SAW Grant Summary – City of Traverse City

What is a SAW Grant?

SAW stands for **S**tormwater, **A**sset Management, and **W**astewater. This is a new grant program administered by the Michigan Department of Environmental Quality (MDEQ) to help communities enhance their understanding of the physical condition of their wastewater and stormwater infrastructure and to plan effectively for long-term capital improvements, operation, and maintenance of their sanitary and storm sewer systems.

How does the SAW Grant Impact the City of Traverse City?

The City of Traverse City has an opportunity to use up to $2 million in SAW Grant funding to develop Asset Management Plans for the City's stormwater and wastewater infrastructure. This work will allow the City to address deteriorating infrastructure while leveraging the grant funds to cover sewer cleaning and televising work that the City would otherwise pay out of its own budget. Furthermore, this grant will allow the City to explore options for new funding sources for its stormwater infrastructure, thereby providing a mechanism for the City to address its growing backlog of projects intended to reduce flooding risk, improve stormwater quality, and enhance public safety.

What Activities is the City Planning to Implement?

Wastewater

- Enhance GIS mapping of collection system
- Sewer cleaning and televising
- Manhole inspections
- Pump station evaluation
- Collection system evaluation and prioritization to identify maintenance and rehabilitation needs
- Flow metering and wet weather modeling
- Evaluate long-term infrastructure maintenance and capital needs
- Rate Study

Total Program Cost:	$1.00 million
State Reimbursement:	$819,000
Local Match:	$181,000

Stormwater

- Enhance GIS mapping of drainage system
- Determine hydraulic bottlenecks and identify critical projects
- Sewer cleaning and televising
- Investment in hardware/software to enhance Asset Management
- Evaluate stormwater quality issues and identify pollution-reducing enhancements
- Evaluate long-term infrastructure maintenance and capital needs
- Review stormwater costs and revenue options

Total Program Cost:	$1.44 million
State Reimbursement:	$1.18 million
Local Match:	$263,000

The US EPA is considering a new national policy that could require Traverse City to participate in the MDEQ's stormwater permit program. *This grant will help the City prepare for this scenario.*

How Long will it Take?

The SAW Grants require that the activities described above be completed *within three years* of the grant award, which could come as early as April 2014. The City must submit the SAW Grant Applications ***on or before December 2, 2013*** to be eligible for the program. We anticipate heavy demand for this grant program, so submitting early is critical.

What Action is Required by Council?

A SAW Grant Resolution for each grant must be approved by City Council in November. The resolutions will commit the City to the local matches as described above, and the requirement to complete all grant-funded activities *within three years*. The approved and signed Grant Resolutions are a required component of the grant application. By accepting grant money, the City is also committed to perform an evaluation of system costs and revenues, including the identification of any funding gaps for the wastewater system. If a funding gap exists, the City will need to make significant progress to close the funding gap within three years of grant acceptance.

City of Traverse City
SAW Grant Scope Outline
Stormwater Asset Management Plan (AMP)

1. Inventory
    a. Grant application: prepare a SAW Grant Application, including coordination between City and consultant, obtain vendor quotes, and prepare all required materials.
    b. Review GIS database and identify data needs. Determine key gaps in storm system data and use this information to identify locations for sewer survey. Also identify additional attributes required to complete the Asset Management Plan.
    c. Perform a field survey of manhole structures to add critical information such as rim elevations, invert elevations, confirm pipe sizes, and determine system connectivity. Based on GIS data available, additional information is required for 1,200 manholes.
    d. Import the survey data into the GIS database for the storm sewer system.
    e. Update the GIS as necessary to include new attributes as deemed necessary to complete the Asset Management Plan.
    f. Research as-built drawings and other historical documents to determine pipe age and confirm pipe material. Enter the data into the GIS.

2. Condition Assessment
    a. Manhole Inventory (MACP): Perform physical inspections of storm sewer manholes within the stormwater collection system. It is anticipated that approximately 900 manholes will be inspected as part of this effort (about 75% of the total system).
    b. Catch Basin Evaluation: Perform a physical inspection of existing curb inlets and catch basins. This evaluation will cover the overall structural condition and will include the physical evaluation of approximately 1,800 catch basins.
    c. Asset Management Plan
        i. Import CCTV and manhole inspection data into storm sewer GIS database. Use these ratings to establish a Risk of Failure variable to be assigned to each component.
        ii. Work with City staff to determine appropriate characteristics to use to establish a Consequence of Failure variable. Characteristics may include: population served, roadway traffic impacted during system repair, potential for flooding, etc.
        iii. Using the Risk/Consequence factors, establish a priority ranking ("Criticality Index") to be used to develop a list of repair/replacement/rehab needs.
        iv. Using the roadway (PASER) and sanitary sewer pipe ratings, use GIS to determine where coincidental high priority areas exist and add these to the list of Early Action Projects to be added to the Capital Improvement Plan.
        v. Develop a Deterioration Forecasting Model based on current asset condition, depth, material, and age. This will be used to forecast system repair/rehab/replacement needs.
        vi. Provide recommendations for future (ongoing) system inspection needs, including CCTV, detention pond inspection, BMP inspection, bridge/culvert inspections, and streambank inventories.

