 3000 aeration diffuser is a submerged portable unit that combines a static tube course bubble aerator with several fine bubble diffusers to accomplish efficient biological treatment. The MARS 3000 units are easy to install and flexible in their application which allows for a prudent design approach for a facility that is planned to expand over time due to increases in flow and/or organic loading. In addition, the static tube design feature employs an aggressive mixing force that would allow for appropriate application in an existing lagoon system that will have some level of sludge already present at the bottom of the cell. Based on the continued wastewater treatment improvement planning process, the Township has evaluated viable alternatives to the MARS 3000 submerged diffusers that also offer ease of installation, low maintenance needs, product longevity and portability so that they too can offer flexible deployment in their application at this sewage treatment facility. Because of the significant depth of the Oscoda Township WWTP lagoon cells, a diffuser element installed near the cell bottom offers several advantages over a surface aerator with respect to oxygen transfer efficiency, mixing and energy costs and this type of unit is preferred for providing replacement aeration capability at this facility.

With this Project Plan, an alternate aeration diffuser unit technology as manufactured by Air Diffusion Systems (ADS) offers advantages for this specific application and is planned for use by the Township to satisfy the goal of improving biological treatment in lieu of the Triplepoint MARS 3000 units previously presented as an alternative for this project. The ADS fine-bubble aeration diffuser disk modules provide exceptional oxygen transfer capability and would be employed utilizing an air supply header design that incorporates the use of multiple disk modules supply points based on the final engineering design process. This aeration technology takes better advantage of the deep lagoon cells to provide improved dissolved oxygen transfer through the water column and effective, efficient treatment within the partial-mix aerated lagoon system design approach. The conceptual treatment design developed by ADS would require a firm blower capacity of 469 scfm provided by a 40 Hp motor. This is a significant reduction in the Township's existing operating condition using a 75 Hp motor. In addition, including VFD motor control will allow the operations team to utilize less total Hp to accomplish biological treatment during the winter period where aeration requirements are less due to the better dissolved oxygen saturation in the cold water of the lagoon treatment cells and at influent organic loading conditions that are below the design basis. This flexibility will allow a further reduction in energy requirements and offer the opportunity to optimize control of the biological treatment process.

The proposed partial-mix conceptual design approach utilizing the ADS disk modules is represented in Figure 5 – Fine-Bubble Aeration and supplemental design basis information prepared by ADS as part of developing a preliminary cost estimate and which is included for review in Appendix H. The proposed approach is developed from decades of experience with aerated lagoon applications, industry accepted design principles and calculations that take into account the current raw influent wastewater characteristics and Phase I facility design flow of 0.5 MGD. This aeration supply solution is flexible and can be easily expanded to meet the biological treatment requirements at the originally planned design flow of 1.0 MGD, if desired. The ADS reports provide a preliminary configuration of disk modules placed within each of the three (3) existing lagoon treatment cells to demonstrate how this technology can be implemented in a phased approach. As the influent wastewater flow increases with time, more aeration units can be purchased and installed to keep pace with system expansion and spread out the capital and operations expenses over time. This assures that current users do not have to pay for future treatment capacity that may or may not be realized by future revenue generating customers. Application of the partial-mix design would taper the placement of the aeration diffuser units within the lagoon treatment cells so that more oxygen and mixing is provided near the raw influent portion of the system where it is most needed and then gradually reduced in intensity as the wastewater flows through the lagoon cells.

The original lagoon system renovation plan established an average day design flow for this facility at 1.0 MGD. It was this ultimate capacity that was planned for the treatment facility to achieve with renovation of the existing AFB lagoon system. As presented in Section C Existing Facilities, Item 6. Current Wastewater Flows, monthly average daily flows in the summer period are approximately 0.3 MGD or less than one-third of the 1.0 MGD ultimate design flow. Over the past several years, the monthly average day flows for each month over the operating year have remained fairly consistent. Based on population projections for the Oscoda Township WWTP service district, no significant or sudden increase is expected in the foreseeable future. Therefore, the equipment arrangement based on a partial-mix design and a 0.5 MGD design flow most realistically presents how replacement aeration may initially be incorporated into the facility improvement plan. It is important to note that the existing blowers were sized to match the aeration capacity required for the 1.0 MGD complete-mix design. The blower currently supplying air to the deteriorated diffuser equipment in Cell #1 is equipped with 75 Hp high efficiency motor purchased in 2008 to replace one of the original AFB blower/motor that failed. The two (2) existing AFB Gardner-Denver blowers are still in

operable condition and are equipped with 60 Hp motors. However, operated at full motor speed, these blowers would be too large and/or inefficient for the current 0.5 MGD aeration supply requirements and in any event are not considered reliable due to the age exceeding the typical useful life for this type of equipment.

The proposed partial-mix design will accomplish a high degree of biological treatment in an efficient manner. The BOD_5 concentration in the final treated effluent discharged from new Lagoon Cell #3 is predicted to be 1.43 mg/L in the summer and 6.26 mg/L in the winter at a design flow of 0.5 MGD. An average kinetic design coefficient parameter was used to calculate the stated treated effluent values. As is typical for lagoon treatment systems, the actual performance for organic removal is expected to be higher in the summer months with increased biological activity due to consistently warmer water temperatures and slightly lower in the winter as the lagoon cell water temperature becomes colder. In either case, the predicted effluent concentration values for BOD_5 represent very efficient biological treatment over the range of respective design flows planned for a continuously discharging aerated lagoon system during the 20-year planning period. The preliminary design conservatively assumes that biological removal of the total influent organic BOD_5 and complete nitrogen loading from ammonia will be removed within the lagoon treatment cells and must be satisfied by the aeration supply system along with an allocation for future organic loading that may be introduced from influent total suspended solids concentrations that may settle out in the fine-bubble aeration environment. A summary of the preliminary design data is included for review in Appendix H.

