

APPENDIX B

Engineering Report

Wastewater Collection Concept Report

Hudson Heritage Project

3532 North Road (U.S. Route 9)
Town of Poughkeepsie
Dutchess County, New York



Engineers
Land Surveyors
Planners
Environmental & Safety Professionals
Landscape Architects

Prepared for:

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December 8, 2015
Revised October 17, 2016

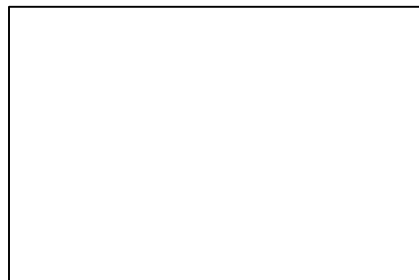
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**Wastewater Collection
Concept Report**
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Dutchess County, New York

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1.0 INTRODUCTION

The Hudson River Psychiatric Center, also known as the Hudson Heritage Site or Project Site, is located in the Town of Poughkeepsie in Dutchess County, New York. The property on which the Hudson Heritage development is proposed consists of 156.19± acres of land previously owned by the New York State Office of Mental Health and was the site of the Hudson River Psychiatric Center. The buildings onsite are currently abandoned and in a deteriorating state. The parcel is adjacent to NYS Route 9 at the intersection of Winslow Gate Road.

Hudson Heritage is an integrated development project proposed to be built over a 10-year period. The project would include two primary components: residential units and commercial. The commercial units would be constructed in the first phase followed by the residential units and hotel. Figure 1 in Appendix A of this report shows the conceptual layout of the proposed development.

1.1 Existing Wastewater Utility Infrastructure

This report outlines the methodology for collection and treatment of wastewater generated by the proposed development. Proposed sewer collection infrastructure is discussed in Section 4.0 of this report. Impacts and respective mitigation of the proposed collection are discussed in Section 5.0 of this report.

The project site resides within the Town of Poughkeepsie's fourth ward district. The wastewater generated onsite and wastewater from offsite are conveyed through mains which flow to the City of Poughkeepsie treatment facility for treatment prior to discharge to the Hudson River.

The City of Poughkeepsie has an operating wastewater treatment facility (WWTF) located at 173 Kittredge Place, approximately 1.0 mile south of the proposed development. The plant became operational in August 1977 and is currently designed to treat an average of 10.0 MGD during the dry season (May 1st to November 30th) and 14.0 MGD during the wet season (December 1st to April 30th). The facility operates in a conventional activated sludge treatment process, consisting of preliminary, primary and secondary unit processes. Current State Pollutant Discharge Elimination System (SPDES) permit limitations on Biological Oxygen Demand (BOD) and Total Suspended Solids TSS are 30 mg/l and 30 mg/l, respectively. Current flows (2014-2015) into the facility average 5.7 MGD during the dry season and 8.0 MGD during the wet season.

The site has an existing wastewater collection system with pipes ranging in size from 8" – 30." It is reported that much of this system is constructed of cement pipe. An estimated

4,300 lineal feet of the existing piping resides with easements owned by the State of New York. It was reported by New York State that they have initiated three emergency repairs in the 2014-2015 timeframe on their sewer main within the easements. The State has noted the existing pipe remaining near the repaired areas were in a deteriorating condition and in need of replacement.

If the proposed project did not materialize, the existing sewer infrastructure will continue to deteriorate. Repair and/or replacement of the mains would be the responsibility of the New York State Office of Mental Health.

1.2 Legal Requirements

It is proposed to build a complete wastewater collection system to serve the Hudson Heritage development. The existing agreement between the Town of Poughkeepsie and New York State is proposed to be transferred to the site owners with the exception of one area between the existing meter pit and existing Culinary Institute of America connection point. The proposed wastewater generation from the site is not estimated to exceed the reserved capacity.

To accommodate the new development, the proposed sewer infrastructure is proposed to be located outside currently established easement limits. Legal actions are required as a result of the proposed development to re-align the easements to the proposed collection mains.

2.0 PROJECT DESCRIPTION

The project sponsor proposes the development of residential housing of various types (single family, multi-family, apartments, townhouses, student housing, and lofts) along with commercial buildings including retail, restaurants, public spaces, a hotel and bed and breakfast. The first phase of the project involves construction of the commercial portion with the exception of the hotel. Residential housing and the hotel is proposed in the second phase. Most of the existing structures are to be demolished under the proposed site plan. There are five (5) existing buildings that are to remain and undergo renovation. This renovation is proposed to be performed in the second phase.

Specifically, the project will include the following:

Residential

Residential properties will be comprised of apartments, townhouses, and single-family homes in a range of unit sizes dispersed throughout the project site as follows:

- 225 townhouses with 3 bedroom each (675 bedrooms);
- 500 apartments split between 1 and 2 bedroom units (800 bedrooms); and,
- 25 single-family dwellings with 4 bedrooms each (100 bedrooms).