3. Metering / Modeling
    a. Develop hydrologic and hydraulic models for the City's stormwater collection system. The hydrologic component will be based on drainage areas already delineated in the 2007 Stormwater Management Report. The hydraulic model will

be developed using the existing GIS data available for the storm sewer system, supplemented with survey data collected in Task 1 (Inventory).

i. EPA SWMM or XP-SWMM will be used to conduct the modeling effort.
ii. NOAA Atlas 14 rainfall data will be used to establish peak flow rates for the modeling effort.
iii. Runoff hydrographs will be calculated for storms ranging from the 1-year through the 100-year recurrence interval events.
iv. Existing storage facilities, such as detention ponds, will be included in the model.
v. The hydraulic model will focus on the main components of the storm sewer system (primarily for sewers 18-inch diameter and larger). The hydraulic model will be expanded to areas identified as flood-prone or problematic as determined in Task 6 (Level of Service).

b. Use the hydraulic model to determine where hydraulic deficiencies exist.
   i. Calibrate the model to observed conditions where observations are available.
   ii. Prepare hydraulic profiles for all studied reaches and determine where surcharge may result in unacceptable Level of Service.
   iii. Prepare figures and maps that show undersized sewers and culverts.
   iv. Any open channel components of the stormwater collection system will be modeled under the SAW Stormwater Management Plan (SMP) Grant (see details in the SMP scope). The modeling effort for enclosed and open systems will be closely integrated so as to minimize modeling costs.
c. Upon the completion of the modeling effort, transition the hydrologic/hydraulic model files to City staff and conduct staff training on the model to ensure sufficient local understanding of the model structure and capabilities.

4. Purchase GIS and Asset Management Software and Hardware
   a. Purchase CUES Granite XP (software). The City uses CUES Granite XP for taking video inspection of its wastewater and stormwater collection systems. The City proposes to purchase Granite XP GIS interface module to simplify the process for Field Crews, GIS Professionals, and the Asset Management Team. Field Crews are certified by NASSCO's Pipeline Assessment and Certification Program (PACP). The Field Crews will have digital maps in the truck and will have the ability to associate all inspection to the actual feature inside of the ESRI GIS database. Correction, inspection, and reports can be stored on these features for future analysis of each system by simply clicking on the pipe and starting an inspection. The condition of each feature will be captured for the groundwork for a asset management plan.
   b. Purchase Novotx Elements XS GIS-Based Asset and Work Order Management System (software). Novotx Elements combines Asset Management with GIS integration and Web Based Technology. As a GIS-Based Asset and work order management system, Elements will integrate with the City's current GIS. This will allow the City to track labor, material and equipment for maintenance along with tracking cyclical required inspections through work orders. Work orders can be routed through different crews and departments at a different times while relating back to the parent work order, which totals all job cost information and displays task summary details. The City will be able to track these work orders on a map, which can be directly integrated to features in our GIS. This will be the foundation for Asset Management and will continue to give the City the information needed to create a capital improvement plan. There is also a inventory management system

that manages job costs, tracks stock levels, produces purchase orders and itemizes receipts. Elements can be used on iPads and Android tablet devices.

c. Purchase MTEC GPS Mapping Stick (hardware). The GPS Mapping Stick is a GPS that directly connects to our camera for inspections. With this technology all Sanitary, Storm, and wye locations and conditions will be capture with sub meter accuracy. The City will have the actual locations of pipes that were entered into the database utilizing manhole to manhole digitizing techniques. The condition assessment along with precise location can be captured simultaneously.

d. Purchase Trimble GeoXH 6000 Precision Laser/Instrument (hardware). The GPS Mapping Stick is a GPS that directly connects to our camera for inspections. With this technology all Sanitary, Storm, and wye locations and conditions will be capture with sub meter accuracy. The City will have the actual locations of pipes that were entered into the database utilizing manhole to manhole digitizing techniques. The condition assessment along with precise location can be captured simultaneously.

5. Sewer Cleaning and Televising (PACP ratings)
   a. Based on the City's existing GIS database, the total length of enclosed storm sewers is about 340,000 lineal feet. The cleaning and CCTV effort will focus primarily on storm sewer mains 15 inches and larger in diameter, not including short reaches between catch basin inlets an the main lines. The total amount of storm sewer to be televised under this grant is 150,000 lineal feet, or about 45% of the total system.
      i. Based on estimates received from a cleaning/televising contractor (quote included with this grant application), the following costs are assumed for storm sewer pipe cleaning and televising:

Sewer Size Class	Unit Price	Quantity	Total
18" and smaller	$3.40	60,000 LF	$204,000
21" – 27"	$4.10	45,000	$184,500
30" – 42"	$5.10	35,000	$178,500
48" and up	$2.30	10,000	$23,000
		Total	**$590,000**
		Total (with 10% contingency)	**$649,000**

   b. Cleaning/CCTV Contract Administration: throughout the duration of the storm sewer cleaning and CCTV project, coordinate with the contractor to ensure the following:
      i. Conformance to PACP methodology
      ii. Ensure data is collected, coded, and stored such that it can be transferred to the City's GIS environment
      iii. Review pay requests and provide recommendations for payment
      iv. Provide assistance to identify locations of sewers to be televised
      v. Provide assistance to identify alternate sewer reaches to televise in the event that the contractor encounters sewers that are difficult or impossible to inspect due to debris buildup or structural failure
   c. Transfer the MACP sewer condition coding into the City's GIS.