In accordance with the discharge permit compliance expectations, a primary goal of the new aeration system is to improve nitrification within this lagoon treatment system over the current condition. Nitrification in a continuously discharging aerated lagoon system is difficult to predict, especially in a northern climate where there are a greater range in temperatures and seasonal variations. Lagoon systems are typically tricky to model for nitrification as they are designed with relatively long retention times and, therefore, subject to several environmental factors that are not considered in well established models utilized for modern mechanical wastewater treatment facilities. The ability to predict ammonia nitrogen removal efficiency with a strong degree of certainty hinges on several important factors including the raw influent ammonia levels, which in this case may be above normal domestic wastewater due to industrial and/or commercial sources. One aspect of the overall wastewater treatment facility improvement objective will consider systematically evaluating these sources in an effort to reduce influent ammonia levels so that this reduction at the source can have a direct benefit to realize improved treated effluent water quality that is discharged from the upgraded Oscoda Township WWTP.

Lagoon nitrification is accomplished by specialized microorganisms that are non-motile and highly sensitive to temperature, pH, alkalinity, dissolved oxygen, BOD_5 levels and other inhibitors. In this particular case, the greatest influence on performance is likely to be temperature. Nitrification will be greatest in lagoon systems during the summer and early fall seasons with limited nitrification occurring in the winter as water temperatures begin to fall below the 5-7^{o} C threshold and remain low into spring. Historical SolarBee unit testing data show lagoon cell water temperatures at or under 5^{o} C into mid-April. Recent effluent readings at 1.4^{o} C during the winter indicate that even with effective aeration equipment, a significant degree of nitrification may not occur until spring arrives. With consistently warmer weather and ambient temperatures arriving, an aerated lagoon system can be expected to accomplish a reasonable degree of nitrification which will continue to improve throughout the summer and early fall.

The nitrification potential of aerated lagoon systems is typically not considered to be significant or occur with consistency until the BOD_5 concentrations are below about 30 mg/L. Prior to this stage of treatment, there will be ammonia-nitrogen assimilation into biomass by

the microorganisms responsible for the organic loading reduction processes and some degree of nitrification will occur above this value. However, as stated above there are other important factors that influence the rate and degree of ammonia removal in a lagoon system. The proposed partial-mix design approach that incorporates a bottom cell aeration system like the ADS diffuser disk product would restore efficient organic removal throughout the lagoon cell environment and allow the system to achieve and sustain conditions that are first necessary to foster and then improve the natural nitrification processes that are already occurring to a limited extent within the existing lagoon treatment system. By accomplishing this facility upgrade alone, the Oscoda Township WWTP will provide a reasonably strong degree of improved nitrification as noted in Item b) of Part I, Section 4 – Schedule of Compliance in the first modified groundwater discharge permit.

Phosphorus Removal Modifications

Beginning with the original groundwater discharge permit GW183500103 issued by the Groundwater Permits Unit, MDEQ on January 10, 2003, the Oscoda Township WWTP has been required to comply with a total phosphorus limitation of 1.0 mg/L as established for both the treated effluent and down-gradient groundwater monitoring wells. As part of the July 2007 permit renewal application review process, a May 2008 memo was issued by the SWAS, MDEQ documenting acceptance of the proposed total phosphorus limit of 1.0 mg/L considering the potential impact of the existing venting discharge to the wetlands located down-gradient of the discharge site and using a daily discharge volume of 1.5 MGD. As a result of this history, it is expected that the total phosphorus limitation of 1.0 mg/L established for treated effluent and groundwater quality will remain throughout the life of this facility and will not become more restrictive. Due to the affirmative SWAS response to the GPU technical staff referral and the approach whereby the GPU program staff *consider* the SWAS recommendations for existing and previously permitted systems, there is anticipated to be a rather low level of risk associated with the MDEQ desiring to lower the total phosphorus limit in the future.

As presented in Section C – Existing Facilities, Item 4. Biosolids Management and Disposal, of this Project Plan, a large volume of sludge has accumulated in the first half of existing lagoon Cell #2 (south cell) due in part to the current location for chemical feed application of liquid alum. For a continuously discharging lagoon system like the Oscoda Township WWTP, the natural biological treatment processes are not able to consistently remove phosphorus to levels below 1.0 mg/L before the treated effluent must be discharged to the rapid infiltration basins. Therefore, the addition of a metal salt like ferric chloride or aluminum sulfate (alum) is required to assure compliance with the discharge permit limitations. The existing chemical feed system was designed with the intent to feed ferric chloride but alum was chosen due to the cost difference in chemicals and has remained in use since system initiation in 2003. The FVOP operations team is in the process of switching to ferric chloride I response to successive non-compliance events and the fact that ferric chloride is expected to be more effective, result in lower daily volume of chemical use and is currently less costly to purchase.

Along with the other facility improvements presented herein, the chemical feed point would be relocated from the current point near the SolarBee unit in existing Cell #2 to a new concrete mixing structure. Minor piping modifications completed at the discharge end of new Lagoon Cell #2 would direct gravity flow to the new treated concrete structure. The existing chemical feed and storage equipment would be modified accordingly to switch from liquid alum to ferric chloride use and the delivery piping would be routed form the existing external junction box to the new concrete structure. The mixing structure would provide a mechanical mixer to impart a “rapid-mix” regime for injection of ferric chloride to the wastewater flow stream that occurs from Lagoon Cell #2 to Cell #3 and the concrete would be treated to protect against the corrosive properties of ferric chloride. Once the old aeration equipment is removed and new

Lagoon Cell #3 is cleaned, a new full length curtain baffle would be installed to establish a quiescent zone for precipitation, coagulation and settling of phosphorus in the south half of Cell #3. New distribution piping would be installed from the chemical feed/mixing structure to the southeast end of Cell #3 to allow chemically treated flow to enter Cell #3 and promote coagulation and settling in the new quiescent zone.