Commercial

- 80-room Hotel and restaurant/spa [Renovated Kirkbride Administration Building];
- 15-room bed and breakfast, museum, or similar facility;
- 165,000 SF retail building; and,
- 185,000 SF of retail spread out over 14 buildings.

Community Amenities

- Club House; and,
- Community Center

Due to the size of the proposed project, conflicting site plan layout with existing infrastructure and the deteriorating state of the infrastructure, the preferred alternative is to construct a new, on-site collection system for wastewater. Replacement maximizes service life and reliability of the system.

3.0 PROJECT PHASING

Development of the property is expected to proceed in several phases of construction in the following order:

- Site preparation and infrastructure improvements (site clearing, grading, roadway, paving, drainage, electric utilities, water distribution, sanitary sewer);
- Commercial Retail areas; and,
- Hotel and residential areas.

The sewer collection main line that connects the offsite properties in the Town's 4th Ward to the Town's collection system on the west side will be constructed in the first phase. Additional sewer infrastructure will be added as new buildings are constructed. New construction will be designed to the latest applicable standards of relevant codes and standards. Testing of the new main will be in accordance with applicable codes and standards at the time of construction.

4.0 WASTEWATER COLLECTION SYSTEM

4.1 Estimate of Wastewater Flows

The proposed development includes a mix of residential and commercial uses. Projected water demand is based on the Building Program presented in the most up-to-date Development Master Plan.

The anticipated average daily wastewater flow for the proposed development was estimated using typical hydraulic loading rates as recommended in Table B-3 of the latest edition of the New York State Design Standards for Intermediate Sized Wastewater Treatment Systems (March 2014) as summarized in Table 1 below. The estimated flows were adjusted when applicable to take into account the allowed 20% reduction in flow for use of water-saving fixtures as mandated by Section 15-0314 of the Environmental Conservation Law.

The proposed development at full buildout and maximum occupancy is expected to generate approximately 228,800 gallons of wastewater per day on average (158.9 gpm) with a maximum daily flow of 457,570 gpd (318 gpm) as shown in Table 1. The peak hourly flow is expected to be 915,136 gpd or 636 gpm assuming a peaking factor of 4.

TABLE 1: HUDSON HERITAGE PROJECT PROJECTED WATER DEMAND/WASTEWATER FLOW ⁽¹⁰⁾						
Type of Use	Unit	Unit Qty	Hydraulic Loading Rate ⁽¹⁾ (gpd/unit)	Water Saving Credit ⁽²⁾ (%)	Hydraulic Loading Rate w/ Credit (gpd/unit)	Average Daily Flow (gpd)
Residential						
Multi-Family Apartments	1-Bedroom	200	110 ⁽³⁾	---	110	22,000
	2-Bedroom	300	220 ⁽³⁾	---	220	66,000
Town Homes	3-Bedroom	225	330 ⁽³⁾	---	330	74,250
Single-Family Homes	4-Bedroom	25	440 ⁽³⁾	---	440	11,000
Commercial						
Retail/Gas Station/Bank	sf	350,000	0.1	20%	0.08	28,000
Employees ⁽⁴⁾	employee	875	15	20%	12	10,500
Hotel & Spa						
Hotel Rooms	sleeping unit	80	110 ⁽⁵⁾	---	110	8,800
Restaurant	seat	60	35	20%	28	1,680
Spa (12,000 sf) - 80 patrons	patron	80	20 ⁽⁶⁾	20%	16	1,280
Bed & Breakfast						
Rooms	room	15	110 ⁽⁵⁾	---	110	1,650
Civic/Community						
Club House (3,700 sf) ⁽⁷⁾	seat	148	20 ⁽⁷⁾	20%	16	2,368
Community Center (13,276 sf) ⁽⁸⁾	patron	266	5 ⁽⁸⁾	20%	4	1,064
Employees ⁽⁹⁾	employee	16	15	20%	12	192
Avg Daily Flow:						228,784
Max Day Peak Factor:						2.0
Max Daily Flow (gpd):						457,568
Max Daily Flow (gpm):						318
Hourly Peak Factor:						4.0
Peak Hourly Flow (gpd):						915,136
Peak Hourly Flow (gpm):						636

Notes:

- Hydraulic Loading Rates from Table B-3 of NYS Design Standards for Wastewater Treatment Systems (2014) unless otherwise noted below
- NYSDEC allows for up to 20% reduction in flows for installations equipped with certified water-saving plumbing fixtures.
- Unit rate of 110 gpd/bedroom includes the 20% reduction for use of water-saving post 1994 plumbing fixtures
- Assumed 2.5 employees/1,000 sf of retail floor space per Development Impact Assessment Handbook, Urban Land Institute 1994
- Unit rate for room or sleeping unit includes the 20% reduction for use of water-saving post 1994 plumbing fixtures
- Category or use not specifically listed in Table B-3 of 2014 NYSDEC Standard. In lieu, use Hydraulic Loading Rate of 20 gpd per Health Club patron per Table B-3.
- Assumed 25 sf of gross floor space per seat and rate of 20 gpd/seat for Lounge/Bar per Table B-3 of 2014 NYSDEC Standard
- Assumed 50 sf of gross floor space/occupant and rate of 5 gpd/patron for Library/Museum per Table B-3 of NYSDEC Standard
- Assumed 1.25 employees per 1,000 sf of community center gross floor space
- Projected water demand/wastewater flow assumes full buildout and maximum occupancy of proposed facilities