6. Level of Service Evaluation
    a. Use an online survey tool, such as SurveyMonkey, to solicit additional City-wide feedback. Geocode the results of the survey (in addition to the feedback from the public meetings) to create a problem area map. This map will be used to determine the appropriate areas for additional modeling/analysis.
    b. Organize 2 public meetings to receive feedback from residents on flooding problem areas. These meetings will also be used to discuss appropriate Level of Service (i.e. flood protection) for the City's stormwater collection system. In the interest of efficiency, these public meetings will be held in conjunction with the stakeholder meetings identified in the Stormwater Management Plan.
    c. Evaluate ordinance changes necessary to meet local needs and provide an adequate Level of Service for present and future needs. These changes will likely address:
        i. Changes to sewer pipe capacity and flood control
        ii. Changes to stormwater detention requirements to address flood control and stormwater quality concerns
        iii. Changes to development/redevelopement requirements to address stormwater quality
        iv. Tracking and enforcing public/private stormwater BMP maintenance
        v. Modifications to adapt the City's local rules to meet eventual MDEQ MS4 permit rules, assuming the US EPA policy will bring Traverse City into the program.
    d. Capital Improvement Plan (CIP)
        i. Using the data from the modeling effort and the initial output from the Asset Management Plan, develop a 5-10 year CIP to address the more critical projects. Prepare planning-level construction cost estimates.
        ii. High priority projects identified in the Stormwater Management Plan, including known capital needs for detention ponds, drainage channels, and bridges/culverts will be included for a system-wide tabulation of capital needs for all stormwater-related infrastructure.

7. Rate Study / Revenue Recommendations
    a. Review all existing capital and O&M costs related to the City's storm sewer assets, including those costs identified in the Stormwater Management Plan. This will result in a comprehensive set of system needs for both enclosed (piped) and open (drainage channels, ponds) that the City can use to determine total system revenues necessary to address its stormwater infrastructure. This will include a tabulation of costs for the following system components:
        i. High Priority Capital Improvement Needs from the AMP
        ii. High Priority Capital Improvement Needs from the SMP
        iii. Annual maintenance/repair needs identified in the AMP
        iv. Annual maintenance/repair needs identified in the SMP
    b. Identify annual funding needs based on costs determined above.
    c. Develop a 10-year cash flow plan to address the needs identified above.
    d. Review available funding alternatives:
        i. Local taxes
        ii. Special Assessment Districts
        iii. Development review fees / impact fees
        iv. Stormwater user fees/taxes (assume result of Jackson case would require a referendum for a new user fee or tax)
    e. Develop a preliminary Rate Model for determining appropriate and equitable fees/taxes.
    f. Identify the top 10-12 ratepayers based on measured impervious area by parcel.

g. Establish a Stormwater Advisory Group (12-16 members), comprised of key ratepayers and other stakeholders.
    i. Meet 5-6 times
    ii. The group will become familiarized with the City's stormwater infrastructure and will learn about the current needs and funding issues.
    iii. The group will explore funding options and discuss program priorities.
    iv. The group will develop non-binding policy recommendations to the City Council on appropriate stormwater funding and will help to set a path toward a ballot referendum* on the stormwater fee/tax option.
h. Develop revenue recommendations and prepare a Funding Option Summary Memorandum.
i. Prepare Scope and Fee Estimate for Revenue Implementation, including PR-related services necessary to prepare for a ballot referendum*.

* *Based on the Jackson decision making their Stormwater User Fee an "illegal tax", it is assumed that any dedicated funding structure for stormwater will need to go through a referendum in order to satisfy the Headlee Amendment and prevent legal challenges. The actual strategy toward revenue development may depend on whether enabling legislation (a law specifically allowing for the establishment of stormwater user fees) is introduced and passed by the Michigan Legislature.*

City of Traverse City
SAW Grant Scope Outline
Stormwater Management Plan (SMP)

Summary of Project Goals:

The Stormwater Management Plan (SMP) will address the components of the City's drainage system that are not covered by the Asset Management Plan (AMP). This is necessary to determine the City's potential obligations for future maintenance and repair of County Drains, detention ponds, and other critical elements of the stormwater collection infrastructure. Although the AMP covers the enclosed (i.e. piped) components of the stormwater infrastructure, the SMP will cover the remaining components that may impact long-term financial commitments. This SMP would provide the City with detailed information on the functionality, hydraulic capacity, surface water quality, and maintenance needs for the open drainage systems, culverts and bridges throughout the City.

Stormwater system deficiencies will be identified and mitigation measures determined along with associated planning-level cost opinions. The SMP will also provide the City and its residents with necessary information to prioritize future projects. It will also allow the City to further regulate stormwater quantity ***and*** quality for development projects in order to protect the quality of water tributary to Grand Traverse Bay. Upon completing the SMP, the City will have the following information:

- Detailed understanding of stormwater conveyance patterns, hydraulic restrictions, and necessary upgrades to protect against flooding. This will supplement the proposed system modeling performed as part of the AMP.
- Review of existing watershed plans and identification of goals/projects that remain unfulfilled.
- Identification of potential sources of stormwater pollution and recommended improvements to enhance stormwater quality.
- Enhanced public education on stormwater conveyance and water quality issues.
- Enhanced understanding of long-term maintenance needs to maintain an adequate level of service.