Relocating the chemical feed point from the current location to the discharge end of Cell #2 would first serve to eliminate the excessive sludge buildup that has and would continue to occur within the first half of existing Cell #2 under the original design premise. The new location for chemical feed offers the theoretical opportunity to reduce the total amount of chemical that must be used on a daily basis to meet the effluent limitation. This is due to the fact that there will be less phosphorus to precipitate in the treated water at this point in the system since the inert and gross solids have already settled out and biological treatment resulting in phosphorus uptake is nearly complete. In addition, ferric chloride is expected to be more effective as a metal salt in precipitating total phosphorus in the treated effluent leaving new Lagoon Cell #2 which would help to reduce chemical use and gain improved process control for achieving the effluent discharge permit limitation. The new mixing point will also serve to improve phosphorus removal by providing a controlled environment for chemical feed and mixing which is fundamental to success and efficiency. The new chemical feed point would serve to provide improved treatment for phosphorus removal while delivering a lower cost of operations over the current arrangement for this required aspect of the treatment facility. An alternate approach would be to feed the metal salt chemical at a location near the hydraulic outlet of Cell #2 directly at a bottom-cell aeration diffuser unit. The continuous feed of chemical would be injected directly into the air stream of the aeration diffuser and mixing would occur as the chemical travels vertically up and then laterally away from the injection point. In discussion with the FVOP team, providing a mixing chamber is preferred but this issue can be further reviewed during the detailed design stage.

Rapid Infiltration Basin Improvements

Improvements to the existing disposal system to achieve more uniform distribution of treated effluent consist of installing new piping, risers and isolation valves in each of the existing rapid infiltration basins. Accepted design practice for rapid infiltration basin disposal systems will often incorporate multiple vertical risers that are installed within the basal area of each effluent disposal cell. These risers are simply a PVC pipe that terminates vertically about 2 feet above the surface of the basin. Treated effluent directed to the disposal cell simply flows upward and spills out the top of each distribution riser like an umbrella water feature and falls to a splash pad provided around the riser. As the discharge of treated water continues, the total volume dosed to the basin increases and sheet flow will develop from the riser in a radial direction outward toward the containment berms. The number, size and spacing of effluent distribution risers should consider the total basin size, discharge hydraulics, soil permeability, loading and resting cycles and the maximum daily discharge rate and volume. A large number of WWTP's discharging to groundwater in Michigan employ this approach. Many of these discharge from a holding pond or effluent storage basin to the selected infiltration cell or sand bed. With permeable soil conditions and reasonable loading rates, the severe winter conditions do not typically pose operational issues at these facilities. The proposed effluent distribution approach is similar to the existing condition that has reliably been in operation at this site for several decades.

To address the facility discharge compliance expectation raised by the Groundwater Permits Unit, MDEQ at the Oscoda Township WWTP site, it is proposed to install a total of four (4) vertical risers within the basal area of each existing rapid infiltration basin. The risers would be oriented in a quadrant arrangement and spaced about 75 feet from the interior berm and 100 feet between each adjacent riser. The final number of risers and their spacing design would attempt to reasonably balance the distance between each new riser as well as their

respective distance to the edge of the disposal cell to provide improved adequate coverage of the individual basin footprint and promote reasonably uniform surface application. Complete and uniform infiltration basin surface application is not cost reasonable nor is it operationally possible for this type of system during winter application in Michigan. As part of the effluent distribution improvements, it will be necessary to install new buried SDR 26 pressure piping to convey the treated effluent from the existing underground piping to the distribution risers provided for each infiltration basin. A manually controlled isolation valve is provided to allow the operator to rotate the individual basins for maintenance and resting. The piping design will allow the continued use of the existing corner inlet effluent disposal structures so that in the unlikely event there is a piping/valve issue, the affected infiltration basin could still be used via the original structure. Figure 7 – Rapid Infiltration Basin Effluent Distribution Piping in Appendix A illustrates the preliminary design for the proposed wastewater disposal system piping and riser locations intended to provide significantly improved distribution of treated effluent over the surface of the existing rapid infiltration basins.

Based on technical and project planning discussions with the Groundwater Permits Unit, MDEQ soil scientist, the proposed disposal system upgrades presented herein would improve effluent distribution and satisfy the MDEQ compliance upgrade expectations. The December 14, 2011, Facility Improvement Work Plan presented a more sophisticated system to provide uniform distribution of treated effluent over the surface of each rapid infiltration basin by incorporating a new discharge structure, electrically actuated valve, flow meter coupled with a basic computer control system. Upon further review and discussion with the Groundwater Permits Unit, MDEQ soil scientist, a more simple and reliable approach was agreed as acceptable and would serve to improve disposal over the current conditions. The main challenge for uniform distribution over the entire surface of a given basin at this particular site is overcoming the relatively high soil permeability. This fact combined with the large individual basin size makes it extremely difficult to flood a basin if the daily volume of treated effluent is actively managed. The proposed multiple riser design configuration will provide adequate coverage of the infiltration basin footprint in a reliable, cost effective manner. When the new distribution piping is installed, the surface of the existing rapid infiltration basins could be chisel plowed or rotor tilled to work up the upper 12 inches of sand and remove the existing vegetation-grass cover and any accumulated residual solids. The infiltration basins will also be leveled when clean sand is restored.

The disposal system improvements may also contribute to the overall treatment capability and effectiveness of the Oscoda Township WWTP. Given the right conditions, significant nitrification may occur in deep unsaturated soils present beneath an effluent disposal system. Regular uniform distribution of treated effluent over the surface of the disposal area will increase the opportunity for nitrification to occur in the subsurface soils environment beneath the basins. This potential increase in ammonia nitrification is very important toward the overall goal of the wastewater treatment facility upgrades as presented in this work plan. In addition to nitrification, phosphorus adsorption can occur in deep unsaturated soils. Depending on the types of soil present and their respective depths, a significant amount of phosphorus adsorption may occur. Due to the age of this system, a portion of the total adsorption capacity of the site has been depleted. However, with adequate dosing/resting cycles, the original adsorption capacity can be regenerated to a certain degree and improved distribution will certainly aid the natural filtering properties inherent within the soil matrix. An additional consideration in this regard is that uniform distribution has typically not occurred so the total capacity available for phosphorus adsorption may be greater than one would expect based on the age of the system alone. With discharge permit compliance measured in the groundwater, improvements that may provide additional treatment prior to effluent reaching the water table are worth serious consideration.

