**Gateway Action Plan – Task #4**

**Adirondack Gateway Council**
**Saratoga, Warren and Washington County,**
**New York**

# Sewer Infrastructure Assessment

**October 2014**

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**Municipal Advisory Disclaimer:**

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## EXECUTIVE SUMMARY

The Adirondack Gateway Council is a not for profit organization tasked with supporting planning, regionalization and development efforts between and among its 20 member organizations. In 2011, the AGC received a grant from the US Department of Housing and Urban Development to fund the Adirondack Gateway Sustainable Communities Regional Planning Program for the Adirondack Gateway Region. The primary goal of the program is to create a comprehensive regional development plan that will serve as a guide for local, regional and state policies and investments and enable the region to grow in a sustainable manner over the next 20 years. This Plan will address the inter-related challenges of housing, transportation, environmental impact, economic and workforce development. This report focuses on the feasibility of providing regionalized sewerage services among 8 of the 20 municipalities and municipal organizations that comprise the AGC.

This report provides concept level analysis and recommendations for expansion and regionalization of sewage collection, conveyance and treatment infrastructure. The report begins with a regional growth assessment, completed using both population growth and known proposed development to determine the future sewage collection and treatment needs within the member communities. With the locations and magnitude of future sewerage needs known, an assessment of potential sewerage routes was completed based on local topography, land use and proximity to existing treatment facilities. Recommendations for proposed sewer routing are included, along with opinions of probable cost for each community. An assessment of the conditions and capacity was completed at the Glens Falls and Washington County Sewer District No. 2 (WCSD#2) wastewater treatment plants (WWTP). Recommended improvements and opinions of probable cost for each of the wastewater treatment facilities are included and based on previously completed long-term control plans and the sewerage needs assessment developed within this report.

The total existing average daily and peak 6-hour flows for the area analyzed within this report are approximately 4.76 and 14.93 million gallons per day (MGD), respectively. With the projected population increase and proposed development, the total proposed average daily and peak 6-hour flows for the area analyzed within this report are approximately 8.49 and 22.37 MGD, respectively. This represents a 78% increase of the average flow and 50% increase of the peak flow in the sewer to be conveyed to the publically owned treatment works over the next 20 years.

To accommodate the projected sewer needs, new collection and conveyance infrastructure is generally needed along Route 9 in the Town of Moreau, throughout the Villages of Fort Edward and Hudson Falls, along Dean, Vaughn and Wait Road's in the Town of Kingsbury, and along Dixon Road and Main Street/ Corinth Road/ Carey Road in the Town of Queensbury. No new infrastructure needs were identified within the Town of Fort Edward, Village of South Glens Falls or the City of Glens Falls. At the Washington County Sewer District No.2 WWTP, average daily flows are estimated to increase from 1.88 MGD to 2.02 MGD, with peak 6-hour flows increasing from 4.70 MGD to 4.41 MGD. At the City of Glens Falls WWTP, average daily flows are estimated to increase from 3.98 MGD to 6.47 MGD, with peak 6-hour flows increasing from 12.94 MGD to 17.96 MGD. The estimated total cost for the selected collection and conveyance infrastructure improvements is approximately $81.5 million. The estimated total project cost for improvements to the Glens Falls and WCSD#2 treatment facilities is approximately $20.5 million.

In addition to the engineering analysis described above, the report provides projected timelines and scheduling for the most likely phasing of the improvements described within. Discussions of the NYS Smart Growth Act and its role in regionalization of public services, opportunities for project funding sources, environmental impacts, legal requirements for regionalization of sewer services and suggested public information outreach are also included to provide context to the recommendations made within and expected next steps.

# 1.0 Introduction

The Adirondack Gateway Council ("AGC", a 501 c 3 not for profit corporation organized under the laws of New York) was formed in 2011 and consists of over 20 municipalities and municipal organizations in Warren, Washington and Northern Saratoga Counties. AGC membership covers 1,800 square miles of Hudson River watershed, prime industrial & agricultural land, along with pristine portions of the lower Adirondack Mountains. Refer to Figure 1 for the location of the AGC.

## 1.1 Background

The AGC was awarded a Regional Sustainability Planning Grant in 2011 from the US Department of Housing and Urban Development to promote a more equitable, sustainable and economically viable region. This report addresses Task #4 – Sewer Infrastructure Assessment of communities identified within the scope of this report.

## 1.2 Scope and Purpose

The primary goal of this report is to provide a planning level assessment of the AGC's sewer infrastructure, along with engineering recommendations that will serve the AGC's goal of creating a comprehensive, stakeholder driven regional development plan.

This report summarizes existing conditions and projected growth in the stakeholder communities, performs a needs assessment and provides recommendations for the technical and economic feasibility of taking a regional approach to wastewater collection and treatment.

## 1.3 AGC Communities Description

While the AGC consists of over 20 municipalities and municipal organizations, this report focuses on the sewer infrastructure of the following entities:

City of Glens Falls
Village of South Glens Falls
Town of Queensbury
Town of Kingsbury
Village of Hudson Falls
Village of Fort Edward
Town of Fort Edward
Town of Moreau
Washington County Sewer District No. 2

An overall location map showing the boundaries of the communities listed above is included in Figure 2.

## 2.0 Regional Growth Assessment

An assessment of regional growth was completed to project potential growth and expansion of sewer infrastructure needs. To aid in the projection of potential growth, a two-pronged method was used to determine a realistic estimation of future sewer needs. The first method projected future populations of the impacted communities based on a 2040 horizon. The second method utilized three types of potential growth identified by member communities and the use of County tax parcel information. These areas of growth consisted of (1) connection of existing private on-site sewer infrastructure, (2) infill population growth within impacted communities and (3) known proposed development requiring new sewer infrastructure.

### 2.1 Description of Needs Projection Methodologies

The section below describes the methodology employed in the projection of future sewer flows and loadings from the AGC communities identified above.

#### 2.1.1 Population Growth Projections

A Log-Linear population projection was chosen for this analysis. The method is also utilized by the Capital District Regional Planning Commission and by other Regional Planning Organizations within New York State.

This analysis is comprised of quantitative trend analysis using the log-linear projection model set up in a MS Excel Workbook. The Log-Linear model — so-called because of its straight-line form when plotted and a logarithmic scale for X-axis measurements — uses historic population to forecast or project future population based on a logarithmic curve, which is the best general model for natural populations.

Log-Linear models when used for forecasts project the historic rate of change of the actual data into the future at a steadily declining rate (i.e. historic growth or decline will

continue, but at a lesser rate). Log-linear models are a basis for population forecasts because they project average historic rates of change into the future in a manner consistent with the average changes in natural populations. While short-term population data will typically exhibit some variety of saw tooth pattern when charted, long-term population data usually follow a log-linear trend.

The MS Excel Workbook requires input of historic population data for the study area's eight municipalities. The Workbook model uses "Index Years" in place of actual years for computing the natural logs of the Independent Variables, with the first year, 1990, set equal to zero (1990 = 0).

Once the historic (and estimated) data was entered and the Log Index Factor set, the Workbook Model computed the Log-Linear Population Trends of the data using simple regressions on the population data and the natural log of the Index Years. It next computed projections based on the Population Trends and the historic (and estimated) data.

When population trend lines for each of the municipalities were reviewed, it became apparent that the 1990s were a turbulent time for the area. Population totals dropped steeply in Glens Falls, South Glens Falls, the town and village of Fort Edward, Hudson Falls, and Kingsbury while growth slowed in Queensbury and Moreau. During this decade, the General Electric capacitor plant in Hudson Falls ceased operations and the urban flight phenomenon exacerbated population declines in relatively densely-populated areas.

Between 2000 and 2010, growth returned to all municipalities in the study area – a uniform trend that was uncommon for the latter half of the 20th century. As such, separate trend lines were developed based on post-1990 data and post-2000 data. In order to rectify the divergent trend lines to project realistic population growth, the two projections were combined into an average composite trend line.

Also of note, in calculating the anticipated growth totals by 2040, village growth was subtracted from town growth to maintain exclusivity between village and town growth, avoiding double counting.

In sum, the population of the study area is expected to grow from its 2012 level of 76,236 to 90,642 by 2040 according to the composite log-linear projection. This is an increase of 14,406 people, or 19% of the 2012 population. The municipality expected to experience the most growth in real terms is the Town of Queensbury, which will add an additional 7,927 people (28%), while the Town of Kingsbury is shown to experience the highest growth percentage at 49% (2,648). The Village of Fort Edward is projected to grow the least in real terms, adding an additional 210 people (6%) to its 2012 population, while the City of Glens Falls is expected to have the lowest growth percentage between 2012 and 2040 at 2% (267 people).

The population of the Village of South Glens Falls is expected to increase by 239 people, or 7%, and the Village of Hudson Falls is projected to grow by 257 people, or 4%. The Town of Moreau is expected to gain 2,384 people (21%) in its population total while the Town of Fort Edward should see an increase of 474 people (16%). Overall, the municipalities that are more densely populated (i.e.: villages and cities) are projected to experience less growth than the outlying towns in the study area.

Refer to Table 1 for a complete summary of population projection analysis.

### 2.1.2 Growth Projection from Community and County Data

Evaluation of the potential growth and sewer infrastructure needs for the stakeholder communities requires knowledge of anticipated growth along with existing infrastructure and currently serviced areas. To aid in identifying areas of potential growth, meetings were held with representatives of both the stakeholder communities and corresponding sewer districts. During these meetings representatives identified areas of anticipated future developments and locations of anticipated sewer infrastructure needs including

residential housing developments, proposed industrial parks, areas where zoning changes have occurred which will bring in potential new business and existing properties with private septic tanks. The community representatives also provided copies of existing comprehensive growth plans, previously completed sewer studies, zoning and existing sewer infrastructure mapping including sewer sizes, routing and pump station locations.

Information gathered from stakeholder communities was incorporated into a working GIS ArcMap model of the overall study area, which incorporated parcel data from Saratoga, Washington and Warren counties. The model was used to visually identify the three (3) types of development considered in the scope of this study.

Existing Private On-Site Sewage Systems:

Parcels with existing private on-site sewage infrastructure within or immediately adjacent to existing sewer districts or parcels which have existing private on-site sewage systems and were identified to be sewered were identified on the mapping in yellow. These properties currently discharge sewage waste to subsurface treatment systems in densely populated areas where centralized treatment facilities exist. These parcels were identified through the use of County parcel GIS data, community identification or previous reports where areas of potential sewer district expansion were identified.

Vacant Sewered:

These areas include vacant parcels which are currently identified as having sewer connections but are not currently developed (infill growth), nor are they contributing flow to any sewage collection system. These parcels have the potential to be developed in the near future and do not require additional infrastructure to contribute flows to the existing collection and treatment facilities. These types of potential developments were identified through the use of County parcel GIS data and are color coded red on the mapping.

Potential/Scheduled Development:

Information received from member communities regarding areas of potential development and build-outs was interpreted and incorporated by selecting and coding the County provided tax parcel shape-files for the corresponding parcels within the GIS model. These areas identified by the communities were color coded brown on the map to represent community identified growth or "potential development".

Refer to Figure 2 for an overall map of existing AGC member community sewer infrastructure and the various color coded development areas.

The three (3) types of development identified are anticipated to contribute sewage flow to the two (2) existing sewage treatment facilities. In order to determine the impacts of the sewage flows on the treatment plants these developments were assigned sewage flow projections. The flow projections were later interpreted into potential population growth and equivalent dwelling units (EDU's). Each type of development was assigned flows in a similar manner; County tax parcel information and development information available for these parcels, including lot size, property class, existing sewer, zoning, existing building area (square footage) and number of rooms in existing buildings were used in conjunction with zoning codes, Table B-3 "Typical Per-Unit Hydraulic Loading Rates" from the *New York State Design Standards for Intermediate Sized Wastewater Treatment Systems, March 5, 2014 (Department of Environmental Conservation)* and typical design values for estimating flows from commercial and industrial sources as prescribed in *Wastewater Engineering Treatment and Reuse, 4$^{th}$ Edition (Metcalf & Eddy).*

Parcels with existing facilities were assigned flows based upon the statistics available within the County GIS data. Existing single family residences, considered one (1) EDU, were assigned a flow of 200 gallons per day (gpd), two-family homes were assigned two (2) EDU's and a flow of 400 gpd, etc. Proposed residential developments were assigned a number of single family homes based on the number of units identified by the

community. Each unit was interpreted to be one (1) EDU and assigned 200 gpd per EDU. Vacant residentially zoned parcels and residential developments without an identified number of units were assigned flows using the assumption that the land would be subdivided to the minimum lot size allowable per the respective community zoning codes. The resultant number of lots were then considered the number of EDU's for the parcel. Parcels less than half of the minimum lot size within the zoning codes were not included within the flow projections as it was assumed a zoning variance would not be granted. Proposed commercial developments, existing commercial parcels and vacant parcels which are in commercially zoned areas were assigned flows based on a hydraulic loading rate of 1,500 gallons/acre-day. Parcels were assumed to contain the minimum percent of pervious area allowed by the community zoning code and half of the impervious portion of the parcel would be the commercial building. The resultant building area was multiplied by the hydraulic loading rate to determine the projected parcel flow. The parcel was then assigned a number of equivalent dwelling units based on this projected flow. The number of equivalent dwelling unit is the quotient of the parcel flow and 200 gpd/ EDU. Similarly, proposed, existing and industrially zoned vacant parcels were assigned flows based on the lot requirements within the respective community zoning codes. As the type of industry to be built on these parcels is yet to be determined, flow rates are preliminary. Light and medium industry flow rates of 1,500 gallons/acre-day and 3,000 gallons/acre-day, respectively, were assigned based solely on the zoning for the proposed lot. In instances where the proposed industrial lot was not industrially zoned, a light industry flow rate was assumed. Flow rates were assigned to the resultant lot area after removal of the minimum pervious area. Projections assigned to parcels are preliminary in nature; assumptions made for this study may not reflect the types of developments which may actually be built.

Loading projections were calculated based on the proposed developments projected flow or projected population, depending on the type of use. Residential and commercial loading rates were assigned based on projected population. Loading rates assigned to these properties were taken from the typical constituent tables presented in *Wastewater*

*Engineering Treatment and Reuse*, 4th Edition (Metcalf and Eddy). Industrial loading rates were based off the projected flows from the sites. Loading rates for these sites were taken from typical constituent tables presented in *Water and Wastewater Technology, 6th Edition* (Hammer and Hammer). Projected loadings are preliminary in nature as the type of development will dictate the actual loadings. Loadings rates used are indicated on the flow and loading projection tables.

Within the Town of Moreau the previously completed Route 9 development study *Map, Plan and Report – Sewer District #1 Extension #4* prepared by C2AE in December 2013 was used to identify the proposed Route 9 development area and the information within the report was used for future flows and loadings.