1. Identify Baseline Conditions
    a. The public meeting and survey data collected as part of the AMP will be used to provide information on existing problem areas and expected Level of Service (LOS) for the City's system of open drainage channels and detention ponds. Review the Grand Traverse Bay Watershed Master Plan and the Boardman Lake Watershed Study. Each of these plans are over 10 years old and will require some updating in order to meet current needs and to identify the latest trends in stormwater management for water quality purposes.
        i. This Stormwater Management Plan will also place a focus on the Kids Creek Watershed along the west side of Traverse City. As part of the Kids Creek evaluation, it will be necessary to perform some hydrologic and hydraulic modeling to determine baseline conditions. Existing 2-foot contours and aerial photography will be used to confirm watershed boundaries and estimate runoff hydrographs. Much of the hydrologic modeling for this task will have already been performed as part of the Asset Management Plan.
    b. Review the City's 2007 Stormwater Management Report. Identify specific recommendations that have not yet been implemented.

c. Prepare for and attend a Stormwater Management Plan Kickoff Meeting. This meeting will include attendees from the City of Traverse City, as well as interested local stakeholders, including The Watershed Center – Grand Traverse Bay (WCGTB).

2. Asset Evaluation – Open Channels and Shoreline
    a. Identify key drainage courses that have a significant impact on the City's stormwater assets. The key focus of this study will be approximately 3 miles of Kids Creek (and its tributaries) within City limits.
    b. Perform Streambank Inventories along the Kids Creek and its immediate tributaries (assume up to 3 miles of streambank inventory). Establish a rating system for inventoried drainage courses (Unified Stream Assessment or similar).
        i. Identify sedimentation / erosion/scour at bridges and culverts along the channel reaches assigned for the Streambank Inventories.
        ii. Dimensions, materials, and overall conditions of culverts within the 3-mile reach selected for the Streambank Inventory. Pipe condition ratings for culverts will be based on FHWA criteria. This evaluation will include the presence of sediment buildup or other debris that may reduce the intended hydraulic capacity.
    c. Channel cross section survey: this will be necessary for hydraulic modeling. Cross sections will typically be measured at 500-foot intervals, with additional cross sections as necessary near bridges/culverts and at transitions in channel cross section. Cross section survey will be limited to the main channel only (top of bank to opposite top of bank). Existing 2-foot contours will be used to supplement survey data in order to define the floodplain where necessary. This survey will be conducted along the 3-mile reach identified for the Streambank Inventory.
    d. Inspect approximately 2.3 miles of shoreline along the north half of Boardman Lake (within City limits) for evidence of erosion, illicit discharges, unstable banks along the shoreline, and other physical characteristics that could impact water quality. Establish a shoreline rating system (similar to the streambank rating referenced above) and assign ratings through the studied reach.
    e. The following stream data will be transferred to the City's GIS database:
        i. Streambank condition rating
        ii. Shoreline condition rating (Boardman Lake)
        iii. Photos of severe erosion areas, hydraulic blockages, dry weather illicit discharges (if encountered), and all bridges and culverts along the studied reaches
        iv. Condition rating for culverts

3. Capacity Analysis – Open Channels
    a. Quantify the response of Kids Creek and hydraulic structures along the creek to wet weather events. This includes hydrologic and hydraulic modeling of the creek within City limits, including associated bridges and culverts. The results from this effort can be used by the City to prioritize future projects to address hydraulic deficiencies and can also be used to verify where hydraulic conditions may present water quality problems (via channel erosion and increased sediment pollution). Specific efforts include:
        i. Incorporate the open channel hydraulic analysis into the hydrologic/hydraulic model created as part of the AMP. This will tie the two models (open and closed systems) together for a more comprehensive and coherent City-wide model.

ii. Identify areas of known concern based on the hydraulic modeling effort, including:
    1. Hydraulic deficiencies that may cause flooding
    2. Reaches with excessive flow velocities and erosion potential (stormwater quality concern).
iii. Floodplain evaluation: use the hydraulic model to verify the 100-year flood profile and floodplain along Kids Creek. South of Seventh Street, the Kids Creek floodplain is Zone A (approximate). Additionally, the existing (official) floodplain is based on a 1982 Flood Insurance Study, now over 30 years old. Given the large footprint of the floodplain and the impact of future land use in the southwest area of the City, more accurate floodplain estimates will allow the City to better manage future land development.

4. Water Quality Considerations
    a. In addition to the stormwater conveyance needs identified above, this task will focus on specific opportunities to address subwatershed water quality concerns as defined in the 2003 watershed plans described in this scope. Key subwatersheds of concern will be identified. These areas will be a focus for recommended stormwater BMP planning.
    b. Up to 3 stakeholder meetings will be held to discuss existing stormwater quality issues. These meetings will be used to establish a set of key goals that will serve to assist in the location and selection of structural and non-structural BMPs. In the interest of efficiency, these meetings will be held in conjunction with the public meetings identified in the Stormwater Asset Management Plan.
    c. The Kids Creek and Boardman Lake watersheds, as well as areas along the east side of the City, experience water quality problems primarily related to Total Suspended Solids (TSS), nutrients, and elevated bacteria levels resulting from urban runoff and channel erosion. Proposed capital improvements will focus on:
        i. Reducing unnatural sediment transport through streambank stabilization, lake shoreline stabilization, retrofits to developed areas (especially in and around downtown Traverse City).
        ii. Retrofitting existing detention ponds to enhance stormwater quality.
        iii. Identify locations with an elevated risk of stormwater pollution.
        iv. Updating local stormwater guidelines to favor Low Impact Development design techniques and meet anticipated NPDES Phase II stormwater requirements (to which Traverse City may be subject if US EPA policies are enacted).