With the wastewater treatment design modifications to convert the existing facility to a partial-mix aerated lagoon system, the hydraulic flow pattern would be altered to direct the treated

effluent from the north half of new Lagoon Cell #3 into the existing influent/effluent control structure through a new vertical telescopic valve. From the effluent compartment of this structure, treated effluent would flow via the existing 14-inch diameter outfall pipe to the rapid infiltration basins by hydraulic head differential with flow conditions in the 14-inch diameter outfall pipe at full-flow. As part of the overall MDEQ compliance expectations, the capability to measure and record daily discharge flow is required. This would be accomplished by installing a new 12-inch magnetic flow meter on the 14-inch discharge line and within a new concrete meter vault located near the existing control structure. The new flow meter will transmit effluent discharge flow to a remote receiver installed at the improved influent/effluent control structure.

b. Controlling Factors

The service area population is anticipated to experience only modest growth during the next 20 years. The projected wastewater needs for the Oscoda Township WWTP service district were estimated using customer community specified growth rates and which will be reviewed for reasonableness by EMCOG as the regional planning commission. The design flows were generated based on this information and a reasonable allocation for potential future industrial and/or commercial flow contributions. The Phase I design flow of 0.5 MGD is greater than the wastewater flow that would be determined by population projections alone. This is partly due to the conservative view toward the significant potential that exists with the Wurtsmith AFB and attempting to prudently plan for wastewater treatment infrastructure that is relatively consistent with the Township's original premise of achieving an ultimate treatment capacity of 1.0 MGD at the Oscoda Township WWTP. If actual wastewater flows within the Township's municipal sanitary sewer service area were to significantly increase sooner than anticipated due to unforeseen positive demographic and/or economic conditions occurring within the community, the planned wastewater treatment infrastructure may need to expand consistent with a phased implementation.

The existing lagoon treatment cells have a substantial volume available for wastewater treatment when compared to the existing daily influent flow. This results in a significantly greater retention time in the treatment system when compared to conventional design parameters for aerated lagoon systems. This is one main reason that the existing system is performing acceptable for organic removal even though the aeration system is poor. This long retention time and the depth of the treatment cells both work to the Township's advantage over the initial 20-year planning horizon and the utilization of fine-bubble aeration equipment installed at the bottom of the lagoon cells will provide a very efficient wastewater treatment regime. The preliminary design parameters that were utilized for the proposed wastewater treatment improvements are based on an average raw influent waste strength exhibiting $CBOD_5$ of 250 mg/L, ammonia of 45 mg/L and total phosphorus of 6.0 mg/L, respectively. The design $CBOD_5$ value of 250 mg/L is considered conservative based on the available raw influent data obtained to date which indicates an average of 195 mg/L. The $CBOD_5$ concentration data conforms to anticipated metrics. This allows some inherent safety factor and/or room for expansion of the rated treatment capacity of the Oscoda Township WWTP based on actual concentrations and the ammonia levels received at the facility. Based on further raw influent data, it may be possible to refine the final design based with due consideration to the ammonia levels. The raw influent data obtained to date indicate ammonia concentrations may be consistently greater than levels that are associated with typical domestic sanitary sewage generated within a municipal sewer collection system. The elevated ammonia levels appear to remain sustained over the period of review and may pose specific treatment facility performance concerns that justify additional sampling and further investigation to establish a sound data set for the detailed design process. In any event, the preliminary design for the lagoon treatment system takes into account the current average

ammonia concentration of 45 mg/L for developing the aeration system equipment needs. In the event that ammonia levels decrease over time toward more "domestic" values, the same condition would be realized with that of actual $CBOD_5$ values where there is potential room for expansion of the rated treatment capacity of the Oscoda Township WWTP.

c. Project Maps

The following maps and figures that correspond to selecting the recommended alternative are included in Appendix A and listed for reference as follows:

Figure 1 – Project Location and Sewer Service Area

Figure 5 – Fine-Bubble Aeration

Figure 7 – RIB Effluent Distribution Piping

d. Sensitive Features and Mitigation

The selected alternative has minimal impact on nearby inland lakes, streams, floodplain and wetland areas. As previously presented, the construction required to accomplish the MDEQ required wastewater treatment improvement project is isolated to the existing Oscoda Township WWTP site and will not be performed in these MDEQ permit required areas. Figure 2 – Natural Features shows the locations of wetlands south of the existing treatment and disposal site and illustrates the flood zones developed by FEMA for the Au Sable River in the immediate area of the project site.

e. Estimated Schedule for Design and Construction

The following Table 12 presents the proposed project schedule following the SRF FY2015 Q2 milestone schedule in accordance with the MDEQ approved Implementation Schedule for the Oscoda Township WWTP improvements. This schedule is presented for planning purposes and may be altered based on the availability of funding.

Table 12 – Proposed Schedule for Design and Construction

Anticipated Date	WWTP Improvement Project Activity
May 2014	Advertise Public Hearing
June 2014	Hold Public Hearing
June 2014	Submit Final SRF Project Plan to MDEQ
July 2014	Survey, Project Development and Preliminary Design
August 2014	Begin Detailed Design
August 3, 2014	DEQ Review Comments on Project Plan Submittal
September 3, 2014	Respond to DEQ Project Plan Review Comments
October 3, 2014	Correction of All Remaining Planning Deficiencies
December 4, 2014	Publication of Environmental Assessment (EA)
January 3, 2014	Public Notice Clearance – DEQ Approval of Project Plan
August 1, 2014	Submit MDEQ Part 41 Permit Application
August 1, 2014	Submit Design Plans/Specifications and User Charge
November 4, 2014	DEQ Comments on Plans/Specifications/User Charge
November 27, 2014	Submit Part I – SRF Loan Application
December 3, 2014	Submit Final Design Plans and Specifications/User Charge
January 3, 2015	Submit Part II – SRF Loan Application
January 3, 2015	Part 41 Permit Issued/Approved User Charge
January 3, 2015	Issue Publication for Invitation to Bid
February 6, 2015	Opening of Construction Bids
February 13, 2015	Township Resolution of Tentative Contract Award
February 14, 2015	Submit Part III – SRF Loan Application/Bid Data
March 11, 2015	MDEQ Order of Approval/Award Bid for Construction
April 2015	MFA/MDEQ SRF Loan Closing
May 2015	Begin WWTP Improvement Construction
October 2015	Complete Construction
November 2015	O&M Manual, Startup Assistance and Record Drawings

f. Cost Summary

Table 13 summarizes the estimated costs for the selected alternative of providing fine-bubble aeration treatment. Appendix F provides a summary of the pre-engineering estimated project costs for the recommended improvement alternative.