## 2.2 City of Glens Falls

### 2.2.1 Description of Existing Infrastructure

The City of Glens Falls currently owns, operates and maintains a wastewater treatment plant (WWTP) located at 2 Shermantown Road. The WWTP currently receives and treats residential, commercial and industrial wastewater from the City, the Village of South Glens Falls, the Town of Moreau, the Town of Queensbury and a development in the Town of Kingsbury. The WWTP was constructed in the early 1980's and according to the *Final Draft Report Combined Sewer Overflow Phase 1 – Long Term Control Plan* prepared by CDM Smith revised January 2013, some of the collection system within the City dates back to the 19th century. The collection system, with force mains, pump stations and gravity sewers ranging in pipe diameter from 6-inches to 48-inches, serves the majority of the City. Parts of the City which are currently not serviced by the collection system are described below and were classified into the three categories of potential growth.

### 2.2.2 Private On-Site Sewer Infrastructure

Representatives from the City of Glens Falls provided B&L with ArcGIS shape and database files of the existing collection system including manhole location, sewer, force main and pump station information and locations. This information, used in conjunction with County tax parcel information was used to perform a search to identify properties with private on-site sewage systems (ie. septics) within the City bounds. Approximately twenty (20) parcels were identified as being served by private on-site sewage systems. These parcels were assigned projected flows as described in the methodology above and were color coded yellow on the resultant Figure 3 – City of Glens Falls Sewer Infrastructure and Projected Growth Map.

### 2.2.3 Vacant Land

Similar to the search performed for the existing private infrastructure within the City of Glens Falls, a search of vacant parcels with existing sewer infrastructure was completed. These types of parcels are considered to be ready for development although development may not be scheduled and are already within the existing sewer service area. Approximately four hundred (400) vacant parcels were identified within the City bounds. These parcels were assigned projected flows as described in the methodology above and were color coded red on the resultant Figure 3 – City of Glens Falls Sewer Infrastructure and Projected Growth Map.

### 2.2.4 Potential/Scheduled Development

To identify the potential areas of growth within the City of Glens Falls, a meeting was held with City representatives. No areas of proposed development were identified within the City bounds.

### 2.2.5 Flow and Loading Projection

Wastewater flow (average and peak hour) and loading (BOD, TSS, TKN) information from the WWTP Discharge Monitoring Reports was analyzed and distributed to the

respective treatment plants. This formed the basis of the existing flow and loading. New flow and loading was analyzed from a proposed development (case 1) and growth projection (case 2) perspective. For each case, the new and existing flow and loading was totalized. The greater of the two cases was selected for the purposes of the evaluating available capacity at the WWTP's and to determine locations and extents of needed collection system improvements. Projection criteria for flow and loadings were derived from several sources, including but not limited to 2008-12 US Census Data, Metcalf & Eddy, 4th edition and 10-States Standards. Specific formulae and projection criteria are included in the flow and loading projection table.

Existing sewage from the City of Glens Falls is treated exclusively at the Glens Falls WWTP. The City currently contributes 2.95 MGD on an average day, with 6-hour period peak flows reaching 9.57 MGD. Existing BOD, TSS and TKN loadings are 3,395, 4,491 and 512 lbs per day, respectively. Case 1, proposed development, governs the selected flow and loading case. Future projected average day and 6-hour period peak flows are estimated to be 3.19 and 10.06 MGD, respectively. Future projected BOD, TSS and TKN loadings are estimated to be 4,319, 5,395 and 645 lbs per day, respectively.

Refer to Table 2 for City of Glens Falls Flow and Loading Projection.

## 2.3 Village of South Glens Falls

### 2.3.1 Description of Existing Infrastructure

The Village of South Glens Falls, part of the Town of Moreau and located in Saratoga County, currently collects and conveys an average daily flow of approximately 0.325 MGD of sewage to the City of Glens Falls WWTP. Sewage from the Village is conveyed across the river to the WWTP via a pump station located along River Street and a 12-inch force main. The extent of the existing sewer infrastructure was interpreted and manually drawn in the overall GIS model based on information shown on the map entitled *Village of South Glens Falls Sanitary Manhole Locations and Rodding Distances*, undated, which was provided by the Village.

### 2.3.2 Private On-Site Sewer Infrastructure

A review of the parcel information provided in the County tax parcel GIS files indicates that the majority of the Village of South Glens Falls is currently connected to the public sewer system; this information was confirmed by Village representatives who indicated that only two private on-site sewage systems exist within the Village. Through the use of county GIS tax parcel information, these two parcels with private on-site sewage systems were identified and shown (parcels color coded yellow) on the resultant map labeled Figure 4 – Village of South Glens Falls Sewer Infrastructure and Projected Growth Map.

### 2.3.3 Vacant Land

A search of the County tax parcel GIS information resulted in approximately sixty (60) vacant sewered parcels within the limits of the Village of South Glens Falls. These parcels are color coded red on the resultant map labeled Figure 4 – Village of South Glens Falls Sewer Infrastructure and Projected Growth Map.

### 2.3.4 Potential/Scheduled Development

As a result of the meetings held with the community, three (3) areas of proposed developments were identified. These areas included a subdivision in the south-western part of the Village, 82 apartment units near the central part of the Village and 16 apartment units in the north-western part of the Village. The proposed developments were assigned flows based on the indicated number of units or parcels. These three identified developments were included in the GIS mapping and are colored brown on the resultant map labeled Figure 4 – Village of South Glens Falls Sewer Infrastructure and Projected Growth Map.

### 2.3.5 Flow and Loading Projection

Wastewater flow (average and peak hour) and loading (BOD, TSS, TKN) information from the WWTP Discharge Monitoring Reports was analyzed and distributed to the respective treatment plants. This formed the basis of the existing flow and loading. New

flow and loading was analyzed from a proposed development (case 1) and growth projection (case 2) perspective. For each case, the new and existing flow and loading was totalized. The greater of the two cases was selected for the purposes of the evaluating available capacity at the WWTP's and to determine locations and extents of needed collect system improvements. Projection criteria for flow and loadings were derived from several sources, including but not limited to 2008-12 US Census Data, Metcalf & Eddy, 4th edition and 10-States Standards. Specific formulae and projection criteria are included in the flow and loading projection table.

Existing sewage from the Village of South Glens Falls is treated exclusively at the Glens Falls WWTP. The Village currently contributes 0.33 MGD on an average day, with 6-hour period peak flows reaching 1.06 MGD. Existing BOD, TSS and TKN loadings are 375, 496 and 57 lbs per day, respectively. Case 1, proposed development, governs the selected flow and loading case. Future projected average day and 6-hour period peak flows are estimated to be 0.38 and 1.14 MGD, respectively. Future projected BOD, TSS and TKN loadings are estimated to be 512, 669 and 82 lbs per day, respectively.

Refer to Table 3 for Village of South Glens Falls Flow and Loading Projection.

## 2.4 Town of Queensbury

### 2.4.1 Description of Existing Infrastructure

The Town of Queensbury, located in Warren County, encompasses eight (8) sewer districts. Of the eight (8) districts, seven (7) collect and convey sewage to the Glens Falls WWTP. The remaining district collects sewage from a development which is directed to an on-site subsurface disposal system. The Route 9 Sanitary Sewer District, bounded by Interstate 87 on the west, encompasses properties to the east and west of Route 9 from the City of Glens Falls to its junction with Route 149. The Queensbury Consolidated Sanitary Sewer District encompasses properties immediately north of the City of Glens Falls, serving portions of Aviation Road, Quaker Road, Upper Glen Street,

Bay Road, Ridge Road, Meadowbrook Road and side streets. The South Queensbury Sanitary Sewer District, an inter-municipal agreement between four municipalities which was formed as the result of an order of consent from the DEC, serves the Floyd Bennett Memorial Airport, developments to the east of the airport along the municipal line for Kingsbury, and portions of Queensbury and Dix Avenue. The Warren County Sewer District, which contracts with Washington County Sewer District #1, is located to the north of the South Queensbury Sanitary Sewer District. This district serves properties just east of the Floyd Bennett Memorial Airport. The remaining three (3) sewer districts collect sewage from significantly smaller areas just east or west of the City of Glens Falls, including the Main Street/ Corinth Road corridor which leads out of and is just west of the City of Glens Falls. Mapping of the existing collection system infrastructure was initially provided as a .pdf by the Town and is available through an online mapping resource. Locations of sewer infrastructure were interpreted from the mapping and incorporated into the GIS model. GIS shape-files for pump station locations, manhole locations, sewer mains and district boundaries were provided after much of the report was progressed and incorporated into the data set. It should be noted that projected flows and loadings were allocated based on municipal boundaries. Sewer district boundaries were used for reference only and are not incorporated within the mapping.

### 2.4.2 Private On-Site Sewer Infrastructure

The majority of the properties to the west of Interstate 87, which bisects the Town of Queensbury, have sandy soils and are currently served by private on-site sewage systems. Representatives from the Town have indicated that they do not intend to provide municipal sewer to these properties in the near future. Areas to the north of Route 149 are currently not serviced by the collection system. The only existing property with private on-site sewage system identified for connection by the Town to the municipal collection system was the schools, located just west of exit 19 from Interstate 87. This property is indentified on the resultant map labeled Figure 5 – Town of Queensbury Sewer Infrastructure and Projected Growth Map in yellow.

### 2.4.3 Vacant Land

A search of the County tax parcel GIS information resulted in the identification of approximately two hundred (200) vacant sewered parcels. These identified parcels were preliminarily evaluated for consistency with the zoning codes and whether they appeared to be adjacent to an existing sewer. Lots less than half the minimum lot size as prescribed in the zoning codes were not included in the vacant sewered sewage flow projections. Some of the identified lots may be part of subdivision conservation lands; these could not be easily identified without individual subdivision plans so they were retained in the sewage flow projections. These properties are identified on the resultant map labeled Figure 5 – Town of Queensbury Sewer Infrastructure and Projected Growth Map in red.

### 2.4.4 Potential/Scheduled Development

Several developments were identified by representatives from the Town of Queensbury including several industrial parks, a residential development, expansion of the Floyd Bennett Memorial Airport and development of the rezoned Main Street/ Corinth Road corridor. It should be noted that another consulting firm has applied for a CFA grant and is currently preparing a map plan and report for extending sewer along Corinth Road for the proposed Carey Industrial Park. A review of the zoning for the proposed developments indicated that several of the parcels within the proposed industrial developments are zoned LC-10A (land conservation with a minimum lot size of ten (10) acres) and NR (neighborhood residential). The proposed developments are color coded brown on the resultant map labeled Figure 5 – Town of Queensbury Sewer Infrastructure and Projected Growth Map.

### 2.4.5 Flow and Loading Projections

Wastewater flow (average and peak hour) and loading (BOD, TSS, TKN) information from the WWTP Discharge Monitoring Reports was analyzed and distributed to the respective treatment plants. This formed the basis of the existing flow and loading. New flow and loading was analyzed from a proposed development (case 1) and growth

projection (case 2) perspective. For each case, the new and existing flow and loading was totalized. The greater of the two cases was selected for the purposes of the evaluating available capacity at the WWTP's and to determine locations and extents of needed collect system improvements. Projection criteria for flow and loadings were derived from several sources, including but not limited to 2008-12 US Census Data, Metcalf & Eddy, 4th edition and 10-States Standards. Specific formulae and projection criteria are included in the flow and loading projection table.

The majority of existing sewage from the Town of Queensbury is conveyed to and treated by the Glens Falls WWTP (a negligible amount of sewage from the Town of Queensbury is conveyed to the WCSD#2; for the purposes of this report and tables the flows to WCSD#2 were excluded). The Town of Queensbury conveys about 0.738 MGD to the Glens Falls WWTP of which about 0.025 MGD originates from properties located in the Town of Kingsbury (Washington County). Of the 0.738 MGD, the Glens Falls WWTP treats an average daily flow of 0.71 MGD from the Town of Queensbury, with the 6-hour period peak flow reaching 2.32 MGD. Existing BOD, TSS and TKN loadings at the Glens Falls WWTP from the Town are 822, 1,087 and 124 lbs per day, respectively. Case 1, proposed development, governs the selected flow and loading case. Future projected average day and 6-hour period peak flows to the Glens Falls WWTP are estimated to be 1.99 and 4.87 MGD, respectively. Future projected BOD, TSS and TKN loadings are estimated to be 6,761, 5,165 and 736 lbs per day, respectively.

Refer to Table 4 for Town of Queensbury Flow and Loading Projection.

## 2.5 Town of Kingsbury

### 2.5.1 Description of Existing Infrastructure

The Town of Kingsbury, located in Washington County, contributes sewage flows from a few "out-of-district users" to both the Washington County Sewer District #2 Wastewater

Treatment Plant (WCSD#2 WWTP) and the Glens Falls Wastewater Treatment Plant (GFWWTP). Parcels located immediately adjacent to the Village of Hudson Falls, generally along Dix Avenue and Route 32 convey sewage flows into the Village of Hudson Falls, which eventually enters the three (3) mile long interceptor sewer leading to the WCSD#2 WWTP. Parcels which contribute sewage flows to the GFWWTP are located in a small industrial park in the north-western portion of the Town of Kingsbury on Park Road, just east of County Line Road. Flows from these users are conveyed to the Floyd Bennett Memorial Airport pump station within the Town of Queensbury and eventually to the GFWWTP.

### 2.5.2 Private On-Site Sewer Infrastructure

Parcels with existing private on-site sewage system which have a high probability of connecting into the existing collection system were previously identified in the *Draft Facility Plan and Plan for Future Growth Washington County Sewer District No. 2* prepared by C.T. Male Associates, July 2011. These parcels were identified on *Figure 4-1: Washington County Sewer District #2* within the report as potential sewer service areas. The information from the figure was interpreted and incorporated into the GIS model. Private on-site sewer status was confirmed through use of the County tax parcel information. Parcels with private on-site sewer infrastructure and the potential to contribute flows to the existing collection system are color coded yellow on the resultant map labeled Figure 6 – Town of Kingsbury Sewer Infrastructure and Projected Growth Map.

### 2.5.3 Vacant Land

A search of the County tax parcel information for currently vacant and sewered parcels within the Town of Kingsbury resulted in the identification of several parcels along the south-eastern corner of the Village of Hudson Falls. Additional parcels within the industrial park east of the airport were identified as matching this criteria. These parcels are color coded red on the resultant map labeled Figure 6 – Town of Kingsbury Sewer Infrastructure and Projected Growth Map.

### 2.5.4 Potential/Scheduled Development

Two major areas of potential development were identified within the Town of Kingsbury. The first, an area just north-east of the Village of Hudson Falls is anticipated to become primarily residential housing and the second, another residential development north-east of the Floyd Bennett Memorial Airport and the existing industrial park. Both developments include large tracts of land which are identified as existing or vacant farmland. Parcels which were identified as proposed developments are identified on the resultant map labeled Figure 6 – Town of Kingsbury Sewer Infrastructure and Projected Growth Map in brown.