5. Capital Improvement Plan (CIP)
    a. Develop a set of capital improvement projects for each deficiency or problem area. In some instances, multiple options for each deficiency may be developed.
        i. Modeling and/or calculations will be provided to verify the projects will function as intended.
    b. Develop planning-level opinions of project cost for recommended projects.
    c. Prioritize projects for short-term (i.e. 3-5 year schedule) and long-term (5-10 year schedule).
    d. Coordinate the CIP with the Stormwater Asset Management Plan in order to provide a system-wide calculation for stormwater infrastructure investment needs.

City of Traverse City
SAW Grant Scope Outline
Wastewater Asset Management Plan (AMP)

1. Inventory
    a. Review GIS database and identify data needs. Determine key gaps in the wastewater collection system data and use this information to identify locations for sewer survey. Also identify additional attributes required to complete the Asset Management Plan.
    b. Perform a field survey of manhole structures to add critical information such as rim elevations, invert elevations, confirm pipe sizes, and determine system connectivity. Based on GIS data available, additional information is required for about 20% of the sanitary system manholes, or about 390 manholes.
    c. Import the survey data into the GIS database for the sanitary sewer system.
    d. Update the GIS as necessary to include new attributes as deemed necessary to complete the Asset Management Plan.
    e. Research as-built drawings and other historical documents to determine pipe age and confirm pipe material. Enter the data into the GIS.

2. Condition Assessment
    a. Manhole Inventory (MACP): Perform physical inspections of sanitary sewer manholes within the City's wastewater collection system. It is anticipated that approximately 1,000 manholes will be inspected as part of this effort (about 50% of the total sanitary sewer system).
    b. Pump Station Evaluation: The City owns and operates eight (8) pump stations. Each pump station will be physically evaluated to determine the structural condition of the substructure (i.e. wet wells or pits), condition of the pumps/motors, and the condition of control systems.
    c. Forcemain Evaluation: Much of the City's wastewater collection system relies on a network of pump stations and forcemains. Many of the forcemains are aging and the structural condition of these forcemains is unknown. Six (6) locations will be selected to evaluate the internal and external condition of key forcemains. This work will include the following:
        i. Excavate to the forcemain and evaluate exterior pipe condition.
        ii. Where possible, dewater forcemain and cut a section from the forcemain to allow for internal (CCTV) inspection. This process may require bypass pumping. CCTV inspections will be performed using PACP methodology. Although it is not expected that the entire length of forcemain will be evaluated during this process, the video inspection will provide an adequate sampling of the forcemain condition, and a decision can be made relative to rehabilitation or replacement.
    d. Asset Management Plan
        i. Import CCTV and manhole inspection data into sanitary sewer GIS database. Use these ratings to establish a Risk of Failure variable to be assigned to each component.
        ii. Work with City staff to determine appropriate characteristics to use to establish a Consequence of Failure variable. Characteristics may include: population served, roadway traffic impacted during system repair, potential for basement backup, etc.
        iii. Using the Risk/Consequence factors, establish a priority ranking ("Criticality Index") to be used to develop a list of repair/replacement/rehab needs.

iv. Using the roadway (PASER) and sanitary sewer pipe ratings, use GIS to determine where coincidental high priority areas exist and add these to the list of Early Action Projects to be added to the Capital Improvement Plan.
v. Develop a Deterioration Forecasting Model based on current asset condition, depth, material, and age. This will be used to forecast system repair/rehab/replacement needs.
vi. Provide recommendations for future (ongoing) system inspection needs, including CCTV, detention pond inspection, BMP inspection, bridge/culvert inspections, and streambank inventories.

3. Metering / Modeling
    a. Temporary Flow Metering: The City of Traverse City experiences higher than normal baseflows, with monthly averages well above the EPA-established level of 120 gpcd which defines excessive baseflow. Since metering is currently limited to the treatment plant and current documented flows are calculated on a monthly basis, it is not known where the key sources of inflow/infiltration are in the City's collection system or how the system flows peak during wet weather. The work under this scope will include the installation and monitoring of flows under varying antecedent moisture conditions, on an hourly (or sub-hourly) basis, so as to determine wet weather response and to develop appropriate hydrologic parameters to model the main components of the collection system under design flow conditions in order to determine Level of Service.
        i. Install 8 temporary flow meters and a rain gage for a duration of 6-9 months. The meters will be installed at existing pump stations within the City's collection system. This will allow for the capture of local sewer flow response under varying antecedent moisture conditions. Download meter and rain gage data at a 2-week interval.
    b. Develop hydrologic models for each metered district. The Antecedent Moisture Model (AMM) will be used to calibrate the rainfall derived inflow and infiltration (RDII). The calibrated models will be used to calculate 10-year and 25-year recurrence interval peak flows by applying the calibrated models to long-term rainfall and temperature data.
        i. Analyze baseflows and calculate capture coefficients for each metered district to confirm the source(s) of elevated baseflows and higher wet weather flow responses. This will be used to prioritize future sewer investigation and potential rehabilitation efforts.
    c. Develop a hydraulic model of the main components of the wastewater collection system, focusing on the trunk system for which flow meter data will be available. The hydraulic model will be run against the 10-year and 25-year recurrence interval flow events as defined in the hydraulic model.
        i. Prepare a Technical Memorandum summarizing the hydrologic responses and hydraulic performance of the wastewater collection system. Note specific problems relating to elevated baseflows and wet weather flows, and identify hydraulic deficiencies under design flow conditions.
    d. Upon the completion of the modeling effort, transition the hydrologic/hydraulic model files to City staff and conduct staff training on the model to ensure sufficient local understanding of the model structure and capabilities.