Table 13 – Cost Summary of the Selected Alternative

Description	Capital Costs	OM&R Costs PW	Total Project PW
Fine-Bubble Aeration Treatment	$1.09 M	$8.59 M	$9.68 M

h. Authority to Implement Selected Alternative

Implementation of a selected wastewater treatment alternative is the responsibility of the Charter Township of Oscoda having the full authority to approve and finance the necessary improvements. The Township retains a contract operations service provider for the sewer and water infrastructure serving the community. The contract operations firm may offer managerial recommendations to the Township's Board of Trustees regarding the wastewater collection and treatment systems.

The Charter Township of Oscoda Board of Trustees reviewed a draft SRF Project Plan and elected to submit the document to the MDEQ on the November 11, 2013, regularly scheduled board meeting. Upon receiving MDEQ review comments and revising the Project Plan as necessary, the Charter Township of Oscoda Board of Trustees plans to adopt a final SRF Project Plan with selection of Alternative No. 4 following the scheduled Public Hearing. The public notice advertisement, public hearing transcripts and resolution for adoption of the final SRF Project Plan by the Charter Township of Oscoda Board of Trustees are included in Appendix G.

i. Green Project Reserve

Through the MDEQ compliance schedule established in the modified groundwater discharge permit, the Charter Township of Oscoda is required to restore effective biological treatment at the Oscoda Township WWTP. The existing aeration diffuser network in Cell #1 has failed and the existing air supply blowers are sized to match the oxygen capacity required for the original 1.0 MGD "complete-mix" biological treatment design. The blower currently supplying air to the deteriorated diffuser equipment in Cell #1 is equipped with 75 Hp high efficiency motor purchased in 2008 to replace an original AFB blower/motor that failed. There are two (2) existing original AFB Gardner-Denver blowers that remain operable and are equipped with 60 Hp motors. Operating at full motor speed, these blowers would be too large and/or inefficient for the air supply required at the current 0.310 MGD maximum monthly average flow up to the Phase I design flow 0.5 MGD utilizing a partial-mix design. The recommended solution for satisfactorily addressing this MDEQ compliance objective is presented in Section IV – Selected Alternative within the Aeration System Improvements narrative. New diffuser disk modules incorporating fine bubble aeration technology as manufactured by Air Diffusion Systems (ADS) are recommended. The conceptual design developed by ADS would require a firm blower capacity of 470 scfm provided by two (2) new blowers and motors. Significant energy reduction and annual operational cost savings can be achieved by modifying the lagoon treatment process, providing fine bubble aeration units and installing new higher efficiency aeration supply blowers with variable speed drives. The resulting energy savings projected with this improvement alternative are approximately 47% at the design flow/loading and current monthly average flow conditions when compared to the existing system.

The significant reduction in electrical consumption achieved through implementation of the Selected Alternative allows the Township to qualify for Green Project Reserve (GPR) funding

in accordance with the current Environmental Protection Agency (EPA) guidance document. Specifically, the proposed improvements to restore efficient biological treatment will qualify for Categorical GPR principal forgiveness under Section 3.2-2, Energy Efficient Categorical Projects of the EPA *Procedures for Implementing Certain Provisions of EPA's Fiscal Year 2012 Appropriations Affecting the Clean Water and Drinking Water State Revolving Fund Programs* document. This categorical qualification is based on realizing electrical energy savings in excess of 20% as a result of the improvement project and, therefore, preparing a business case in support of the GPR qualification is not required. The aeration supply system improvements are eligible for "principal forgiveness" which would result in a reduction to the capital amount of the SRF Loan. At this time, the pre-design budgetary cost estimate for the aeration system improvements is $324,150 and it is anticipated that most if not all of this amount would qualify for GPR principal forgiveness. The proposed improvements are submitted pursuant to paragraph 3.2-2 of the above-referenced EPA guidance document as a categorically eligible project that achieves at least a 20% reduction in energy consumption. A detailed presentation of the electrical cost savings is provided for review in Appendix I.

j. User Costs

The Charter Township of Oscoda funds sanitary sewer collection system and wastewater treatment facility operations entirely through user fees that are based on usage. Sewer revenue is generated based on a Readiness to Serve (RTS) charge and a commodity charge that together cover the necessary Operations & Maintenance (O&M) costs and existing debt related to the sanitary sewer infrastructure. Currently, the Township's RTS charge is $11.00/month and the commodity charge is currently $2.80/1,000 gallons. For the first year of operation following implementation of the SRF Project Plan improvements, the billed sewer usage is estimated at 90,000,000 gallons for the combined RTS and O&M charges set by the Township.

Based on the relatively significant scope of the project, the MDEQ required improvements to the Oscoda Township WWTP will result in the need to raise sewer user rates. The amount of the increase will depend on the final scope of the project that is funded by the SRF Loan and the opportunity for the Township to qualify for GPR funding and/or obtain 90% grant funding for the Design Engineering and User Charge development costs through the SAW Grant program. The following Table 14 compares a monthly sewer bill for a typical residential customer in the Charter Township of Oscoda using 6,000 gallons per month before and after implementing the Selected Alternative No. 4 project that is planned for FY 2015. Due to the uncertain availability of GPR funding for FY 2015 SRF projects and securing financial assistance through the SAW Grant, two different scenarios for user charges are shown for the Selected Alternative No. 4. The first user charge scenario assumes a 50% "principal forgiveness" through GPR program funding for the eligible aeration system improvements and obtaining a SAW Grant for engineering services. The second scenario presents the user charge assuming standard SRF Loan financing without either GPR funds or a SAW Grant.