### 2.5.5 Flow and Loading Projections

Wastewater flow (average and peak hour) and loading (BOD, TSS, TKN) information from the WWTP Discharge Monitoring Reports was analyzed and distributed to the respective treatment plants. This formed the basis of the existing flow and loading. New flow and loading was analyzed from a proposed development (case 1) and growth projection (case 2) perspective. For each case, the new and existing flow and loading was totalized. The greater of the two cases was selected for the purposes of the evaluating available capacity at the WWTP's and to determine locations and extents of needed collect system improvements. Projection criteria for flow and loadings were derived from several sources, including but not limited to 2008-12 US Census Data, Metcalf & Eddy, 4$^{th}$ edition and 10-States Standards. Specific formulae and projection criteria are included in the flow and loading projection table.

Existing sewage from the Town of Kingsbury is treated at both the Glens Falls WWTP and the WCSD#2 WWTP. The Glens Falls WWTP treats an average daily flow of 0.03 MGD of the existing sewage from the Town, with the 6-hour period peak flow reaching 0.08 MGD. The WCSD #2 WWTP treats 0.09 MGD on an average day of the existing sewage from the Town, with the 6-hour period peak flow reaching 0.23 MGD. Existing BOD, TSS and TKN loadings at the Glens Falls WWTP from the Town are 29, 38 and 4 lbs per day, respectively. Existing BOD, TSS and TKN loadings at the WCSD #2 WWTP

from the Town are 112, 140 and 23 lbs per day, respectively. Case 1, proposed development, governs the selected flow and loading case. Future projected average day and 6-hour period peak flows to both WWTPs are estimated to be 1.22 and 2.52 MGD, respectively. Future projected BOD, TSS and TKN loadings are estimated to be 4,701, 4,168 and 617 lbs per day, respectively.

Refer to Table 5 for Town of Kingsbury Flow and Loading Projection.

## 2.6 Village of Hudson Falls

### 2.6.1 Description of Existing Infrastructure

The Village of Hudson Falls, located in Washington County along the Hudson River in the south-west corner of the Town of Kingsbury, currently contributes sewage flows to the Washington County Treatment Plant. The Village is entirely located in the WCSD #2 area. Within the Village there are several pump stations, force mains and miles of sewers ranging from six (6) inches to thirty-six (36) inches in diameter. Several combined sewer overflows (CSO's) exist within the Village as well. According to the *Washington County Sewer District #2, Fort Edward, New York Combined Sewer Overflow Phase 1 – Long Term Control Plan* prepared by C.T. Male Associates and dated December 2010, some of the collection system within the Villages of Hudson Falls and Fort Edward date back to the 19$^{th}$ century.

### 2.6.2 Private On-Site Sewer Infrastructure

No existing private on-site sewage systems were identified through a search of the County tax parcel information.

### 2.6.3 Vacant Land

A search of the County tax parcel information was conducted to identify the vacant and sewered properties. Approximately one hundred (100) vacant sewered parcels were

identified. These parcels are color coded red on the resultant map labeled Figure 7 – Village of Hudson Falls Sewer Infrastructure and Projected Growth Map.

### 2.6.4 Potential/Scheduled Development

No proposed developments were identified.

### 2.6.5 Flow and Loading Projections

Wastewater flow (average and peak hour) and loading (BOD, TSS, TKN) information from the WWTP Discharge Monitoring Reports was analyzed and distributed to the respective treatment plants. This formed the basis of the existing flow and loading. New flow and loading was analyzed from a proposed development (case 1) and growth projection (case 2) perspective. For each case, the new and existing flow and loading was totalized. The greater of the two cases was selected for the purposes of the evaluating available capacity at the WWTP's and to determine locations and extents of needed collect system improvements. Projection criteria for flow and loadings were derived from several sources, including but not limited to 2008-12 US Census Data, Metcalf & Eddy, 4$^{th}$ edition and 10-States Standards. Specific formulae and projection criteria are included in the flow and loading projection table.

Existing sewage from the Village of Hudson Falls is treated exclusively at the WCSD #2 WWTP. The Village currently contributes 0.44 MGD on an average day, with 6-hour period peak flows reaching 1.10 MGD. Existing BOD, TSS and TKN loadings are 545, 685 and 111 lbs per day, respectively. Case 1, proposed development, governs the selected flow and loading case. Future projected average day and 6-hour period peak flows are estimated to be 0.48 and 1.17 MGD, respectively. Future projected BOD, TSS and TKN loadings are estimated to be 646, 812 and 130 lbs per day, respectively.

Refer to Table 6 for Village of Hudson Falls Flow and Loading Projection.

## 2.7 Village of Fort Edward

### 2.7.1 Description of Existing Infrastructure

The WCSD#2 WWTP is located at 17 Cortland Street in the Village of Fort Edward. The WCSD#2 was formed in the 1980's while the three (3) mile long interceptor sewer, pump stations and WWTP were constructed in 1986. The WCSD#2 is a combined sewer system (CSS), meaning it conveys both sewage and stormwater flows to the WWTP. The WCSD#2 collection system consists of ten (10) pump stations, seven (7) of which are combined wastewater pump stations, force mains and sewers ranging from six (6) inches to thirty-six (36) inches in diameter. The interceptor sewer ranges in diameter from fifteen (15) to thirty (30) inches. The WCSD#2 previously provided B&L with copies of the existing sewer and manhole GIS shape-files. These files were incorporated into the GIS model. Pump station locations were interpreted from CSO mapping previously provided to B&L. The majority of the Village of Fort Edward contributes sewage flow to the WCSD#2 WWTP.

### 2.7.2 Private On-Site Sewer Infrastructure

A search of the County tax parcel information was completed. No existing private on-site sewage systems were identified within the Village of Fort Edward.

### 2.7.3 Vacant Land

A search of the County tax parcel information resulted in identification of approximately one hundred (100) parcels which are currently vacant and are identified as being serviced by the existing collection system. These parcels are color coded red on the resultant map labeled Figure 8 – Village of Fort Edward Sewer Infrastructure and Projected Growth Map.

### 2.7.4 Potential/Scheduled Development

Representatives identified several locations where housing developments are proposed along with a community area. Two of the identified developments are in the south-

eastern most portion of the Village adjacent to existing developments. One of which will consist of approximately forty (40) homes and the other sixty to ninety (60 to 90) homes. Another, identified as senior housing, is located within the center of the Village. The last was identified in the north-western corner of the Village, consisting of forty to sixty (40 to 60) homes. The community area would be located on the southernmost tip of Rogers Island. The Village also identified that the existing General Electric location may eventually connect into the collection system. Parcels which were identified as proposed developments are shown on the resultant map labeled Figure 8 – Village of Fort Edward Sewer Infrastructure and Projected Growth Map in brown.

### 2.7.5 Flow and Loading Projections

Wastewater flow (average and peak hour) and loading (BOD, TSS, TKN) information from the WWTP Discharge Monitoring Reports was analyzed and distributed to the respective treatment plants. This formed the basis of the existing flow and loading. New flow and loading was analyzed from a proposed development (case 1) and growth projection (case 2) perspective. For each case, the new and existing flow and loading was totalized. The greater of the two cases was selected for the purposes of the evaluating available capacity at the WWTP's and to determine locations and extents of needed collect system improvements. Projection criteria for flow and loadings were derived from several sources, including but not limited to 2008-12 US Census Data, Metcalf & Eddy, 4$^{th}$ edition and 10-States Standards. Specific formulae and projection criteria are included in the flow and loading projection table.

Existing sewage from the Village of Fort Edward is treated exclusively at the WCSD #2 WWTP. The Village currently contributes 0.14 MGD on an average day, with 6-hour period peak flows reaching 0.35 MGD. Existing BOD, TSS and TKN loadings are 173, 218 and 35 lbs per day, respectively. Case 1, proposed development, governs the selected flow and loading case. Future projected average day and 6-hour period peak flows are estimated to be 0.28 and 0.63 MGD, respectively. Future projected BOD, TSS and TKN loadings are estimated to be 672, 785 and 118 lbs per day, respectively.

Refer to Table 7 for Village of Fort Edward Flow and Loading Projection.

## 2.8 Town of Fort Edward

### 2.8.1 Description of Existing Infrastructure

The Town of Fort Edward is largely unsewered. Sewered parcels exist in the tract of land where the Town of Fort Edward separates the Village of Hudson Falls and the Village of Fort Edward. Sewers that exist here are generally less than twelve (12) inches in diameter with the exception of the interceptor sewer which is thirty (30) inches through this section.

### 2.8.2 Private On-Site Sewer Infrastructure

Representatives from the Town and the WCSD#2 identified many homes adjacent to the sewered portion of the Town which have existing sewers and have a high probability of connecting to the existing collection system. These parcels were confirmed to have private on-site sewage systems through the use of the County tax parcel information. Parcels which have private on-site sewage systems with the potential to contribute flows to the existing collection system are color coded yellow on the resultant map labeled Figure 9 – Town of Fort Edward Sewer Infrastructure and Projected Growth Map.

### 2.8.3 Vacant Land

A search of vacant parcels within the same tract of land between the Village of Fort Edward and the Village of Hudson Falls, adjacent to the existing collection system was conducted. Approximately fifteen (15) parcels were identified as being vacant and sewered. These parcels were identified in red on the resultant map labeled Figure 9 – Town of Fort Edward Sewer Infrastructure and Projected Growth Map.

### 2.8.4 Potential/Scheduled Development

As a result of meetings with Town and WCSD#2 representatives, two areas were identified as proposed developments with potential to connect to the existing collection

system. The first is the expansion of the General Electric plant and the other is a housing development with three-hundred fifty (350) units just east of the Village of Fort Edward on Route 197. These parcels were identified in brown on the resultant map labeled Figure 9 – Town of Fort Edward Sewer Infrastructure and Projected Growth Map.

### 2.8.5 Flow and Loading Projections

Wastewater flow (average and peak hour) and loading (BOD, TSS, TKN) information from the WWTP Discharge Monitoring Reports was analyzed and distributed to the respective treatment plants. This formed the basis of the existing flow and loading. New flow and loading was analyzed from a proposed development (case 1) and growth projection (case 2) perspective. For each case, the new and existing flow and loading was totalized. The greater of the two cases was selected for the purposes of the evaluating available capacity at the WWTP's and to determine locations and extents of needed collect system improvements. Projection criteria for flow and loadings were derived from several sources, including but not limited to 2008-12 US Census Data, Metcalf & Eddy, 4$^{th}$ edition and 10-States Standards. Specific formulae and projection criteria are included in the flow and loading projection table.

Existing sewage from the Town of Fort Edward is treated exclusively at the WCSD #2 WWTP. The Town currently contributes 0.06 MGD on an average day, with 6-hour period peak flows reaching 0.15 MGD. Existing BOD, TSS and TKN loadings are 74, 93 and 15 lbs per day, respectively. Case 1, proposed development, governs the selected flow and loading case. Future projected average day and 6-hour period peak flows are estimated to be 0.36 and 0.74 MGD, respectively. Future projected BOD, TSS and TKN loadings are estimated to be 1,227, 1,209 and 179 lbs per day, respectively.

Refer to Table 8 for Town of Fort Edward Flow and Loading Projection.

## 2.9 Town of Moreau

### 2.9.1 Description of Existing Infrastructure

The Town of Moreau, located in Saratoga County, is largely privately sewered. Within the Town, the Village of South Glens Falls has existing sewer infrastructure which is previously described in Section 2.3. Although sewer mapping was not provided, representatives from the Town identified that there is an existing sewer, force main and pump station in the north-eastern portion of Moreau. The force main is located along Bluebird Road and Sission Road and the sewer leads to Harrison Avenue, onto Van Buren Street and crosses the Hudson River where it is directed to the GFWWTP.

### 2.9.2 Private On-Site Sewer Infrastructure

No private on-site sewage system infrastructure was identified for connection to the existing collection system. The Route 9 development study by C2AE is included within the proposed developments.

### 2.9.3 Vacant Land

A search of the County tax parcel information resulted in the identification of several parcels just outside the Village of South Glens Falls which are vacant and sewered. These parcels were identified on the resultant map labeled Figure 10 – Town of Moreau Sewer Infrastructure and Projected Growth Map in red.

### 2.9.4 Potential/Scheduled Development

The Route 9 completed development study *Map, Plan and Report – Sewer District #1 Extension #4* prepared by C2AE in December 2013 was included within the proposed developments for the Town of Moreau. Flows, loads, sewer routes and costs provided within the C2AE report were carried through this study. In addition to the Route 9 sewer expansion, several other proposed developments were identified by representatives from the Town of Moreau. These developments included the industrial park in the north-eastern corner of the Town along the Hudson River, a two-hundred fifty (250) unit

residential development, a senior housing development and a large development bounded by Route 197 and Reservoir Road. These proposed developments are shown on the resultant map labeled Figure 10 – Town of Moreau Sewer Infrastructure and Projected Growth Map in brown.

### 2.9.5 Flow and Loading Projections

Wastewater flow (average and peak hour) and loading (BOD, TSS, TKN) information from the WWTP Discharge Monitoring Reports was analyzed and distributed to the respective treatment plants. This formed the basis of the existing flow and loading. New flow and loading was analyzed from a proposed development (case 1) and growth projection (case 2) perspective. For each case, the new and existing flow and loading was totalized. The greater of the two cases was selected for the purposes of the evaluating available capacity at the WWTP's and to determine locations and extents of needed collect system improvements. Projection criteria for flow and loadings were derived from several sources, including but not limited to 2008-12 US Census Data, Metcalf & Eddy, 4$^{th}$ edition and 10-States Standards. Specific formulae and projection criteria are included in the flow and loading projection table.

Existing sewage from the Town of Moreau is treated exclusively at the Glens Falls WWTP. The Town currently contributes 0.02 MGD on an average day, with 6-hour period peak flows reaching 0.07 MGD. Existing BOD, TSS and TKN loadings are 25, 34 and 4 lbs per day, respectively. Case 1, proposed development, governs the selected flow and loading case. Future projected average day and 6-hour period peak flows are estimated to be 0.60 and 1.23 MGD, respectively. Future projected BOD, TSS and TKN loadings are estimated to be 2,371, 2,074 and 306 lbs per day, respectively.

Refer to Table 9 for Town of Moreau Flow and Loading Projection.