4. Purchase GIS and Asset Management Software and Hardware
    a. Specific hardware and software purchases are included as part of the Stormwater Asset Management Plan scope.

5. Sewer Cleaning and Televising (PACP ratings)
    a. Based on the City's existing GIS database, the total length of City-owned sanitary sewer is about 420,000 lineal feet. Of this sewer, about 50% has been cleaned and televised within the last 3-5 years. The cleaning and CCTV effort will focus on the remaining 50% of the system that is older than 20 years old and has not recently been cleaned and televised. This translates to a quantity of about 200,000 lineal feet.
        i. Based on estimates received from a cleaning/televising contractor (quote included with this grant application), the following costs are assumed for sanitary sewer pipe cleaning and televising:

Sewer Size Class	**Unit Price**	**Quantity**	**Total**
All sizes	$2.05	200,000 LF	$410,000
		Total	**$410,000**
		Total (with 10% contingency)	**$451,000**

    b. Cleaning/CCTV Contract Administration: throughout the duration of the sanitary sewer cleaning and CCTV project, coordinate with the contractor to ensure the following:
        i. Conformance to PACP methodology
        ii. Ensure data is collected, coded, and stored such that it can be transferred to the City's GIS environment
        iii. Review pay requests and provide recommendations for payment
        iv. Provide assistance to identify locations of sewers to be televised
        v. Provide assistance to identify alternate sewer reaches to televise in the event that the contractor encounters sewers that are difficult or impossible to inspect due to debris buildup or structural failure
    c. Transfer the MACP sewer condition coding into the City's GIS.

6. Level of Service Evaluation
    a. Organize 2 public meetings to receive feedback from residents on any areas of concern, focusing on basement backups. These meetings will also be used to discuss appropriate Level of Service for the City's wastewater collection system, including a discussion of the City's regulatory obligations for wastewater collection and treatment.
    b. Capital Improvement Plan (CIP)
        i. Using the data from the modeling effort and the initial output from the Asset Management Plan, develop a 5-10 year CIP to address the more critical projects. Prepare planning-level construction cost estimates. Projects to be considered may include:
            1. Pump station upgrades
            2. Forcemain rehabilitation / replacement
            3. Manhole rehabilitation
            4. New pumping/storage facilities (if deemed necessary during the modeling effort)
            5. Sewer replacement to address hydraulic deficiencies (if identified during the modeling process)

7. Rate Study / Revenue Recommendations
    a. Review all existing capital and O&M costs related to the City's sanitary sewer assets. This will result in a comprehensive set of system needs that the City can use to

determine total system revenues necessary to address its wastewater infrastructure. This will include a tabulation of costs for the following system components:

i. High Priority Capital Improvement Needs from the AMP
ii. Annual maintenance/repair/rehabilitation needs identified in the AMP

b. Identify annual funding needs based on the costs determined above, and prepare a 10-year cash flow plan to address the identified needs.
c. Review the long-term system needs in the context of the existing rate structure, existing debt, and existing fund balances. Determine if a funding gap exists, and, if so, prepare a 5-year plan to adjust sewer rates to meet the needs identified in the Asset Management Plan.

Total SAW Grant - City of Traverse City
SAW Grant Cost Summary

Wastewater AMP	$	1,000,944
Stormwater AMP	$	1,295,000
Stormwater Mgt. Plan	$	148,500
TOTAL	**$**	**2,444,444**
MDEQ Funding	$	2,000,000
Local Match	$	444,444

(max = $2 million, 90% on first million, 75% on second million)

MDEQ formula for first $1 million grant:

STATE MATCH / 0.9 = TOTAL PROJECT
$ 1 million / 0.9 = $1,111,111
Local Match = $111,111 on first $1 million of grant

MDEQ formula for second $1 million grant:

STATE MATCH / 0.75 = TOTAL PROJECT
$ 1 million / 0.75 = $1,333,333
Local Match = $333,333 on second $1 million of grant

Traverse City Match:	$	111,111	(from first million of state match)
	$	333,333	(from second million of state match)
	$	444,444	TOTAL

City of Traverse City

SAW Grant: Wastewater Asset Management Plan (AMP)