- Estimated Readiness To Serve Charge:

  GPR-SAW Grant Funding: $12.85 or $2.14/1,000 gallons

  SRF Loan Only: $13.70 or $2.28/1,000 gallons

- Estimated O&M or Commodity Rate (both user charge scenarios): $2.80/1,000 gallons

Table 14 - Township Resident Monthly Sewer Bill Comparison based on User Charge

	New Monthly Bill (6,000 gal/month)	Old Monthly Bill (6,000 gal/month)	Monthly Increase
SRF with GPR and SAW Grant	$29.65	$27.80	$1.85
Standard SRF Loan Only	$30.50	$27.80	$2.70

V. EVALUATION OF ENVIRONMENTAL IMPACTS

A. Description of the Impacts

The potential beneficial and detrimental environmental impacts of the selected alternative are evaluated in this section of the Project Plan. The analyses of impacts are divided into direct, indirect and cumulative impacts. Direct environmental impacts are directly attributable to the construction and operation of the wastewater treatment facility improvement project. Indirect impacts are caused by implementation of the MDEQ required improvement project but are removed in time and/or distance from the site and are often considered secondary in nature. Cumulative impacts are those impacts which increase in magnitude over time or which result from individually minor but collectively significant actions occurring upon completion of the site work and commencement of facility operations.

1. Beneficial or Adverse Impacts

A discussion of the full range of potential impacts (i.e., direct, indirect and cumulative) must identify the nature of the impacts in terms of both beneficial and adverse impacts. The following section will describe the positive and negative impacts resulting from the selected alternative with special emphasis on cultural or environmentally sensitive resources. In general, the impacts as a result of the project are positive. The environment will benefit from significantly improved wastewater treatment, better effluent distribution and reduced power consumption. The adverse impacts related to temporary traffic impact, dust and increased localized noise at the remote Oscoda Township WWTP site are considered relatively minor.

2. Short-Term and Long-Term Impacts.

The analysis in this section evaluates short-term use impacts and the resulting performance, operations and maintenance enhancements from a long-term perspective. When viewed from the set of improvements to the existing condition, there are no long-term risks to public health, safety or welfare resulting from the proposed project. The short-term effects that are attributed to potential soil erosion and migration will be effectively mitigated by implementing appropriate soil erosion and sedimentation controls.

3. *Irreversible or Irretrievable Resources*

The analysis of environmental impacts also includes any irreversible commitments or use of irretrievable resources such as the commitment of construction materials, energy and land to the proposed improvement project. Since the wastewater treatment system improvements will focus on the existing Oscoda Township WWTP site, there are no identified or known negative irreversible or irretrievable impacts to future uses of land and water resources.

B. Analysis of Impacts

1. Direct Impacts

Direct impacts are those collective environmental impacts that are directly attributable to the construction and operation of the project. The Charter Township of Oscoda must consider impacts resulting from construction in areas which have not been previously disturbed. The potential positive/negative effects of the proposed project are considered for each of the following environmental factors:

- **Historic, Archaeological, Geological, Cultural or Recreational Areas**

An application for a Section 106 Review of the selected improvement project was made to the Environmental Review Coordinator at the State Historic Preservation Office (SHPO).

Based on a review of the state historic database, there are no historic properties affected by the project. The results of the SHPO agency review are anticipated to confirm that no historic properties would be affected by the proposed wastewater treatment improvement project. In general, projects not affecting historically significant structures themselves may also be reviewed by SHPO to evaluate the potential disturbance to the surrounding landscape that may negatively affect historic property. The removal of mature trees and/or significant alterations of the existing surrounding landscape may affect a property's overall aesthetic value and therefore its ability to be listed on the federal register. Since the proposed project construction is limited to the existing Oscoda Township WWTP property, minimal disturbance to the surrounding landscape is anticipated from the project.

The Oscoda Township WWTP site is relatively remote in a natural and/or industrial setting so the opportunity for negative impact is decreased by virtue of this location. There are no recreational areas owned by the Township in proximity to the project site that will be affected by this project. In accordance with the MDEQ guidance for Project Plan development, letters to the appropriate Tribal Historic Preservation Officers (THPO) were submitted to confirm that there will be no impact to religious or culturally significant tribal lands as a result of this project. A copy of the review letter generated by SHPO, and any letters received from the THPO contacts, will be included in Appendix E of the final SRF Project Plan.

- **Natural Settings and Sensitive Ecosystems**

The improvements to the Oscoda Township WWTP will occur at the facility site north of the adjacent wetlands and approximately 2,200 feet from the Au Sable River. Due to the limited extent of construction activities and adequate isolation from these natural features, both in lateral isolation distance and ground elevation, a Part 301 Inland Lakes and Streams permit or a Part 31 Floodplain permit is not required for this project.

A review of the U.S. Fish and Wildlife Service endangered species listing identified several plants and animals listed for Iosco County. These species include the Piping Plover, Pitcher's Thistle, Kirtland Warbler and Eastern Massasauga. A review of these species and their respective habitats indicates that the construction of planned facility improvements at the Oscoda Township WWTP site will not endanger potentially sensitive ecosystems. The agency review request letters submitted and any letters received will be included in Appendix E of the final SRF Project Plan.

- **Existing and Future Quality of Surface Water and Groundwater**

A primary goal of the proposed improvement project is to provide and maintain reliable wastewater treatment service in compliance with the Rule 2218 groundwater discharge permit issued for the Oscoda Township WWTP. Implementation of this project will achieve compliance with the MDEQ permit requirements and improve the quality of treated effluent that is discharged from the Oscoda Township WWTP. Therefore, the proposed project is not anticipated to cause changes to the quality of nearby surface or groundwater other than ultimately improving the quality of these resources.