## 2.10 Summary of Existing and Projected Flows by Municipality

| Municipality | Existing Average Daily Flow (MGD) | Projected Average Daily Flow (MGD) | Existing Peak 6-Hour Flow (MGD) | Projected Peak 6-Hour Flow (MGD) |
|---|---|---|---|---|
| City of Glens Falls | 2.95 | 3.19 | 9.57 | 10.06 |
| Village of South Glens Falls | 0.33 | 0.38 | 1.06 | 1.14 |
| Town of Queensbury | 0.71 | 1.99 | 2.32 | 4.87 |
| Town of Kingsbury | 0.12 | 1.22 | 0.31 | 2.52 |
| Village of Hudson Falls | 0.44 | 0.48 | 1.10 | 1.17 |
| Village of Fort Edward | 0.14 | 0.28 | 0.35 | 0.63 |
| Town of Fort Edward | 0.06 | 0.36 | 0.15 | 0.74 |
| Town of Moreau | 0.02 | 0.60 | 0.07 | 1.23 |

## 3.0 Sewer Conveyance and Connectivity Analysis

Based on engineering review of the geography of the study area, existing sewer collection and conveyance infrastructure in the AGC communities and consultation with the GF and WCSD#2 staff, it was assumed that some communities would contribute sewage flow and load to only one of the WWTP's. The assumptions for contribution are summarized below:

| **Glens Falls WWTP Only** | **WCSD#2 WWTP Only** | **Either** |
|---|---|---|
| (C) Glens Falls | (T) Fort Edward | (T) Queensbury |
| (V) South Glens Falls | (V) Fort Edward | (T) Moreau** |
| | | (T) Kingsbury** |
| | | (V) Hudson Falls** |

**Alternate Routing Analyzed

### 3.1 Sewer Routing Methodology

The Towns of Moreau and Kingsbury and Village of Hudson Falls sewer contributions were broken into sewer shed areas based on location, topography and flow paths of existing sewer infrastructure to model the downstream impact of flow and loading to the WWTPs. A brief description of the sewer shed areas is presented below:

#### 3.1.1 Town of Moreau (See Figures 11A, 11B):

Area M1: This area consists primarily of industrial development with some residential/commercial contribution. Area M1 is located in the northeastern section of Town bounded by the Hudson River to the East from Harrison Avenue Extension south to the intersection of Sisson Rd and Route 28.

Area M2: This area consists of only residential/commercial development in the central section of Town, generally bounded by Route 32 to the west, east along Reservoir Rd and bounded to the south by Route 197 (Reynolds Rd).

Area M3: This area consists of residential/commercial development along the Route 9 corridor in the northern central section of the Town. Flow and loading projections for this area were developed from the 2013 C2AE *Map, Plan and Report*.

3.1.2 Town of Kingsbury (See Figures 11A, 11B):

Area K1: This area consists of residential/commercial development in the northwestern portion of Town. The area is generally bounded by the Town of Queensbury limits to the West, Vaughan Rd to the North, Tracy Rd to the South and Dean Rd to the east.

Area K2: This area consists of residential/commercial development in the southwestern portion of the Town, adjacent to the Village of Hudson Falls limits to the west, north along Vaughan Rd and Route 4, south to Route 196 (Newton Drive).

3.1.3 Village of Hudson Falls (See Figures 11A, 11B):

Area HF1: This area consists of the northern portion of the Village of Hudson Falls that contributes existing flow to the Hudson Falls Pump Station in the Washington County Sewer District #2 located at the foot of River Street Hill and limited residential/ commercial infill development.

Area HF2: This area consists of the southern portion of the Village of Hudson Falls that contributes existing flow to the North Burgoyne Pump Station and Trunk Sewer in the Washington County Sewer District #2 and limited residential/ commercial infill development.

Refer to Table 10 for flow and loading contribution of the sewer areas described above. Below is a summary of the flow contributions for each of the sewer areas considered in the six scenarios described in the next section:

| Municipality | Sewer Area | Equivalent Dwelling Units | Average Daily Flow (MGD) | Peak Hourly Flow (MGD) |
|---|---|---|---|---|
| Town of Moreau | M1 | 1345 | 0.269 | 0.538 |
| | M2 | 385 | 0.077 | 0.154 |
| | M3 | 1151 | 0.230 | 0.460 |
| Town of Kingsbury | K1 | 1051 | 0.210 | 0.420 |
| | K2 | 2136 | 0.427 | 0.854 |

3.2 Sewer Routing Analysis

A total of six (6) scenarios were analyzed, allocating the flow and loading from seven (7) sewer shed areas in the Towns of Moreau and Kingsbury and Village of Hudson Falls to the WWTP's and conveying flows from the remaining communities to the above listed WWTP's. The Village of Hudson Falls could contribute flows to each WWTP, however it was assumed at the current progress of the study that all new development and growth would be contributed to the WCSD #2 WWTP based on the review of where the growth areas are located. The Village of Hudson Falls Scenarios will be reviewed in more detail in the next phase of the project.

Below is a summary of the analyzed conveyance scenarios:

Scenario 1: Areas M1, M2 and K2 flow to the WCSD#2 WWTP; Areas M3 and K1 flow to the Glens Falls WWTP. Refer to Table 11 for flow and loading allocation.

Scenario 2: Areas M2 and K2 flow to the WCSD#2 WWTP; Areas M1, M3 and K1 flow to the Glens Falls WWTP. Refer to Table 12 for flow and loading allocation.

Scenario 3: Areas M1 and M2 flow to the WCSD#2 WWTP; Areas M3, K1 and K2 flow to the Glens Falls WWTP. Refer to Table 13 for flow and loading allocation.

Scenario 4: Areas M2, K1 and K2 flow to the WCSD#2 WWTP; Areas M1 and M3 flow to the Glens Falls WWTP. Refer to Table 14 for flow and loading allocation.

Scenario 5: Areas M1, M2 and M3 flow to the WCSD#2 WWTP; Areas K1 and K2 flow to the Glens Falls WWTP. Refer to Table 15 for flow and loading allocation.

Scenario 6: Areas K1 and K2 flow to the WCSD#2 WWTP; Areas M1, M2 and M3 flow to the Glens Falls WWTP. Refer to Table 16 for flow and loading allocation.

A summary of the computed future flow and loading for the WWTP's may be found in Table 17.

## 3.3 Proposed Sewer Routing

While some future sewer routes were identified by the respective communities, many of the proposed development areas will require additional new infrastructure. Proposed developments and infill development adjacent to existing sewers were assumed to be able to connect to the existing sewer and no new infrastructure was identified. Where properties were not adjacent to existing infrastructure, new sewers were proposed. These were preliminarily located along corridors bordering as many development parcels as possible. It was assumed that for any large scale development, the cost of infrastructure within the development would be paid for by the developer and was not evaluated as part of this study and the developer costs were not included in the cost estimates. A map of the sewer shed areas, including labels which correspond to the scenarios above and proposed sewer infrastructure locations are included on Figure 11A and 11B.

Approximate sewer lengths for the proposed new infrastructure were taken from the GIS model. Profiles were created using Google Earth for each of the proposed sewer routes

to conceptually determine the type of sewer (gravity or force main) required for conveyance. It was assumed that gravity would be buried a minimum depth of five (5) feet and a maximum depth of eighteen (18) feet and force mains would be buried five (5) feet. The concept profiles were used in conjunction with the minimum allowable pipe slopes as prescribed in *Great Lakes-Upper Mississippi Board of State and Provincial Public Health and Environmental Managers, Recommended Standards for Wastewater Facilities, 2004 Edition (10 States Standards)* to determine the feasibility and location of gravity sewers. Pump stations and force mains were located as needed to overcome large grade changes. Pump stations were located at the toe of any identified hills. It was assumed that gravity sewer would be required parallel to these force mains to capture flows and convey them to the pump stations. Where geographic features seemed impractical to overcome additional routing options were evaluated and the proposed sewer location was altered. All of the proposed force mains, pump stations and sewers were included on the GIS model and the proposed sewer infrastructure was color coded on Figures 11A and 11B to reflect the two (2) conveyance options: conveyance to Glens Falls WWTP or conveyance to WCSD#2 WWTP.

Approximate sizes of the proposed sewers were determined through the use of Mannings equation. For cost estimating purposes, gravity sewer sizing was based on the proposed sewers installed at the minimum slope and flowing half full to accommodate future growth. For force mains, an eight (8) inch diameter main was assumed. Approximate sewer shed flows were determined based on the projected flows for the areas which would contribute to each of the sewers. Where one pipe may be used for conveyance to either WWTP the more conservative flows and pipe diameter were chosen. In areas where the proposed sewers serve only a few parcels on a side street, it was assumed that the minimum allowable public sewer size, eight (8) inch diameter, would be used. The total lengths and sizes of the proposed sewers for each of the communities are listed on the opinion of probable cost. Description and reference to the opinion of probable cost are included in Section 6.0. Hydraulic capacity and condition of existing sewers below all proposed connection points were not evaluated

during this study. Capacity and condition of the existing sewer will be evaluated through desktop studies, field work including televising, etc. in future stages of this project. The costs for repair and/or replacement of aged or failing mains is not included within the opinions of probable cost.

Scenario 1 is the recommended alternative for sewer collection and conveyance. Scenario 1 allocates the sewering needs of the communities equitably and promotes the use of existing sewer infrastructure, which encourages infill growth and discourages sprawl, which is in line with the NYS Smart Growth Infrastructure Policy Act. Scenario 1 is also the second lowest cost of all scenarios with an opinion of probable construction cost of $ 63,420,000. While Scenario 2 is approximately $200,000 less than Scenario 1, this amount is within the margin of error for these low resolution cost estimates and therefore a cost difference of this amount should not be considered a significant factor.

## 4.0 WWTP Conditions Assessment and Recommended Improvements

This section provides an assessment of the current available treatment capacity and discussion of need for expansion of treatment capacity at the Glens Falls and Washington County Sewer District #2 WWTP's. The results of the conveyance and connectivity option analysis in Section 3 were utilized to evaluate future needs of treatment process capacity at the WWTP's. Future needs were evaluated using the projected future flows and the recommended improvement from the LTCP's to provide additional recommendations for capacity improvements.

### 4.1 Existing Treatment Capacity Evaluation

#### 4.1.1 Methodology

A desktop level unit process capacity evaluation was completed for the Glens Falls and Washington County Sewer District #2 WWTPs. Treatment capacity for each unit process was determined through an evaluation of each municipality's Combined Sewer Overflow (CSO) long term control plan (LTCP's), as-built drawings and design criteria from the *Great Lakes-Upper Mississippi Board of State and Provincial Public Health and Environmental Managers, Recommended Standards for Wastewater Facilities, 2004 Edition* (10 States Standards) and *Wastewater Engineering Treatment and Reuse, 4th Edition (Metcalf & Eddy).*

For each unit process, parameters for capacity rating were specified from 10 States Standards, information from the manufacturer of the unit process and/or Metcalf & Eddy. For each parameter, data from each unit process and operational standards were used to calculate the maximum flow and/or biological or solids loading that the process could handle while still maintaining the minimum effluent standards. The current hydraulic loading was taken as either the average daily flow or the peak hourly flow for the plant (dependent on whether the capacity rating was based on the average daily or peak hourly flow), adjusted for any flow that may have been removed during previous

unit processes. This adjustment was made using linear proportions from the Biowin Process Models in the Long Term Control Plans published by CDM.

### 4.1.2 City of Glens Falls WWTP

The City of Glens Falls owns and operates a WWTP facility along the banks of the Hudson River on Shermantown Rd in the City of Glens Falls. The liquid train of the WWTP consists of a mechanically cleaned bar screen, vortex grit unit, primary settling tanks, aeration tanks, secondary clarifiers and ultra-violet (UV) disinfection prior to discharge into the Hudson River. For a detailed description of each unit process, refer to the *Combined Sewer Overflow Long Term Control Plan, January 2013, by CDM (GF CSO LTCP)*.

Based on discharge monitoring report (DMR) records provided by the City for Jan 2012 thru Dec 2013, the WWTP treated an average daily flow of 3.98 MGD with a peak instantaneous flow of 20.60 MGD. Analysis of 2013 flow records indicates the WWTP has a hydraulic peaking factor of approximately 3.25 between average daily flow and sustained 6-hour peak flow. According to the GF CSO LTCP, the treatment plant was designed to handle 9.5 MGD average day flow, with peak hourly flows at 13.35 through primary treatment and 20.35 MGD through secondary treatment. Table 18 shows the results of the unit process capacity analysis. Unit processes with maximum capacities less than the current loading are described in the following text.

As stated in the GF CSO LTCP, the plant was designed with a weir-style sewer flow regulator (SFR) that limits flow through the plant to 13.35 MGD. According to the facility, flows begin to spill through CSO 002 located downstream of the SFR at approximately 13.7 MGD. Flows entering the facility pass thru the mechanical climber screen which has a rated capacity of 16 MGD based on a maximum horizontal velocity of 3.0 ft/s. During peak flows, the horizontal velocity thru the screen exceeds 3.0 ft/s which can reduce removal efficiency of the screen. Following the mechanical screen,

flow enters the vortex grit unit which has a rated hydraulic capacity of 18.5 MGD according to the GF CSO LTCP.

After the preliminary treatment works, flow enters the primary settling tanks to reduce BOD load to the aeration process. The primary settling tanks are hydraulically limited by the effluent weirs to a flow of 13.35 MGD.

Flow exiting the primary settling tanks enters the aeration tanks which have a maximum capacity of 13 MGD based on hydraulic detention time. The facility currently has one aeration tank out of service which limits the total aeration system capacity. The GF CSO LTCP included a BioWin model of the secondary treatment process, analyzing various flow and operational conditions to evaluate treatment potential of the process.
The results of the BioWin model indicate that with only one aeration tank online, the maximum capacity of the aeration process is 9.5 MGD. However, at this average flow combined with a 6-hour peak wet weather event of 13.35 MGD, the aeration process (with one aeration tanks and three secondary clarifiers) is not capable of meeting SPDES permit limits.

Following the aeration process, flow enters one of three existing secondary clarifiers. The secondary clarifiers have a rated capacity of 13.5 MGD and 23 MGD at the average daily and peak hourly flows, respectively, according to 10-States Standards for surface overflow rate. The GF CSO LTCP included a solids flux analysis, which estimates a range of treatment capacity based on varying assumptions for sludge volatility index (SVI), a measure of the potential of sludge to concentrate. Capacity based on solids flux analysis yields a maximum capacity of 22.5 MGD at 5% min mixed liquor suspended solids (MLSS) and average SVI.

The UV disinfection system at the plant is capable of treating flows up to 20 MGD. The arrangement of the UV system allows for another bank of UV modules to be added in the future if needed.

The units in the solids treatment process have the capacity to treat the solids current loadings based on operator utilization of existing processes. Due to increasing environmental regulations and associated costs, the City plans to eliminate the incinerator and utilize a different solids handling and disposal process. This process is to be determined.

### 4.1.3 Washington County Sewer District No. 2 WWTP

The Washington County Sewer District No. 2 owns and operates a WWTP facility along the banks of the Hudson River on Cortland Street in the Village of Fort Edward. The liquid train of the WWTP consists of a coarse trash rack, influent screw pump station, mechanically cleaned bar screen, vortex grit unit, primary settling tanks, aeration tanks, secondary clarifiers and ultra-violet (UV) disinfection prior to discharge into the Hudson River. For a detailed description of each unit process, refer to the *Combined Sewer Overflow Long Term Control Plan, December 2010, by CDM (WCSD#2 CSO LTCP)*.

Based on discharge monitoring report (DMR) records provided by WCSD#2 for Jan 2012 thru Feb 2014, the WWTP treated an average daily flow of 1.88 MGD with a peak instantaneous flow of 4.80 MGD. Analysis of 2013 flow records indicates the WWTP has a hydraulic peaking factor of approximately 2.5 between average daily flow and sustained 6-hour peak flow. According to the WCSD#2 CSO LTCP, the treatment plant was designed to handle and is currently permitted for a 2.5 MGD twelve month rolling average day flow, with a design peak hourly flow of 5 MGD.