Task	Scope Item	Description	Approximate Cost	Notes/Assumptions
INVENTORY				
	1a	Review GIS database: identify data needs	$ 5,444	Wastewater AMP kickoff - City staff time to review GIS databased - identify needed attribute data
	1b	Survey sanitary manholes	$ 13,050	Obtain survey data to complete GIS mapping effort (assume 20% of manholes)
				30 manholes per day, 13 days (Utility Systems Specialist, 2-person crew)
	1c	Import data to GIS	$ 750	200 manholes per day, 2 days (GIS/Asset Management)
	1d	Update GIS attributes / add features	$ 3,200	Assume 2 weeks staff time (GIS/Asset Management)
	1e	Research sewer age (record drawings)	$ 2,500	Assume 2 weeks staff time (Engineering Aid) - populate GIS attribute table
	1	**TOTAL - INVENTORY**	**$ 24,944**	
CONDITION ASSESSMENT				
	2a	Manhole Inventory (MACP)	$ 100,000	Assume 50% of manholes (1,000) at $100 / MH, includes MACP coding into GIS
	2b	Pump Station Evaluation	$ 10,000	8 pump stations - review physical condition of pumps, control systems, wet wells
	2c	Forcemain evaluation	$ 72,000	Targeted CCTV: 6 locations to determine internal/external forcemain condition, $12K per site
	2d	Asset Management Plan	$ 65,000	Develop Risk of Failure / Consequence of Failure Database - Prioritize System Needs
	2	**TOTAL - CONDITION ASSESSMENT**	**$ 247,000**	
METERING / MODELING				
	3a	Temporary flow metering	$ 120,000	8 pump stations - temporary metering for 6-month period
	3b	Inflow/infiltration evaluation	$ 30,000	Identify RDII response for metered sewersheds (hydrologic calibration)
	3c	Identify hydraulic deficiencies (Tech Memo)	$ 25,000	Identify high risk areas for sewer surcharges
	3d	H/H Model Transition to City Staff	$ 5,000	Prepare XP-SWMM (or EPA SWMM) model for transition to City (including consultation with City staff)
	3	**TOTAL - METERING/MODELING**	**$ 180,000**	
AM/GIS INVESTMENTS				
	4	**TOTAL - GIS/AM INVESTMENTS**	**$ -**	***AM / GIS Costs covered in Stormwater AMP***
CLEANING AND TELEVISING (PACP)				
	5a	Televise 200,000 lineal feet of sanitary sewer	$ 451,000	Televise approx. 50% of system (components that have not recently been televised)
	5b	Contract administration for CCTV contractor	$ 20,000	Reviewing data for compliance with local needs, review of pay requests
	5c	Transfer PACP data to GIS	$ 14,000	City staff time, assume 800 pipe segments at 30 minutes per segment
	5	**TOTAL - CLEANING & TELEVISING**	**$ 485,000**	
LEVEL OF SERVICE				
	6a	Public Meetings (2)	$ 4,000	Public meetings to discuss known sewer issues, discuss City's regulatory commitments
	6b	Develop Capital Improvement Plan	$ 35,000	Identify Early Action Projects (next 5 years) to address key deficiencies
	6	**TOTAL - LEVEL OF SERVICE**	**$ 39,000**	
RATE STUDY				
	7a	Deterimine existing program expenditures	$ 8,000	Primarily existing O&M costs
	7b	Develop 10-year cash flow analysis	$ 5,000	Consider existing and new expenses (from Asset Management Plan and CIP)
	7c	Funding Needs / Funding Gap Analysis	$ 12,000	City Finance Director / Consultant Coordination
	7	**TOTAL - FUNDING FEASIBILITY STUDY**	**$ 25,000**	
		TOTAL: WASTEWATER AMP	**$ 1,000,944**	

City of Traverse City

SAW Grant: Stormwater Asset Management Plan (AMP)