- **Consumption of Materials, Land, Energy & Construction and Operation**

Construction materials, public funds, energy and manpower will be consumed to construct and operate the proposed wastewater treatment system improvements. There is not currently known to be a shortage of these items nor is it expected that a shortage of these important project elements will result from implementing this project.

The only chemicals used during the construction of the improvements would be fertilizers used after the seeding and mulching of disturbed areas from the construction operations and installation of new piping, structures and/or equipment.

Energy (both electrical and fossil fuels) will be used during construction of the improvements. Upon implementation of the improvements, electrical energy use will decrease due to the more efficient aeration supply system that will be installed to achieve improved wastewater treatment process performance and facility operations.

- **Human, Social and Economic Impacts**

There will be no dislocation of people during construction of the proposed improvements. Minimal impact to residents is anticipated because a majority of the construction work would occur at the Oscoda Township WWTP site which is located in a relatively remote location and any activities will be coordinated to minimize local traffic impacts. Access to neighboring residential, industrial and/or commercial buildings and businesses will be maintained during the construction process.

It is possible that employment of local residents occurs by the contractor(s) who ultimately perform the construction work at the Oscoda Township WWTP site. It is also possible that local contractors are selected to perform the work. While the extent and duration of the construction work is relatively limited, this is a potential positive social and/or economic impact resulting from this project.

Another important related human, social and economic impact resulting from the project is the fact that sanitary sewer rates will be increased to pay for the MDEQ required wastewater treatment system improvements. The issue of utility rate increases is often difficult and this issue will be a challenge to effective educate and support the need for the project.

- **Construction and Operational Impacts**

A minor impact on local traffic may occur during the construction of the proposed wastewater system improvements. During the construction period, heavy equipment will increase local noise and dust levels during operations and a minor impact to traffic from construction workers and trucks delivering materials to the site. There will be a short-term adverse impact on air quality during the construction phase resulting from dust and construction equipment emissions generated during the excavation operations performed for installing piping and structures. However, the Oscoda Township WWTP site is relatively remote and adequately isolated from residential or business areas of the service area.

Since the Oscoda Township WWTP improvements will occur at an operational facility, there will need to be careful planning to efficiently realize the scope of construction while assuring that the existing system can safely and effectively process wastewater generated by the community. The improvement construction sequence or phasing plan will be developed as part of the detailed engineering and design phase of the project.

2. Indirect Impacts

Indirect impacts are those impacts caused by the proposed improvement project but that are removed in time and/or distance. Indirect impacts are often secondary in nature and are generally caused by residential and/or commercial development that is made possible by the project. Examples of indirect impacts include undirected growth including additional traffic, over-extended police and fire protection, or heavy financial burden on existing and future residents for the cost of the water system facilities. It is not expected that the proposed project would cause any significant undirected growth that would result in changes to zoning, population density, or types of developments found throughout the Oscoda Township WWTP service area, including residential, commercial and industrial areas.

Transportation and infrastructure is already in place within the Township's current sanitary sewer service area and the proposed wastewater treatment system improvements will only

serve to enhance the Township's existing municipal infrastructure by restoring the long-term capability of the wastewater treatment facility.

The proposed project will not result in any changes in anticipated land use that are not already defined in the Township's Zoning Map.

There are no anticipated indirect impacts resulting from changes to the existing natural setting adjacent to the Oscoda Township WWTP. Operation of the facility is not anticipated to result in any indirect impacts to sensitive ecosystems or jeopardize any endangered or threatened species resulting from potential secondary growth.

There are no anticipated changes in air or water quality stemming from any primary or potential secondary development as a result of the improvements since any additional commercial and/or industrial development would be subject to the Township's existing zoning requirements.

Since the ultimate source potable water supply is from Lake Huron, there will be minimal additional groundwater consumption over the useful life of the facility due to the projected annual growth of the Oscoda Township WWTP service district. No additional generation of wastes is anticipated as a result of the proposed project.

3. Cumulative Impacts.

There are no anticipated cumulative impacts that would increase in magnitude over time or result from individually minor, but collectively significant actions of the project. There is no anticipated new infrastructure proposed in conjunction with the proposed wastewater system improvements.

VI. MITIGATION

A. General

It is important that structural and non-structural measures which avoid, eliminate or mitigate adverse impacts on the environment be identified in the project plan. Where applicable, the cost of mitigation is considered during the financial analysis and included in the unit costs and lump sum prices developed during the capital cost evaluation for the principal alternatives.

The structural measures involve the specific design and construction of the improvements while the non-structural measures would involve regulatory, institutional, governmental or private plans, policies or regulations imposed on or by the Township. Mitigation of short-term, long-term and indirect impacts must be considered in the Project Plan and as presented in this section.

B. Short-Term Construction-Related Mitigation

- **Traffic and Safety Hazard Control**

  Traffic control and maintaining access to homes and businesses will be the responsibility of the contractor. However, access to all homes and businesses will be maintained and emergency vehicle access will be ensured throughout the duration of the construction project. If applicable, residents will be notified when construction work is scheduled in their area. In the event it is necessary, traffic detour signs and flag control will be incorporated to provide non-local traffic with the information they need to navigate the construction site and to travel safely.

  Construction site safety is the responsibility of the contractor. The contractor will be required to have only trained persons performing all phases of the work. The contractor will also be required to comply with the Occupational Safety & Health Act (OSHA), including using back-up alarms on all equipment, having employees trained in hazard control and maintaining safety data sheets (SDS) for materials that may be used and/or handled by construction personnel.

- **Dust Control**

  Construction activities will result in increased dust in the vicinity of the Oscoda Township WWTP site during the length of the proposed construction. Mitigation measures to minimize the negative effect of dust on residents and construction workers will be defined in the project specifications. It is anticipated that dust control will be provided by the application of water and/or dust palliative during dry and dusty periods. The contractor will be required to control dust in accordance with methods described in the project specifications.