Due to the presence of combined sewer overflows (CSO's) discharging untreated water to Bond Creek and the Hudson River, the WWTP was mandated by the DEC in 2011 to increase its future capacity as follows:

- 8 MGD through influent pump station and headworks
- 7 MGD through the primary treatment and disinfection

- 4 MGD through secondary treatment

Loadings for each process were estimated using linear proportions of recent flows from DMR data to output values from the Biowin Model in the WCSD#2 CSO LTCP.

Flow entering the WCSD#2 WWTP is processed through the existing coarse bar rack to remove large debris upstream of the influent pumping station. Following the coarse bar rack, flow enters the influent wetwell. The influent screw pumps have a rated capacity of 8 MGD with one pump out of service. However, the pump screws and troughs have not been upgraded since their installation and require improvements. Over time, the screw flights and grouted trough have been worn through use and degradation, increasing the clearance distances and reducing pumping capacity. The facility also reports that the control scheme of the pumps creates a hydraulic surge when an additional pump turns on at high flows, temporarily overwhelming downstream processes.

Flow is pumped from the influent wetwell to the preliminary treatment building influent channel where it is further treated through an existing mechanical screen. The existing mechanical bar screen has a rated capacity of 3.3 MGD based on screen approach velocity. The channels between the influent pump and screen have a rated capacity of 6 MGD assuming that all flow goes through the mechanical screen (rather than a portion going through the manual bar screen), a 50% blinding rate at the screen and a maximum water surface elevation at the downstream side of the influent pumps of 138.08 ft. The manual bypass screen located in an adjacent channel to the mechanical screen has a hydraulic capacity of 13.5 MGD based on maximum approach velocity through the screen.

Following the screening process, flow enters one of two aerated square grit chambers which are rated for 5.75 MGD at the peak hourly flow based on a 3 minute minimum detention time. The WCSD#2 CSO LTCP notes that the effluent weirs downstream of the grit chambers are submerged at flows greater than 5.5 MGD, based on current weir

settings. The Parshall Flume, while properly sized for flows up to 15.9 MGD, does not provide accurate flow measurement as indicated by the District (see the WCSD#2 CSO LTCP).

Following the preliminary treatment process, flow enters the primary settling basins. The primary settling tanks have a rated capacity of 7 MGD based on a maximum surface overflow rate of 2000 gpd/sf at PHF.

Following the preliminary settling tanks, flow enters the aeration process. The aeration basins have a rated capacity of 4.3 MGD with both tanks in service at a hydraulic detention time of 3 hours. Since any flows above 4.0 MGD bypass the secondary treatment process, this capacity is sufficient and meets the mandated 4.0 MGD requirement for secondary treatment.

Flow exiting the aeration basins enters one of two existing secondary clarifiers. Based on a surface overflow rate of 1,200 gpd/sf, the secondary clarifiers have a capacity of 5.7 MGD. However, based on a maximum solids loading rate of 2.08 lbs/sf/hr the secondary clarifiers currently have a capacity of 3.5 MGD, less than the mandated 4.0 MGD requirement.

Following the secondary clarifiers, flow disinfected through one of two UV disinfection units operating in series, each with a capacity of 7.5 MGD at PHF. The operator reports that disinfection performance is occasionally inhibited by filamentous algae, flushed out of the secondary clarifier effluent launders during high flows, on the UV banks and effluent weir. This deleterious material causes bulbs to foul, reducing UV dosage and clogs the effluent weir, raising UV channel water level which causes the automatic weir actuator to search for its appropriate setpoint.

The solids treatment process currently meets all loadings. However, the facility reports operational limitations, such as a lack of septage receiving station and inadequate

digester mixing limit the ability of the facility to accept septage, a major revenue stream. Additionally, solids disposal represents a bottleneck to current and future treatment expansion. A Department of State grant was awarded to some of the communities in the AGC in 2013 to review the potential for a regional solids handling and disposal facility.

Refer to Table 19 for a summary of the unit process capacity analysis described above.

#### 4.1.4 Village of South Glens Falls Pump Station

The Village of South Glens Falls Pump Station and force main collects an average of 0.325 MGD of wastewater and pumps it to the City of Glens Falls collection system at Warren Street. Constructed in 1987, the station features a comminutor pit and control building, three (3) submersible sewage pumps which were replaced in 2008, and variable frequency drives to control pump operation. The current pumps are Goulds Model 4NS, with 25 HP motors. The operating point for one (1) pump running at full speed is approximately 700 gpm at 86 ft TDH and the operating point for two (2) pumps running at full speed is approximately 860 gpm at 98 ft TDH. Based on two pumps running at full speed, the pump station has a capacity of 1.24 MGD. Peak hourly flows were estimated based on population, using Figure 1 in the 10 States Standards for Wastewater Facilities. Based on an average day flow of 0.325 MGD and a peaking factor of 3.4, the estimated PHF is 1.11 MGD. Based on an estimation of current PHF, the station has a current utilization of 89.5%.

### 4.2 GF CSO LTCP Analysis, Feasibility of Treatment and Conveyance Capacity Expansion and Recommended Improvements

#### 4.2.1 City of Glens Falls – Collection and Conveyance

The GF CSO LTCP recommended a phased approach to improving CSO capture and overall collection and treatment capacity for the City of Glens Falls sewer system. Phase 1 improvements to the collection and conveyance system included the following:

1. Develop an asset management plan for planning and budgeting long-term Combined Sewer System (CSS) and WWTP operations and maintenance;
2. Complete GIS mapping of the entire sewer collection system;
3. Clean and rehabilitate the combined sewer system at 20,000 LF per year for 5 years.

According to the Facility, the City will be receiving bids on the Phase 1 work listed above in summer 2014.

Phase 2 of the LTCP improvements to the collection and conveyance systems includes continuation of the cleaning and rehabilitation of the combined sewer system, including sewer lining or replacement as well as rehabilitation and replacement of manholes and structures as determined necessary by the ongoing cleaning and inspection programs.

### 4.2.2 City of Glens Falls – WWTP

Using the flow and loading projections developed in Section 3 and recommendations from the respective LTCP's, the future capacity requirements of each WWTP were evaluated. The LTCP recommended a phased approach to improve CSO capture and increase capacity for future expansion.

Phase 1 of the LTCP recommended the following improvements to the WWTP:

1. Construct new SFR at the WWTP, including screen on overflow to divert floatable debris and solids to the preliminary treatment building;
2. Replace mechanical bar screens in the preliminary treatment building;
3. Upgrade aeration systems in Aeration Tanks No.1 and No. 2, reactivate Aeration Tank No. 2, replace existing 600 hp aeration blower.

According to the Facility, the City will be receiving bids on the Phase 1 work listed above in summer 2014.

Phase 2 of the LTCP recommended the following improvements to the WWTP:

1. Add two additional primary settling tanks, primary sludge pump stations, piping and associated equipment and appurtenances;

Phase 1 and 2 improvements were projected to increase the capacity of the WWTP to 12 MGD ADF and 18 MGD peak sustained 6-hour flow. The projected future ADF and PHF to the WWTP for conveyance and collection scenario 1 are estimated to be approximately 6.47 and 17.96 MGD, respectively. Table 20 summarizes the projected flows as future capacity requirements for the WWTP. A new flow regulator is proposed which will limit the flow to the plant to 18 MGD. Based on the flow and loading projections completed in this study, the future capacity expansion recommended in the LTCP will be sufficient to provide for average and peak conditions at the WWTP.

Preliminary analysis of satellite imagery from Google Earth®, meetings with the City and previous site visits reveals that space is available for expansion of the primary settling tanks as described above in the area immediately to the west of the existing primary clarifiers. Further investigation is required in design to determine the extent to which existing underground piping and structures may need to be rerouted to accommodate the new treatment process tankage and equipment.

Phase 3 of the LTCP includes the construction of a 300,000 gallon CSO storage tank at the WWTP to capture additional CSO events for treatment prior to discharge to the Hudson River. Other improvements identified in the LTCP include the use of green infrastructure to reduce or retain stormwater to mitigate CSO's. These include the use of porous pavement, urban parks/green spaces, green roofs, bioretention swales and

water conservation. These technologies may be implemented alone, or as part of a larger project to improve positioning for competitive funding programs.

In addition to the improvements recommended above, the Glens Falls WWTP should consider implementing a program to periodically update its CSS model to evaluate the impacts to the collection and treatment systems of new connections, monitor progress of repairs and to plan future improvements.

## 4.3 WCSD#2 CSO LTCP Analysis, Feasibility of Treatment and Conveyance Capacity Expansion and Recommended Improvements

### 4.3.1 WCSD#2 – Collection and Conveyance

A hydraulic capacity analysis of the Trunk Sewer was completed to evaluate the effects of future flows. This analysis is included as Appendix 2. The trunk sewer starts in the Village of Hudson Falls and flows south through the Town of Fort Edward to the WCSD#2 WWTP in the Village of Fort Edward. One section of the trunk sewer was identified with a rated capacity less than the projected future PHF. This section is located in the Village of Hudson Falls from Manhole 18-7 to 18-4. As this section of sewer is the furthest upstream reach of the Trunk Sewer it is unlikely to experience flows greater than its maximum capacity of 3.93 MGD. The majority of flows conveyed by the trunk sewer enter at points downstream of the pipe with the limiting capacity of 3.93 MGD.

The WCSD#2 CSO LTCP recommended a phased approach to improving CSO capture and overall collection and treatment capacity for the WCSD#2 sewer system. Phase 1 improvements to the collection and conveyance system included the following:

1. CCTV cleaning and inspection of sewers;

2. Separation of sewers along the Main Interceptor Sewer in the Village of Fort Edward (previously completed);
3. Purchase of a new digital video track camera and vehicle for sewer inspections for planning of cleaning and maintenance work;
4. Installation of backwater control gate on the outfall pipe for CSO 003 to prevent inflow from Bond Creek;
5. Rehabilitation of the Feeder Canal trunk sewer (completed Spring 2014);
6. Redirection of the North Burgoyne Pump Station Forcemain to the interceptor sewer in Main Street (to be completed in 2015 construction season); and
7. SCADA monitoring and basic operations improvements for five pump stations and regulators at the Hudson Falls and Notre Dame Pump Stations.

Phase 2 of the LTCP improvements to the collection and conveyance systems includes the following additional improvements:

1. Separation of sewers along the Main Interceptor Sewer in the Village of Hudson Falls;
2. Rehabilitation of the Catherine Street and River Road sewers;
3. Installation of 11,000-feet of storm sewer to separate stormwater from the CSS (Elm St., Coleman Ave., William St., and John St., and North St.);
4. Upgrade of the Notre Dame Pump Station;
5. Rehabilitation of the Hudson Falls Pump Station; and
6. Divert River Street Trunk Sewer from the Hudson Falls Pump Station, construct new pump station and forcemain.

### 4.3.2 WCSD#2 – WWTP

Using the flow and loading projections developed in Section 3 and recommendations from the respective LTCP's, the future capacity requirements of the WWTP was evaluated. The LTCP recommended a phased approach to improve CSO capture and increase capacity for future expansion.

The projected future ADF and PHF to the WWTP for conveyance and collection scenario 1 are estimated to be approximately 2.02 and 4.41MGD, respectively. The facility is currently permitted to treat up to 2.5 MGD average daily flow. Per the NYSDEC, based on the flow and loading projections completed in this study, the future capacity expansion recommended in the LTCP will be sufficient to provide for treatment of average and peak flows at the WWTP. Table 21 summarizes the future capacity requirements for each unit process at the WWTP.

Phase 1 of the LTCP recommended the following improvements to the WWTP:

1. Aeration process improvements (including new aeration blowers, new aeration piping and fine bubble aeration diffusers, installation of bio-selectors at influent end of aeration tank and reconfiguration of tanks to allow for step-feed, plug flow or complete mix operation);
2. Energy Management and Instrumentation Upgrades;

The improvements listed above are included in the current Wendel Energy project at the WWTP, scheduled for completion in 2015. While a plant wide supervisory control and data acquisition (SCADA) system is described and recommended in the LTCP, a smaller scale of instrumentation and SCADA implementation is being completed in the current Wendel Energy project.

The LTCP indicates complete replacement of the influent pump station and preliminary treatment systems to achieve a future peak hourly flow capacity of 13 MGD. However, the facility has indicated that this flow value is erroneous and that influent pumping and preliminary treatment capacity should be 8 MGD, which more closely correlated to the projected future peak flow. It is anticipated that the existing preliminary treatment building may be retrofitted to increase hydraulic capacity to 8 MGD.

Additional improvements identified in the LTCP, through this desktop evaluation and through discussions with WWTP personnel include the following:

1. Replace/rehabilitate existing influent screw pumps and controls;
2. Regrout existing screw pump troughs;
3. Replace existing influent mechanical screen;
4. Install new vortex grit removal system;
5. Retrofit existing preliminary treatment building;
6. Install third primary settling tank, primary sludge pump and associated piping and appurtenances;
7. Install new secondary treatment bypass structure downstream of the primary settling tanks;
8. Upgrade and replace secondary clarifier mechanicals (hydraulic flocculation feedwell, spiral scrapers, density current baffles, tangential skimmer arms, sludge draw off rings, drives, bearings, etc.);
9. Install third secondary clarifier;
10. Install solar covers on secondary clarifier effluent launders; and
11. Complete study for a regional sludge handling facility under the Department of State funding. Village of South Glens Falls Recommended Improvements;
12. Solids thickening and dewatering system (replace existing rotary drum thickeners and 2-stage belt presses with 3-stage belt presses containing internal gravity belt thickeners).

Item 12 is included in the current Wendel Energy project at the WWTP, scheduled for completion in 2015.

## 4.4 Village of South Glens Falls Feasibility of Treatment and Conveyance Capacity Expansion

With a projected average daily flow of 0.38 MGD and a peaking factor of 3.3, the station has a peak hourly flow of 1.14 MGD and a utilization of 101%. For the capacity calculations, see the (V) South Glens Falls Pump Station Evaluation in Appendix 1. Recommended improvements are described in Section 5.

## 5.0 Summary of Proposed Collection System Improvements

### 5.1 Wastewater Collection

Projected flows and loads for each stakeholder communities proposed developments were used to determine preliminary sizing and locations of future infrastructure needs. Below are summaries of the conceptual infrastructure needs determined as a result of this study. Opinions of probable cost for the recommended improvements are discussed in Section 6.0.

#### 5.1.1 City of Glens Falls

Although no additional new infrastructure needs were identified based on the future growth and development within this study several recommendations for the Cities collection system are listed within the *Combined Sewer Overflow Long Term Control Plan, January 2013, by CDM (GF CSO LTCP)*. The recommendations are as follows:

- Develop asset management plan for long term O&M
- Complete GIS mapping of entire collection system
- Perform collection system cleaning and rehabilitation plan

The City is currently engaged in various stages of implementation of the above listed recommendations in accordance with the compliance schedule outlined in the LTCP.