Task	Scope Item	Description	Approximate Cost	Notes/Assumptions
INVENTORY				
	1a	Recover grant application costs	$ 8,000	Reimbursement for consultant fee and City staff coordination
	1b	Review GIS database: identify data needs	$ 6,000	Stormwater AMP kickoff - City staff time to review GIS database - identify needed attribute data
	1c	Survey storm manhole structures	$ 35,000	For rim elevations and better invert elevations and connectivity (1,200 manholes 30 manholes per day, 40 days (Utility Systems Specialist, 2-person crew)
	1d	Import data to GIS	$ 2,500	200 manholes per day, 6 days (GIS/Asset Management)
	1e	Update GIS attributes / add features	$ 5,000	Assume 3 weeks staff time (GIS/Asset Management)
	1f	Research sewer age (record drawings)	$ 8,000	Assume 6 weeks staff time (Engineering Aid) - populate GIS attribute table
	1	**TOTAL - INVENTORY**	**$ 65,000**	
CONDITION ASSESSMENT				
	2a	Manhole Inventory (MACP)	$ 90,000	Assume 75% of manholes (900) at $100/MH, includes MACP coding into GIS
	2b	Catch basin evaluation	$ 21,000	Assume 75% of catch basins (1,800) at 40 CBs per day (45 days)
	2c	Asset Management Plan	$ 65,000	Develop Risk of Failure / Consequence of Failure Database - Prioritize System Needs
	2	**TOTAL - CONDITION ASSESSMENT**	**$ 176,000**	
METERING / MODELING				
	3a	Develop Hydrologic/Hydraulic Models	$ 85,000	XP-SWMM or EPA SWMM - Consultant will develop initial model, to be handed off to City at completion
	3b	Identify hydraulic deficiencies (Tech Memo)	$ 20,000	
	3c	H/H Model Transition to City Staff	$ 8,000	Prepare XP-SWMM (or EPA SWMM) model for transition to City (including consultation with City staff)
	3	**TOTAL - METERING/MODELING**	**$ 113,000**	
AM/GIS INVESTMENTS				
	4a	CUES Granite XP - Software (NASSCO)	$ 12,900	Purchase price (vendor quote)
	4b	Novotx Elements (CMMS Software)	$ 50,000	Purchase price (vendor quote)
	4c	MTEC GPS Mapping Stick - field hardware	$ 12,762	Purchase price (vendor quote)
	4d	Precision Laser/Instrument (Trimble)	$ 7,597	Purchase price (vendor quote)
	4	**TOTAL - GIS/AM INVESTMENTS**	**$ 84,000**	**(Maximum allowable for Traverse City, per SAW Grant rules, is $85,000)**
CLEANING AND TELEVISING (PACP)				
	5a	Televise 150,000 lineal feet of storm sewer	$ 649,000	Assume televising includes ~45% of sewer mains (not including shorter catch basin-to-main line segments)
	5b	Contract administration for CCTV contractor	$ 25,000	Review data for compliance with local needs, review of pay requests
	5c	Transfer PACP data to GIS	$ 14,000	City staff time, assume 900 pipe segments at 30 minutes per segment
	5	**TOTAL - CLEANING & TELEVISING**	**$ 688,000**	
LEVEL OF SERVICE				
	6a	Drainage questionnaire / survey	$ 15,000	SurveyMonkey (or equiivalent) online survey - Geocode resulsts
	6b	Public Meetings (2)	$ 4,000	Public meetings to discuss individual drainage problems, discuss Level of Service expectations
	6c	Review and update local ordinances	$ 35,000	Assume TC will be included in expanded US EPA coverage area for MS4 permits
	6d	Develop Capital Improvement Plan	$ 35,000	Identify Early Action Projects (next 5 years) to address key deficiencies
	6	**TOTAL - LEVEL OF SERVICE**	**$ 89,000**	
OTHER: FUNDING FEASIBILITY				
	7a	Deterimine existing program expenditures	$ 8,000	Primarily existing O&M costs
	7b	Develop 10-year cash flow analysis	$ 5,000	Consider existing and new expenses (from Asset Management Plan and CIP)
	7c	Develop preliminary rate model	$ 22,000	Use existing aerial photography to identify impervious surfaces
	7d	Stormwater Advisory Committee Meetings (5)	$ 20,000	5 meetings expected - meetings used to educate public on stormwater issues and funding needs
	7e	Key potential ratepayer ID and coordination	$ 10,000	10-12 ratepayers identified
	7f	Prepare Funding Feasibility Study	$ 15,000	Recommendations on future stormater funding
	7	**TOTAL - FUNDING FEASIBILITY STUDY**	**$ 80,000**	
		TOTAL: STORMWATER AMP	**$ 1,295,000**	

City of Traverse City

Stormwater Management Plan (SMP)

Scope Item	Description	Approximate Cost		Notes/Assumptions
1a	Identify Baseline Conditions	$	7,500	Review existing Stormwater Management Plans (GTB WMP and Boardman Lake Management Plan). Identify remaining/unmet goals and needs
1b	Identify Baseline Conditions	$	5,000	Review existing City of Traverse City 2007 Stormwater Management Report. Identify unmet needs.
1c	SMP Kickoff Meeting	$	3,000	Meet with City staff and key stakeholders, including the Watershed Center Grand Traverse Bay (WCGTB)
1	**TOTAL - Baseline Conditions**	**$**	**15,500**	
2a	Stream Reach Identification	$	3,000	Work with City staff and WCGTB representatives to identify specific drainage courses that have a significant impact on water quality.
2b	Streambank Assessments	$	12,000	1 mile per day, 3 miles total - focus on Kids Creek and immediate tributaries within City boundaries
2c	Cross section survey - open channels	$	15,000	Cross sectional survey of open channels, where deemed necessary for hydraulic modeling. Assume up to 120 cross sections at 16 sections per day
2d	Boardman Lake Shoreline Inspection	$	10,000	2.35 miles (within City boundaries) of shoreline evaluation - complete shoreline assessment and prepare 3-tier rating system for GIS
2e	Import data into GIS	$	6,000	Import streambank / shoreline data into GIS
2	**TOTAL - Open Channels and Shoreline**	**$**	**46,000**	
3a	H/H Modeling / Floodplain Review	$	25,000	Combined with AMP modeling effort (includes open channel component of modeling effort)
3	**TOTAL - Capacity Analysis**	**$**	**25,000**	
4a	Subwatershed Prioritization	$	8,000	Prioritize sub-watersheds based on pollution potential
4b	Stakeholder Meetings	$	8,000	Meet with WCGTB representatives and interested public to discuss local water quality needs, goals, and desired levels of service (assume 3 meetings)
4c	Water Quality Considerations	$	28,000	Document known problems, identify BMPs necessary to address stormwater quality and meet goals set forth by stakeholder group
4	**TOTAL - Water Quality**	**$**	**44,000**	
5	**Capital Improvement Plan**	**$**	**18,000**	Capital investments for open channels and BMPs: export information to Asset Management Plan
	TOTAL: SMP	**$**	**148,500**	