- **Noise Control**

  Noise levels will increase temporarily during construction of the proposed improvement project. Construction activities will only be allowed during those hours approved by the Township and would be subject to all local noise control ordinances. Construction workers and site visitors may be required to wear earplugs to minimize the effects of long-term noise during the construction operations.

- **Soil Erosion/Sedimentation Control**

  The contractor will be required to obtain a soil erosion and sedimentation control permit from the local agency prior to the start of the work. It is anticipated that mitigation measures that may be utilized will include silt fence, straw bails, rip rap, geotextile fabric and other such methods, as appropriate, based on the type of construction and the location where the work occurs.

- **Restoration of Disturbed Areas**

  As previously stated, the project specifications will require the contractor to provide and maintain access at all times to homes and businesses. Traffic control, including signage and flag persons must be provided when necessary. Restoration of disturbed areas will also be defined in the project specifications. Restoring disturbed lawn areas, roadways, existing utilities, etc. will be completed in a timely fashion and in accordance with the project specifications.

C. Mitigation of Long-Term Impacts

- **General Construction**

  Mitigation measures would be developed through the project specifications to ensure that sensitive environments or special components of the existing infrastructure or facility site do not suffer permanent damage. Every effort will be made to avoid potential long-term or irreversible adverse impacts during the construction of the wastewater treatment system improvements. For example, any work that may have the opportunity to harm or compromise the existing lagoon treatment cell composite liner system will be clearly defined with competent oversight required.

  The construction work performed at the Oscoda Township WWTP site will incorporate "best management practice" methods for installing pipelines or disturbing the earth. Wetland, floodplain, and inland stream mitigation would be handled through the permit process where necessary. In this case, no impacts to inland lakes and streams, wetlands or the Au Sable River floodplain is expected. In the event that impacts cannot be avoided, appropriate wetland mitigation measures will be used. The design and project specifications will include the proper use of physical measures to reduce soil erosion to a manageable level and any disturbed slope areas will be immediately seeded, mulched or sodded to prevent soil erosion and/or sedimentation.

- **Site and Routing Decisions**

  All construction activities proposed by the selected alternative are located within the existing Oscoda Township WWTP site. Where traffic must be re-routed for construction, the Township will work closely with MDOT and state authorities to develop detours within urban areas.

- **Operational Impacts**

  The Oscoda Township WWTP site is located west of the community downtown area and at the southern end of the Wurtsmith AFB and largely removed from the populated areas to provide both a visual buffer and dissipation of odors. The wastewater treatment site has been operational in various forms for several decades and continued operation is not anticipated to result in a negative long-term impact to the community and adjacent natural resources.

  The potential impact related to the continued discharge of treated wastewater effluent generated by the Oscoda Township WWTP has been evaluated by the Permits Section, MDEQ. The effluent and groundwater monitoring limitations established by the MDEQ in the modified groundwater discharge permit are based on this evaluation and are acknowledged by the MDEQ to be appropriate for the Oscoda Township WWTP upon completion of the proposed project. Therefore, the wastewater system improvements will provide long-term protection of the environment.

D. Mitigation of Indirect Impacts

The most effective way of mitigating unrestricted growth in any community is proactive creation of zoning districts and effective enforcement of that zoning. The Charter Township of Oscoda has zoning in place and officials have historically had a significant role in the development of the Township. Unrestricted growth is not anticipated with or without the proposed project.

VII. PUBLIC PARTICIPATION

A Public Hearing for the final SRF Project Plan is scheduled on June 16, 2014. Routine public information and awareness regarding the need for this project has continued during the MDEQ permit negotiation process. The Public Hearing will discuss the need for the improvement project, the principal alternatives, environmental impacts, description of the recommended alternative and associated cost estimates and user charge and a schedule of the proposed project. A copy of the public hearing transcripts are included in Appendix G.

A. Public Meetings on Project Alternatives

A public meeting was held on November 11, 2013 at Charter Township of Oscoda offices to discuss the need for wastewater system improvements and to review the various alternatives under consideration.

B. The Formal Public Hearing

A formal public hearing on wastewater improvement project alternatives and user costs will be held at the Charter Township of Oscoda offices.

1. Public Hearing Advertisement

The SRF Project Plan Public Hearing will be advertised in the Iosco County News-Herald and Oscoda Press, which is the local newspaper for the Oscoda and Au Sable community area 31 days prior to the public hearing date. A copy of the public hearing notice and affidavit of publication of the advertisement are included in Appendix G.

A copy of the SRF Project Plan will be made available to the public for a 31-day period at the Charter Township of Oscoda offices in Oscoda. At this time, no public comments have been received regarding the draft Project Plan or the recommended alternative.

2. Public Hearing Transcript

A verbatim transcript of the public hearing, recorded by a certified court reporter, is included in Appendix G.

3. Public Hearing Contents

The following items will be discussed at the public hearing:

- Project background
- A description of the wastewater treatment and collection system needs and problem areas.
- A description of the principal alternatives considered.
- A breakdown of capital costs and OM&R costs for each of the principal alternatives.
- Proposed method of financing.
- Comparison of environmental impacts for the principal alternatives.
- Recommended Alternative.
- Proposed monthly user costs for implementation of the Recommended Alternative for the average residential customer.

4. Comments Received and Answered

The public hearing attendees include the Charter Township of Oscoda Board of Trustees members, the Township Superintendent, the Township's Economic Development Manager and various members of the general public. A copy of the sign-in sheet for the Public Hearing will be included in Appendix G. Any comments received by the Township during the public comment period or during the public hearing will be included in Appendix G.

Alternative No. 4 will be presented as the Recommended Alternative. The Charter Township of Oscoda Board of Trustees selected this alternative at the Public Hearing.

5. Adoption of Project Plan

The official period for receiving comments will end at the close of the formal public hearing. After the close of the public comment period, the recommended alternative will be selected for implementation by the Charter Township of Oscoda Board of Trustees. A copy of the Township's resolution to adopt the SRF Project Plan and to implement the selected alternative will be included in Appendix G.