#### 5.1.2 Village of South Glens Falls

Although proposed developments were identified within the Village of South Glens Falls, no new sewer needs were identified. However, with additional projected flows directed towards the Village to be conveyed to the GFWWTP, the main pump station may need to be expanded to increase its hydraulic capacity as the peak flow reaches the peak flow design of the station. Additional improvement opportunities identified at the pump station were to increase reliability of the station by ensuring capacity with the largest pump out of service and by installing a backup generator for emergencies.

### 5.1.3 Town of Queensbury

Of the proposed developments within the Town of Queensbury only the Main Street/ Corinth Road corridor and the industrial park along the Hudson River appear to require new infrastructure. The commercial and industrial developments proposed along Main Street and extending to Corinth Road require additional sewer infrastructure. The required infrastructure would be tied into the existing sewer which extends just west of Interstate 87 on Corinth Road. A pump station would need to be added in this area by the intersection with Carey Road. A review of the profiles along these two proposed sewer routes indicates that these two sewers may be gravity. The industrial park along the Hudson River will also require additional infrastructure to convey projected flows to the GFWWTP. Review of the preliminary sewer route profile indicates that this routing may need to be a combination of gravity and force main sewers with a pump station. It is anticipated that sewer metering will be required for conveyance to the WWTP. Costs of metering are incorporated into the cost estimate presented later in this report.

Locations of the identified sewer needs can be found on Figure 11A – Overall Sewer Infrastructure Conveyance and Collection Map for Glens Falls WWTP.

### 5.1.4 Town of Kingsbury

Sewer needs for the proposed improvements within the Town of Kingsbury are significant. Flows from the Town of Kingsbury can be sent to either WWTP. Sewers to service the proposed developments immediately adjacent to the Village of Hudson Falls, area K2, are located along roadways which would service the largest areas possible. Infrastructure required to convey sewage to the WCSD#2 WWTP would be surrounded by the parcels which it is proposed to serve. Some of the larger sewers identified would be located along Dix Avenue, Route 4, Route 35 and Dean Road. Infrastructure required to convey flows to the Glens Falls WWTP would require an approximately one mile long length of sewer which would only service parcels from Kingsbury only. With either scenario, flows from this area being sent to WCSD#2 or Glens Falls WWTP's, the proposed sewer routing would a combination of gravity

sewers, force mains and pump stations. The proposed developments in the north-western portion of the Town, area K1, would also require new infrastructure. Routing to the City of Glens Falls would require less new infrastructure than routing to the WCSD#2 WWTP. Routing to the WCSD#2 WWTP would require construction of a nearly two-mile long sewer which would only convey flows from the development. Routing from either scenario would require a combination of gravity sewers, force mains and pump stations. It is anticipated that sewer metering will be required for conveyance to the WWTPs. Costs of metering are incorporated into the cost estimate presented later in this report.

Locations of the identified sewer needs can be found on Figure 11A or 11B, depending on which WWTP the flow would be conveyed to.

### 5.1.5 Village of Hudson Falls

Although proposed developments were identified within the Village of Hudson Falls, no new infrastructure needs were identified based on future growth and development identified in this study. However, based on input from the Village, the Village experiences large amounts of inflow and infiltration (I&I) due to the age of the collection system and it is recommended that the Village complete an I&I study and develop a program to mitigate sources of I&I.

### 5.1.6 Village of Fort Edward

Conveyance of the projected flows from the majority of the proposed developments within the Village of Fort Edward can be directed to the existing infrastructure. Connection of the General Electric plant into the existing collection system will require construction of a new sewer. Preliminary review of the profile along the sewer route indicates that this may be a gravity sewer. Conveyance of flow from the proposed community area at the southern point of Rogers Island will require the construction of new sewers. Preliminary review of the profile for this routing indicates that the projected flows will need to be pumped via a force main to the existing collection system.

Locations of the identified sewer needs can be found on Figure 11B.

### 5.1.7 Town of Fort Edward

The proposed developments within the Town of Fort Edward require new infrastructure to convey projected flows to the WCSD#2 WWTP. The sewer route for the residential development just east of the Village of Fort Edward was indicated by community representatives. A preliminary review of the sewer route indicates conveyance may be achieved using gravity sewers. The proposed developments within the swath of land between the Village of Hudson Falls and the Village of Fort Edward would require only small sections of new sewer to connect the parcels to the existing sewer infrastructure. The majority of the proposed sewers within this area are assumed to be gravity. Review of the profiles of the sewer routes indicates that the sewer serving parcels along the Hudson River may need to be a combination of gravity sewer, force main and a pump station.

Locations of the identified sewer needs can be found on Figure 11B.

### 5.1.8 Town of Moreau

As previously discussed, information including location, flows and costs for the Route 9 corridor sewer were taken from the 2013 C2AE *Map, Plan and Report.* New infrastructure is also required for conveyance of projected flows from the proposed industrial and residential developments identified. Since the proposed developments are not located adjacent to one another, significant lengths of new sewer will be required to connect them to the existing collection systems. After conceptual review of the profiles for the proposed collection systems in the industrial park along the Hudson, in eastern Moreau, it was determined that this system may need to be a combination of gravity sewer, force main and a pump station. The development to the north of the industrial park may require the inclusion of a pump station and force main to send it to the existing collection system in Moreau or to send it across the river to WCSD#2 WWTP. The two large residential developments identified south-east of the industrial park will also

require a combination of gravity sewers, force mains and sewers to convey flows to the existing collection systems. The location of these features is dependent on the treatment plant to which the flow is sent. It is anticipated that sewer metering will be required for conveyance to the WWTPs. Costs of metering are incorporated into the cost estimate presented later in this report.

Locations of the identified sewer needs can be found on Figure 11A or 11B, depending on which WWTP the flow is conveyed to.

## 6.0 Opinions of Probable Capital Cost

### 6.1 Wastewater Collection and Conveyance

An opinion of probable cost was created for each of the stakeholder communities and the different sewer routing scenarios determined as part of this study. Proposed sewer infrastructure needs were summarized for each community and assigned preliminary costs. The preliminary unit prices used for each item are included in the opinion of probable cost. It was assumed that any proposed industrial developments would provide and pay for any needed pump stations, therefore the cost of pump stations at potential/scheduled industrial developments was not included. No survey or soil borings were completed as part of this study therefore existing conditions along the sewer routings will likely dictate the actual route, type of sewer used and the cost of the infrastructure development projects.

The resultant opinions of probable costs for each community are included as Tables 22 through Table 29.4 in this report, and a summary of these tables is provided below:

| Municipality | Scenario | Table Number | Opinion of Probable Cost |
|---|---|---|---|
| City of Glens Falls* | N/A | 22 | $0.00 |
| Village of South Glens Falls | N/A | 23 | $ 530,000.00 |
| Town of Queensbury | N/A | 24 | $ 6,640,000.00 |
| Town of Kingsbury | 1 & 2 | 25.1 | $ 40,320,000.00 |
| | 3 & 5 | 25.2 | $ 42,410,000.00 |
| | 4 & 6 | 25.3 | $ 41,920,000.00 |
| Village of Hudson Falls | N/A | 26 | $ 50,000.00 |
| Town of Fort Edward | N/A | 27 | $ 9,360,000.00 |
| Village of Fort Edward | N/A | 28 | $ 1,500,000.00 |
| Town of Moreau | 1 & 3 | 29.1 | $ 23,100,000.00 |
| | 2 & 4 | 29.2 | $22,890,000.00 |
| Town of Moreau | 5 | 29.3 | $ 23,100,000.00 |
| | 6 | 29.4 | $ 22,670,000.00 |

*Refer to 2013 City of Glens Falls LTCP for description of recommended O&M work required to comply with NYS DEC implementation requirements.

## 6.2 Wastewater Treatment

### 6.2.1 City of Glens Falls WWTP

Glens Falls WWTP upgrades are included as Table 30. The opinion of probable cost of construction is approximately $14.6 million for all proposed improvements. Unit prices came from suggested upgrades in the GF CSO LTCP, and were adjusted for 2014 dollars. Each unit price included fifteen (15) percent increase for indirect costs and contractor's overhead and profit, thirty (30) percent increase for engineering, legal and administrative costs and twenty-five (25) percent increase for construction contingency. Note all suggested upgrades are required for compliance with the City's LTCP, mandated by the NYSDEC and will be incurred regardless of the proposed development and collection system expansion described herein.

### 6.2.2 Washington County Sewer District No. 2 WWTP

Washington County Sewer District No. 2 WWTP upgrades are included as Table 31. The opinion of probable cost for all recommended improvements is approximately $5.9 million. The final price was increased by 40% for construction contingency and contractor's overhead and profit and by 30% for engineering, legal and administrative work. Equipment costs were obtained through budgetary estimates from local equipment vendors and cost estimating resources. The estimates provided herein are for planning level use. Site work and yard piping costs were taken from R.S. Means for Heavy Construction Cost Data 2014. Solids handling upgrade costs were taken from the *Washington County Sewer District #2 Facility Plan and Plan for Future Growth* by C.T. Male, July 2011, and were adjusted for inflation to 2014 dollars.

## 7.0 Opinions of Operation and Maintenance Costs and User Fee Impacts

A summary of the existing and proposed EDU's is included as Table 32 of this report. The number of existing EDU's from each community contributing to the GFWWTP was determined through conversion of the quarterly rate schedule. It was assumed that the minimum meter rate was equivalent to one (1) EDU which, through unit conversion, was translated into a value of 221 gallons/ EDU/ day. The number of existing EDU's from each community contributing to the WCSD#2 WWTP was determined through conversion of the bi-annual rate schedule. It was assumed that the minimum meter rate was equivalent to one (1) EDU which, through unit conversion, was translated into a value of 219 gallons/ EDU/ day. A new EDU was assumed to be equivalent to 200 gallons/ EDU/ day.

## 8.0 Project Timeline and Scheduling

A general timeline for all proposed improvements is as follows:

October 2014 – March 2016: Planning, 18 months, (includes survey, geotechnical, and easement negotiation).

August 2015 – July 2017: Design, Permitting, Bidding, 24 months, (projects would be completed in phases).

May 2016 – December 2018: Construction, 32 months, (projects would be completed in phases).

## 9.0 New York State Smart Growth Public Infrastructure Policy Act

The New York State Smart Growth Public Infrastructure Policy Act, signed into law in September 2010, provides goals for development that ensure development aligns with the strategic objectives of NYS.

### 9.1 Overview

The Smart Growth Act contains provisions that target public infrastructure investments to priority growth areas. A summary of the goals are presented below:

1. Use, maintain or improve existing water and sewer services;
2. Locate public infrastructure within municipal centers;
3. Promote development projects in developed areas or in areas identified for development in a comprehensive plan, local waterfront revitalization plan or brownfield redevelopment plan;
4. Protect and preserve New York State environmental resources;
5. Foster mixed land uses and compact development;
6. Provide for mobility through a variety of transportation choices;
7. Coordinate between state and local governments;
8. Promote community-based planning and collaboration;
9. Ensure predictability in land use codes; and
10. Strengthen existing communities so as to reduce green-house gas emissions.

### 9.2 Recommendations

The AGC has prioritized the incorporation of Smart Growth principles in the selection and evaluation of potential sewer routes for the various communities for the projects that have been identified by each community through meetings with the community and

review of their latest land use laws and comprehensive plans. The positive outcomes of applying the Smart Growth Policy Act are as follows:

1. Limitation of sprawl to conserve open space and protect Critical Environmental Areas;
2. Promoting centralized water/sewer services; and
3. Concentrating new development patterns by encouraging in-fill development.

It will be important for each community to review and implement the Smart Growth principles as project decisions need to be made in each community as public funding for these sanitary sewer improvements will include a review of Smart Growth. In fact, project scoring memos have been released from a number of agencies that detail compliance with Smart Growth principles.

## 10.0 Funding Opportunities

There are myriad opportunities available to communities for use in the planning, design and construction of wastewater infrastructure. These opportunities are available through state and federal funding. This section provides a brief overview of the prominent funding programs the AGC and member communities should consider utilizing when securing project financing.

This section is divided into two parts: the first provides information for available funding opportunities through the NYS Consolidated Funding Application Program (CFA); the second provides information for available funding opportunities through non-CFA funding programs.

### 10.1 NYS Consolidated Funding Application (CFA) Funding Opportunities

New York State's Consolidated Funding Application (CFA) process allocates funding from various state agencies into a central clearinghouse and application process. Grants and financing programs directly from the federal government are available that pertain to stormwater and wastewater infrastructure.

The City of Glens Falls, along with Washington County Sewer District #2 and the Towns of Queensbury and Moreau completed and were awarded a NYSDOS LGE grant for approximately $800,000 in the CFA Round 4 in 2013. The NYSDOS required work plan has been drafted and submitted for review to NYSDOS for a regional sewer study concerning conveyance and treatment of sanitary sewer as well as biosolids handling and disposal.

The 2014 round of the CFA was announced in the last week of April 2014 with an application submission deadline of July 2014 and an anticipated announcement of awards in late November to December 2014. A similar schedule is expected for 2015.

There are four programs within the CFA umbrella that could provide funding for wastewater infrastructure in the AGC:

1. NYS Department of Environmental Conservation/Environmental Facilities Corporation (DEC/EFC)
    a. Wastewater Engineering Planning Grant Program
    b. Green Innovations Grant Program
2. NYS Department of State (DOS)
    a. Local Government Efficiency Grant Program
3. NYS Empire State Development (ESD) Grant Funds
4. US Housing and Urban Development (HUD) Department of State Office of Homes & a. Community Renewal
    a. Community Development Block Grant (CDBG) Program – Public Infrastructure

10.1.1 NYS DEC/EFC – Wastewater Engineering Planning Grant Program

The NYS DEC through the NYS EFC has made up to $2 million available through the Wastewater Engineering Planning Grant Program in the 2014 CFA for improvements to municipal wastewater systems. This program offers grants to municipalities to help pay for the initial planning and engineering of eligible Clean Water State Revolving Fund (CWSRF) water quality projects.

Projects with no existing wastewater infrastructure must consider decentralized systems; new sewers and a wastewater treatment facility; and new sewers and connection to regional wastewater treatment facility. Projects with existing wastewater infrastructure must consider rebuilding existing wastewater infrastructure and connecting to regional wastewater treatment facility. These requirements support the NYS Smart Growth Public Infrastructure Policy Act (Smart Growth Policy Act) by sprawl and expansion of public infrastructure and the reuse/rehabilitation of existing infrastructure.

Grants are awarded for engineering studies ranging from $30,000 for municipalities with a population less than 50,000 people to $50,000 for municipalities with a population greater than 50,000. A 20% local cost share is required. Eligible municipal applicants must have a median household income of $65,000 or less. Grant funds are used to pay for engineering and/or consultant fees for engineering and planning services for the completion of an engineering report. Program priorities include assisting needy communities to complete engineering studies to plan and implement improvements to address local water quality problems. Successful applicants are required to submit a completed engineering report within 9 months of grant award, which is used as a vehicle to pursue financing through the CWSRF or other programs.

The DEC/EFC Wastewater Engineering Planning Grant could be considered by the AGC and member communities to fund improvements to existing or for new sewer collection, conveyance and treatment improvements.

### 10.1.2 NYS EFC Green Innovation Grant Program

The EFC Green Innovation Grant Program (GIGP) supports projects across New York State that utilizes unique stormwater infrastructure design and create cutting-edge green technologies. Funding is available statewide and is awarded for highly-visible projects that meet the following goals: Protect and improve water quality; spur innovation in stormwater management; build capacity locally and beyond by inspiring others to build and maintain green infrastructure; and facilitate the transfer of new technologies and practices to other areas of the State.

Funding is provided for selected projects to the extent that funds are available. Eligible applicants may submit more than one grant application. The EFC reserves right to limit GIGP funding to one grant award per applicant and reserves the right to fund all or a portion of eligible selected projects. Successful applicants receive a grant for up to 90% of the project construction costs, including eligible planning and design costs. All

recipients are responsible for providing a minimum 10% match of non-Federal funds that may be derived from local or state monies.

The EFC Green Innovation Grant should be considered by the AGC and member communities to fund improvements to existing or for new stormwater collection and treatment improvements. Source control projects improving water quality and reducing stormwater quantity recommended in the LTCP's would be an area of interest for the Glens Falls and Washington County WWTP's.

### 10.1.3 NYS DOS - Local Government Efficiency Grant Program

The NYS DOS Local Government Efficiency Program provides technical assistance and competitive grants to local governments for the development of projects that will achieve savings and improve municipal efficiency through shared services, cooperative agreement, mergers, consolidations and dissolutions. There is up to $4 million available through the Local Government Efficiency Grant Program in the 2014 CFA. This program offers funds to assist local leaders in identifying best practices and implement actions focused on reducing municipal expenditures, limiting the growth in property taxes and increasing efficiencies in service delivery.

The maximum funding for planning, or the planning component of a project that includes both planning and implementation, is $12,500 for each local government involved in the project, not to exceed $100,000. The total maximum cumulative funding for a project is $200,000 for each local government involved in the project, not to exceed $1,000,000. Project type dictates the local cost share requirements.

Eligible projects include re-organization planning, expedited re-organization assistance, and re-organization implementation. The local cost share is 10% for implementation projects and 50% for planning projects or studies. See example below.

| Total Project Cost | Implementation Project | | Re-organization Planning Project | | |
|---|---|---|---|---|---|
| | 10% Local Share | 90% State Share | 50% Local Share | 50% State Share | Refund upon Implementation |
| $20,000 | $2,000 | $18,000 | $10,000 | $10,000 | $8,000 |
| $50,000 | $5,000 | $45,000 | $25,000 | $25,000 | $20,000 |
| $100,000 | $10,000 | $90,000 | $50,000 | $50,000 | $40,000 |

For a planning grant, matching funds equal to at least 50% of the total project cost are required. Upon implementation, the original matching funds required will be refunded up to 90% of the eligible costs. For an implementation project, matching funds equal to at least 10% of the total project cost shall be required. All grants are reimbursement grants.

While included in the CFA process, this program is also available continuously with rolling deadlines on the first Wednesday of every month.

A smaller group of the AGC received a $800,000.00 in the 2013 CFA round to review a regional sewer entity and advance preliminary engineering beyond this study.

### 10.1.4 Empire State Development (ESD) Grant Funds

If AGC constituent communities have economic development projects that hinge on the expansion of wastewater infrastructure, Empire State Development Grant Funds may be available to aid in the job-creating endeavor.

Eligible applicants include but are not limited to: for-profit businesses, not-for-profit corporations*, business improvement districts, local development corporations, public benefit corporations (including industrial development agencies), economic development organizations, research and academic institutions, incubators, technology parks, municipalities, counties, regional planning councils, tourist attractions and community facilities.

Eligible activities include acquisition of land, buildings, machinery and/or equipment; demolition and environmental remediation; new construction, renovation or leasehold

improvements; acquisition of furniture and fixtures; soft costs of up to twenty-five percent (25%) of total project costs; and planning and feasibility studies related to a specific capital project or site.

ESD generally seeks to provide no more than twenty percent (20%) of the financing for any particular project. ESD requires that the applicant contribute a minimum of ten percent (10%) of the total project cost in the form of equity contributed after the applicant's acceptance of ESD's incentive proposal. Equity is defined as cash injected into the project by the applicant or by investors and should be auditable through the applicant's financial statements or accounts, if so requested by ESD. Equity cannot be borrowed money secured by the assets in the project or grants from a government source.

10.1.5 US HUD/NYS OHCR - Community Development Block Grant Program (CDBG)
Department of Housing and Urban Development (HUD) funds provided through the Community Development Block Grants (CDBG) program are directed to localities for activities which result in decent housing in a suitable living environment. Water and waste disposal needs are part of that environment, but must compete with many other needs for funding. Program policy demands that at least 70% of funding benefit low- and moderate-income persons.

Entitlement communities and states receive a basic grant allocation each year and know in advance the approximate amount of federal funds they will receive. Local and state authorities distribute grants based on local priorities and must specify how they will measure performance.

Eligible CDBG recipients include states, and local governments. Eligible activities include a wide range of projects such as public facilities and improvements, housing, public services, economic development, and brownfields redevelopment. State grantees must ensure that each activity meets one of the three national objectives: benefitting

low- and moderate-income persons, aid in the prevention or eliminations of slums or blight, or assisting other community development needs that present a serious and immediate threat to the health or welfare of the community.

Eligible projects for NYS CDBG Public Infrastructure may include the repair or replacement of existing systems, construction of new systems, or expansion of existing systems into areas previously un-served that are in compliance with the NYS Smart Growth Public Infrastructure Act (Chapter 433 of the Laws of 2010) and principally benefit low- and moderate-income persons.

The maximum funding for CDBG Public Infrastructure projects is $600,000 for individual villages, towns, and cities; $750,000 for counties; and $900,000 for a joint applicant. There is no local share requirement.

The CDBG Public Infrastructure Program is administered through the CFA process in NYS. Note: the City of Glens Falls is in-eligible because it is a HUD “Entitlement City”.

## 10.2 Non-NYS Consolidated Funding Application Opportunities

There are several non-CFA funding sources available to the AGC and its members for the planning, design and construction of wastewater infrastructure. They are as follows:

- New York State Environmental Facilities Corporation (NYSEFC)
    - Clean Water State Revolving Fund (CWSRF)
- United States Department of Agriculture
    - Water and Waste Disposal Direct Loans and Grants
    - Water and Waste Disposal Guaranteed Loans
- United States Department of Commerce
    - Economic Development Administration (Public Works and Economic Development Program)

### 10.2.1 NYSEFC – Clean Water State Revolving Fund (CWSRF)

The State of New York manages the Clean Water State Revolving Fund (CWSRF) to finance facilities that improve, maintain or protect water quality. The CWSRF provides financing to recipients for planning, design, and construction of eligible water quality projects. The goal of the CWSRF is to provide short or long term low cost financing that encourages the construction of point source, nonpoint source, estuary, land acquisition, and land conservation easement projects to improve, maintain, or protect water quality.

Clean Water SRFs may provide seven different types of assistance: making loans; buying or refinancing existing local debt obligations; guaranteeing or purchasing insurance for local debt obligations; guaranteeing SRF debt obligations; providing loan guarantees for sub-state revolving funds; earning interest on fund accounts; and supporting reasonable costs of administering the SRF. States cannot use SRFs as a source of grants. Loans are provided at or below market interest rates, including possible zero interest loans (exact rates are negotiated by the applicant and state SRF).

Eligible loan recipients are any municipality, inter-municipal, interstate or state agency. Projects or activities eligible for loans are those needed for constructing or upgrading publicly owned municipal wastewater treatment plants. Devices and systems used in the storage, treatment, recycling, and reclamation of municipal sewage are eligible, including construction or upgrading of secondary or advanced treatment plants; construction of new collector sewers, interceptor sewers or storm sewers; and projects to correct existing problem of sewer system rehabilitation, infiltration/inflow of sewer lines, and combined sewer overflows. Operation and maintenance is not an eligible activity.

All financing applications are required to be accompanied by documentation of 1) State Environmental Quality Review Act (SEQR) completion and signoff by the NYS Office of Parks, Recreation and Historic Preservation (SHPO), 2) sewer district formation or increase (if applicable), 3) Bond Resolution adopted by the applicant, and 4) an

executed contract for engineering planning services, if such services are to be funded by the CWSRF. EFC will continue to only fund projects for which an approvable engineering report has been submitted and that are listed on the Annual List.

All construction contracts to be paid for in whole or in part with CWSRF financing must be bid with Davis-Bacon requirements, or add these requirements by amendment. The FFY 2013 federal budget included the federal labor laws regarding prevailing wages, hours of work, and rates of pay, commonly known as the Davis-Bacon requirements. The 2014 Minority and Women Business Enterprise (MWBE) participation goals will be 20%.

10.2.2 USDA – Water and Waste Disposal Direct Loans and Grants

To develop water and waste disposal systems in rural areas and towns with a population not in excess of 10,000. The funds are available to public bodies, non-profit corporations and Indian tribes. Only the villages of Hudson Falls, Fort Edward, and South Glens Falls and the town of Fort Edward are eligible for funding under this program due to population requirements.

To qualify, applicants must be unable to obtain the financing from other sources at rates and terms they can afford and/or their own resources. Funds can be used for construction, land acquisition, legal fees, engineering fees, capitalized interest, equipment, initial operation and maintenance costs, project contingencies, and any other cost that is determined by the Rural Development to be necessary for the completion of the project. Projects must be primarily for the benefit of rural users.

The rates that are used to calculate these loans are subject to change quarterly. Loans are made based on the applicant's authority and the life expectancy of the system's project, which may be up to the maximum of 40 years.

The material submitted with the application should include an application SF 424.2, two copies of the Preliminary Engineering Report, Environmental Report, population and median household income of the area to be served, current audits or financial information for the past three years, evidence of outstanding indebtedness, organizational documents, the applicant's IRS tax identification number, DUNS number, a proposed operating budget, and some certification forms. This loan program is based on repayment ability. These loans are calculated on similar systems rates, median household income, financial status of the system, and outstanding indebtedness. There are some systems that qualify for grant funding; however, grant funding availability is limited. Applicant contributions show ownership in the projects and are often recommended. These applicant contributions are the first money spent in any project.

### 10.2.3 USDA – Water and Waste Disposal Guaranteed Loans

To provide a loan guarantee for the construction or improvement of water and waste disposal projects serving the financially needy communities in rural areas. This purpose is achieved through bolstering the existing private credit structure through the guarantee of quality loans which will provide lasting benefits. The water and waste disposal guarantee loans are to serve a population not in excess of 10,000 in rural areas. Only the villages of Hudson Falls, Fort Edward, and South Glens Falls and the town of Fort Edward are eligible for funding under this program due to population requirements.

Guaranteed loans are made and serviced by lenders such as banks, savings and loan associations, mortgage companies and other eligible lenders under the Guarantee Loan Program. These funds are available to be used by public bodies, non-profit corporations and Indian tribes. To qualify, applicants must be unable to obtain the required credit without the loan guarantee from private, commercial or cooperative sources at reasonable rates and terms. Each borrower must have or will obtain the legal authority necessary to construct, operate and maintain the proposed facility and services. The facilities must be located in a rural area. All facilities financed under this provision shall

be for public purposes. Guaranteed loans may be made in combination with direct loans.

The lender will structure repayment as established in the loan agreement between the lender and borrower. Normally, guarantees do not exceed 80 percent of the loan. Interest rates are fixed or variable and are determined by the lender and borrower subject to USDA Rural Development review and approval. The maximum time allowable for final maturity for a guaranteed Water and Waste Disposal loan will be limited to the useful life of the facility, not to exceed 40 years. Balloon payments at the end of the loan are prohibited.

The material submitted with the application should include documentation of lender eligibility, an application SF 424.2, two copies of the Preliminary Engineering Report, Environmental Report, population and median household income of the area to be served, audits or financial information for the past three years, evidence of outstanding indebtedness, organizational documents, the applicant's IRS tax identification number, DUNS number, a proposed operating budget, and some certification forms. In addition, the lender should also submit the proposed loan agreement, and financial feasibility analysis and report.

10.2.4 US Department of Commerce – Economic Development Administration (Public Works and Economic Development Program)

The Economic Development Administration (EDA) is authorized to support community water and sewer projects through the Public Works and Economic Development Program. The purpose of the program is to promote long-term economic development and assist in the construction of public works and development facilities needed to support the creation or retention of permanent jobs in the private sector in areas experiencing substantial economic distress.

In general, EDA assistance average and may not exceed 50% of the cost of the program. Projects may receive additional funding, not to exceed 30%, based on the relative needs of the region in which the project will be located (determined by EDA).

Public Works grants may be made to states, cities, counties and other political subdivisions of states, an institution of higher education or a consortium of such institutions, and private or public not-for-profit organizations acting in cooperation with officials of a local government.

Qualified projects must fill a pressing need of the area and: (1) be intended to improve opportunities for the creation of businesses, (2) create long-term employment, and (3) benefit long-term unemployed or underemployed persons and low-income families. Projects must also fulfill a pressing need and be consistent with the comprehensive economic development plan of the area.

Projects must be located in areas with at least one of the following: low per-capita income, unemployment rates above the national average, or an actual or anticipated abrupt rise in unemployment.

## 11.0 Environmental and Archaeological Resource Impact

### 11.1 State Environmental Quality Review Act

The State Environmental Quality Review Act (SEQRA) is state mandated process that assesses the potential environmental impact of ‘”actions” (projects) with the goal of encouraging alternative for development and to mitigate potential impacts. Actions are generally reviewed by project sponsors, owners, state and federal funding agencies and regulators. The basic purpose of SEQR is to incorporate the consideration of environmental factors into the existing planning, review and decision making processes of state, regional and local government agencies at the earliest possible time.

Project impacts are often highly localized and custom for each project action. The SEQR process is structured such that the rigorousness of review matches the potential for significant impact by the project action. Since every project has specific design elements, location issues and public concerns affecting environmental review, applicants should seek the appropriate project specific professional planning, legal and engineering advice.

### 11.2 Environmental Resources

A desktop review of the NYS DEC’s GIS based environmental resource mapper was completed was completed for the impacted project areas. The environmental resource mapper provides information on known critical environmental resources including regulated wetlands, rare plant and animal communities as well as identified significant natural communities. This resource is meant for high-level planning and review of concept projects at the feasibility level.

The City of Glens Falls, Towns of Queensbury, Kingsbury, Moreau and Fort Edward and Villages of Hudson Falls, Fort Edward and South Glens Falls contain rare

plants/animals and/or significant natural communities. These may include threatened or endangered species identified by the US Fish and Wildlife Service, or natural ecological systems identified as critical to environmental health by the NYS DEC's Natural Heritage Program. During the SEQR process, applicants should request a determination from the NYS DEC's NHP to determine the extent and limits of natural communities present. Should a project site be identified as containing plant or animal species or communities of significance, a habitat assessment may be completed to identify the potential for significant species to be present as well as recommendations for mitigating measures or alternative designs to eliminate or minimize environmental impacts of the project.

NYS DEC freshwater wetlands of significant size are identified in the Towns of Queensbury and Kingsbury northeast of the City of Glens Falls, as well as the Town of Moreau along the Hudson River. Freshwater wetlands of smaller size are distributed throughout the Town of Queensbury north of the City of Glens Falls. For projects that may fall within or near regulated freshwater wetlands, a wetland survey may be completed to delineate the extents of wetlands on a project site so that the project may be developed in a way that minimizes or eliminates impacts to freshwater wetlands. A wetland survey specialist will also provide a report discussing the wetland resources on the project site, provide recommendations for mitigating measures and to identify necessary state and Federal permit requirements.

A review of the NYS DEC Environmental Resource mapper for the Washington County Sewer District #2 WWTP site reveals no wetlands, rare plants/animals or significant natural communities present. Further review should be completed under SEQR prior to commencing construction of improvements.

A review of the NYS DEC Environmental Resource mapper for the City of Glens Falls WWTP site reveals the presence of rare plants or animals within the project site. Further

review should be completed under SEQR prior to commencing construction of improvements.

## 11.3 Cultural, Historic and Archaeological Resources

Actions classified as Type 1 or Unlisted actions requiring a draft EIS require comments from the NYS Office Parks, Recreation and Historic Preservation (SHPO) to ensure the project does not negatively impact cultural, historic and/or archaeological resources. Applicants may request comments from the SHPO for specific project areas. In cases where the project site or action does not threaten cultural, historic or archaeological resources, the SHPO will issue a letter of 'No Effect'. Should the action potentially result in impact to cultural, historic or archaeological resources, SHPO may issue a request that a Phase 1A archaeological assessment be completed. This assessment includes the development of a report outlining the past use of a project site and a more detailed investigation of the action's potential to impact critical resources. If significant impacts are identified by the Phase 1A report, the SHPO may request a Phase 1B report be completed. The Phase 1B report

A desktop review of cultural, historic and archaeological resources was completed using the SHPO Sphinx GIS based resource mapping software available at the SHPO website www.nysparks.state.ny.us. A significant portion of the impacted communities lie within potential archeo-sensitive areas. Given the rich history of the project area, it is likely that any work will require some level of archeological review.

## 12.0 Public/Private Partnerships and Legal Requirements

This section provides a summary discussion of legal requirements for Towns and Village's to form or extend a sewer district as well as information regarding the feasibility and requirements to form an overall sewer authority within the AGC communities and entities examined herein.

It is recommended that the AGC communities consult with their respective legal counsel for additional legal advice prior to establishing a district, entering into an agreement with neighboring communities or private entities or forming a regional sewer authority. It is expected these efforts would be part of the DOS funded project from the 2013 CFA grant award.

### 12.1 Legal Requirements for District Formation

A sewer district is established or extended to provide the legal and organizational entity that will implement, operate and maintain the sewer infrastructure. District formation is typically required and completed prior to the implementation of a sewer project. The purpose of a Sewer District is to ensure that the property owners that are benefitted by the sewer system also pay for the sewer system, and that households that are within the entity that are not benefitted by the sewer system are not unfairly burdened with its cost.

Any county (on behalf of a county sewer district), city, town (on behalf of a town sewer district or sewage disposal district), or village may provide for the construction and development of excess sewage disposal capacity for the purpose of conveying, treating and disposing of sewage of another public corporation under General Municipal Law, Article 5-D and County Law S253-a.

### 12.1.1 Villages

New York State empowers villages to establish complete sewer systems (Village Law S14-1400). Villages are able to make local improvements at Village expense or to be assessed against benefitted lands (Village Law S22-2200). A Village can undertake improvements for specific areas within a Village and levy the costs of the contemplated improvements to the benefitted areas only.

### 12.1.2 Towns

Towns may establish or extend a sewer district through three (3) alternative actions:

Alternative 1 – Town Board Initiated Procedure: If the Town board commences the formation of Sewer District under New York State Town Law Article 12-A. Action is subject to permissive referendum requiring the Town board to meet statutory requirements to ensure the project is supported by the private property owners within the impacted service area.

Alternative 2 – Property Owner Petition: Property owners within the area to be served by the proposed Sewer District submit a petition to the Town Board seeking the creation of a Sewer District under New York State Town Law Article 12.

Alternative 3 – Town Special Assessment: Town may make improvements and provide sewer disposal services without the formal creation of a Sewer District under New York State Town Law, Article 12-C. Under this alternative, the Town Board initiates the process of committing to undertake an improvement project by adopting a resolution authorizing the completion of a Map, Plan and Report (MPR) for the proposed improvements. The Town Board may make this decision subject to permissive or mandatory referendum. Once the MPR is completed, a hearing is scheduled and noticed to the public. Following the public hearing, it is the Town Board's responsibility to determine if the contemplated improvements are in the best interest of the public. If so, the Town Board may authorize the improvements, which may be subject to approval

by the New York State Comptroller if the estimated expense of the improvements will be funded by indebtedness in excess of 1/10$^{th}$ of 1% of the assessed valuation of the Town (outside of any incorporated Village's).

In each case, the action is subject to compliance with the New York State Environmental Quality Review Act (SEQRA). In some instances, a Town sewer district meeting certain financial thresholds is subject to approval by the New York State Comptroller.

Below is the general step-by-step process for a Town sewer district formation:

i. Determine District Location
ii. Appropriate Funds for Map, Plan and Report
iii. Hold a Public Hearing
iv. Establish the District
v. Adoption of Final Order Establishing or Extending District
vi. Application for Permission of State Comptroller to Establish or Extend District
vii. Recording Final Resolution
viii. Increase in Maximum Amount Allotted for District Improvements
ix. Increase in Maximum Amount to be Expended Annually for Sewer Service
x. Judicial Review

A sewer district may provide sewer services outside the Sewer District earth through expansion of existing district boundaries or pursuant to the sewer connection contract. Typical sewer connection agreements would require property owners to comply with the Sewer Use Law and to pay a sewer rent at least equivalent to the sewer rent paid by property owners within the sewer district.

New York State Town Law Section 198 (1)(f) authorizes a Town board, on behalf of a Town sewer district, to enter into contracts to provide sewer collection, conveyance and

disposal services to other sewer districts, cities, villages, corporations or individuals outside of the established sewer district limits.

Town Law ss190-b authorizes the establishment of sewage disposal districts.

### 12.1.3 Cities

Cities are authorized to construct, maintain and operate sewage systems and sewage treatment and disposal facilities under General City Law ss20(2) and ss20(7), and under General Municipal Law, Article 5-D.

### 12.1.4 Counties

A county may form a sewer district with the acceptance of a resolution stating such by the county legislature. County Law 5-A authorizes the establishment of sewer, drainage and wastewater treatment and disposal and water quality treatment districts. County Law S220-a authorizes a county to designate a water quality management agency to oversee a water quality management program.

County sewer districts frequently provide major capital facilities for multi-municipal sewage treatment and disposal projects. The creation of county districts and other inter-municipal arrangements allow for the use of sophisticated techniques, often at considerably lower unit costs that could be obtained by a number of smaller independent facilities.

## 12.2 Governance and Management Options

This section below outlines various governance and management options for the collection, conveyance, treatment and disposal of sewage generated within the AGC within the scope of this report.

### 12.2.1 Consolidation to Single Entity

A single public authority may be established under New York Code Article 5, Public Utility Authorities Law. Article 5 provides for the establishment of authorities as public benefit corporations to provide water, sewer and other services to the public. Authorities are typically established for the benefit of a city or county, but may be established for the benefit of multiple counties, cities, towns and villages. New York Code Article 5, Title 8-A: New York State Local Water and Sewer Authority Act allows for the formation of a public utility authority serving the needs of Towns and Villages with the intent of providing economical utility services to the public and to promote cooperation among local governments and public health and welfare.

A regional sewer authority would be subject to the rules and regulations established under Article 5, Public Utilities Authority Law of New York Code. Establishing a regional sewer authority would require action by the New York State Legislature to pass legislation authorized the formation of a regional sewer authority.

A regional sewer authority may offer advantages when securing funding for public infrastructure projects within the authority's jurisdiction. This approach requires vigilance to ensure that local needs of member municipalities and entities are met in a fair and timely manner.

### 12.2.2 Joint Venture/Partnership and Inter-municipal Agreements

Joint ventures and partnerships allow local governments to seek regional and creative solutions to providing public services to users with reduced costs. Article 5-G of the General Municipal Law of New York State provides for municipal corporations and districts with the power to enter into cooperative or joint agreements between or among them to provide any function, power or duty that each has authority to undertake on its own. A municipal corporation may include counties, cities, towns and villages. Since local governments are empowered to undertake together any activity each may

undertake alone, the opportunity to use an intergovernmental agreement to provide services or projects is only limited by the powers of each participant.

A cooperative or joint venture is a business arrangement between participants. Member communities may choose to utilize inter-municipal agreements to share the responsibility of ownership, construction and/or operation and maintenance of the sewer infrastructure. In this alternative, the municipality will need to prepare and execute an inter-municipal agreement or service contract. The agreement/service contract would include necessary provisions outlining the terms of the service relationship such as:

i. A description of the joint service or project, an identification of the participants and the authority pursuant to which each will be undertaking the service or project;
ii. Descriptions of the roles of each participant entities, and the identification of the managing participant, if any;
iii. Fiscal matters, such as the method for allocating costs, rate schedules;
iv. The manner for employing and compensating employees;
v. Timetables and processes for contract review and renegotiation;
vi. Reference to local laws governing the construction and future operation of the project;
vii. Methods for dispute resolution during a contract term; and
viii. Responsibility for liabilities.

Two or more municipalities may enter into contracts to jointly construct and operate a complete sewerage system including trunk lines, laterals and treatment plants, or to contract with a third person, corporation or municipality for the work under General Municipal Law, Article 6.

The City of Glens Falls and the Washington County Sewer District currently hold agreements with neighboring municipalities for the treatment and disposal of sewage.

This alternative for constructing and operating sewerage systems may be attractive as the existing agreements can be used or modified as necessary to accommodate future expansion of facilities and service areas.

Another option would be for Warren and Saratoga Counties to form county sewer districts and enter into a 3-party inter-municipal agreement with Warren, Washington and Saratoga counties to provide sewer utility services.

### 12.2.3 Public/Private Partnerships

Public private partnerships (P3's) are an approach for procuring and operating public infrastructure where the private contractor is responsible for assuming a major share of the responsibility for design, construction, financing, operations and/or performance over the long-term life of the project or infrastructure.

P3's can be an attractive option for municipalities. The follow reasons that make P3's an attractive option include:

1. Long term cost certainty and predictability;
2. Use of innovative solutions for operation and maintenance of infrastructure and facilities;
3. Relieve municipalities of operational responsibilities;
4. Need for new or different resources to manage complex and emerging technologies;
5. Take advantage of economies of scale realized by larger private firms; and
6. Desire to protect taxpayers from project risks such as cost overruns, delays and problems with performance.

The unique challenges and opportunities of each project should be assessed in the context of the municipality's resources and constraints to select an appropriate project delivery model. The complexity of construction projects, particularly wastewater

treatment facility improvements makes P3's an attractive option to provide fixed price of design, construction and long-term operation.

A negotiated agreement between the private company and municipality ensures that each party's interests are represented appropriately. Financial penalties tied to performance incentivize private companies to maintain an acceptable standard of work and service. In some cases, private operations firms are able to monetize existing sewerage assets of the community to provide cash advances. Rates and pricing that private companies charge for sewer service are regulated by the State Public Service Commission.

As previously stated, it is expected that these various partnerships would be further evaluated and explored within the Upper Hudson River Revitalization Plan for Planning and Implementation of Shared Services Project, funded by a 2013 CFA Award.

## 13.0 Public Information Outreach

### 13.1 Overview

The AGC should endeavor to take a positive and proactive position with respect to communication of the proposed developments within the impacted communities. Messages should be clear, concise and consistent, targeted to the specific audiences and tailored to the character and needs of each community. Messages to the public should be conveyed through a portfolio of traditional media and new media. This could include public information sessions, print media via local newspapers, local radio and the internet. The portfolio approach will ensure that a wide and diverse audience is reached in a cost effective manner.

The goals of the outreach program may include:

1. Educate AGC community residents of who the AGC is, their role in the future planning of the local communities, its mission and the benefits of being a member community;
2. Strengthen relationships between and among member communities. Specific examples include the wastewater treatment and sewer collection departments of the communities included herein;
3. Increase the AGC's presence in the member communities as a supportive, guiding force for regional growth, stability and development;
4. Provide an outlet for interested community members to contribute to the regionalization of the AGC. This will assist the AGC in directing the narrative about local governmental cooperation and demonstrate its value as a driving force within the community.

## 14.0 Summary & Next Steps

This report provides a concept level assessment of the AGC's future sewer infrastructure needs, along with engineering recommendations, that will serve the AGC's goal of a comprehensive and stakeholder driven regional development plan for sewer services. For each community within the AGC, population projections and proposed/future potential development opportunities were used to evaluate the sewering needs of each community. Six possible scenarios were created for sewer routing to each of the WWTPs in the AGC: the Glens Falls WWTP and the WCSD #2 WWTP. Scenario 1 was chosen because it is the most cost efficient and divides the sewer needs equitably between the WWTPs and optimizes the needed improvements at each WWTP. Recommendations for each WWTP and corresponding opinions of probable cost were developed based on a capacity analysis and a review of the CSO Long Term Control Plans. The South Glens Falls Pump Station and the WCSD #2 Trunk Sewer were analyzed for available capacity and improvements were suggested based on these analyses. A summary map of the selected scenario indicating the identified improvements to the collection system and WWTPs is included as Figure E.

A general review of all funding sources, environmental and archeological review requirements, partnerships and legal requirements and public information outreach methods was completed for all potential projects noted in this report.

Following acceptance of this report by the AGC and the US Housing and Urban Development Authority, the AGC should begin a public outreach program to 1) promote the role of the AGC and regionalization, 2) inform the public of the regional sewer infrastructure needs and plans and 3) provide interested parties and community members with a forum and action items to further the regionalization initiative. Public support will be critical to assist the AGC with establishing this new order.

The degree to which sewer services are regionalized will dictate many of the steps taken by the AGC and its member communities. Assuming that a high degree of service sharing will be undertaken, legal/public entities will need to be formed (as outlined herein in Section 12) to provide the necessary legal authority to undertake the improvement projects evaluated herein. Depending on the level of regionalization selected, the formation process may take time and considerable effort, likely increasing with the degree of service sharing. For example, a multi-county sewer authority would require action at the state political level, as part of the structured review of the regional sewer system (Authority, County districts, town districts, IMA's, MDU's, etc.). An evaluation of the annual user costs will be required for each option. This report has delineated capital project costs and EDU counts which would then be used to estimate annual costs.

Following the formation of the necessary legal and public entities, professional service providers would be secured (lawyers, planners, engineers, etc.) to secure funding and to plan the concept projects included herein into designs and construction contract documents. This work would include securing permits, SEQR review, project design. Once this work is completed, projects would be 'shovel-ready' and construction could begin.