4.2 Wastewater Collection

The site of the proposed development generally has higher elevations at the northeast and northwest corners of the site and the site elevation trends downward both westerly and southerly toward the southwest corner of the property. There is an existing meter pit at the southwest corner that allows for billing. The meter pit is owned and maintained by the Town of Poughkeepsie. The meter is calibrated annually.

The proposed sewer collection system is anticipated to contain approximately 18,000 lineal feet of sewer main with approximately 87 manholes. There are proposed to be three entities that will own and maintain sections of this collection system. Easements will be granted as required to allow for respective ownership:

- New York State is anticipated to own and maintain approximately 1,920 lineal feet of sewer main and 11 manholes between the existing meter pit and connection point from the Culinary Institute of America.
- The Town of Poughkeepsie is anticipated to own and maintain approximately 3,180 lineal feet of sewer main and 19 manholes between the connection point from the Culinary Institute of America and the eastern connection point located on Paint Shop Road.
- The remainder of the proposed sewer collection system (an estimated 12,900 lineal feet and 57 manholes) is to be owned and maintained by the project sponsor.

The proposed wastewater collection system is anticipated to be an entirely new network of gravity collection pipe comprised of 8" – 30" SDR 35 PVC main, dependent upon estimated peak flows and pipe slope. Thicker-walled piping and/or a substitute material may be utilized under roadways, at deeper installation depths, or where heavier loads are foreseeable. A map of the conceptual sewer layout is included as Figure 1 identifying the entity responsible for the ownership, operation and maintenance of the various portions of the sewer collection system (see Appendix A of this report). As design of the proposed development advances, design of the wastewater collection and conveyance systems will also be advanced. All gravity mains will be tested to Town of Poughkeepsie standards utilizing accepted test methods prior to being placed into service.

The general slope of the sewer main from the eastern connection point on Paint Shop Road to the Meter Pit (Town and State Easement) is estimated to be 1.5%. Pipe slopes are estimated to range from the minimum allowed within 10 State Standards to an estimated 14 percent.

Actual slopes of the mains will vary depending upon location, existing or final grade, and flow rate. The existing system appears to be designed for a maximum average daily flow of 500,000 gpd. This capacity is to remain within the new collection system.

The design intents are to have a minimum velocity of two (2) feet per second through all sewer mains with the pipe flowing full, prevent high velocities in the mains (greater than 10 feet per second) and steep slopes (greater than 20%). Velocities through the sewer mains are to be calculated in the design phase. In areas where velocities and slopes may be excessive as defined in Ten State Standards, additional reinforcement and design features will be added to protect the system.

Proposed manholes in the collection system are to be constructed of concrete and tested for compliance with Town of Poughkeepsie standards, utilizing accepted test methods prior to being placed into service. Manhole lids are anticipated to be placed at final proposed grade.

Areas where gravity collection systems are not capable of conveying wastewater to the collection system by gravity will be equipped with pump stations. All efforts will be made to avoid the need for pump stations. The conceptual layout provided in Figure 1 does not require pump stations. However as the design progresses the presence of a pump station cannot be ruled out. Therefore, the need for any pump stations that arise during site plan development will be designed in accordance with NYSDEC standards (Ref. 1), Ten State Standards (Ref. 2), Dutchess County Department of Health standards, and Town of Poughkeepsie standards.

Building sewers will be constructed according to the latest applicable revisions of the New York State Building Code (Ref. 3), New York State Plumbing Code (Ref. 4), and Town of Poughkeepsie standards. External grease traps followed by a sample manhole shall be installed at restaurants or other food preparation areas as required by the New York State Plumbing Code or Town of Poughkeepsie Sewer Department to prevent fats, oils, and greases from entering the City's WWTF. Owners of these commercial buildings will be required to maintain the grease traps.

The Town of Poughkeepsie will require all sewer mains to be pressure tested to ensure water tightness. Bypassing of wastewater will be performed to ensure continued service to properties offsite that utilize the line.

4.3 Wastewater Treatment

The wastewater from the site is proposed to be conveyed to the City of Poughkeepsie Wastewater Treatment Facility ("WWTF"). The facility's average flows as provided in Section 1.1 of this report are well below the stated capacity. The City plant also has reserved capacity for this project. The agreement between the Town of Poughkeepsie

and New York State Office of Mental Health dated 8 August 1980 ("Agreement") allows the site to discharge up to 500,000 gallons per day into the Town's collection system with ultimate discharge to the City of Poughkeepsie's plant.

The Memorandum of Understanding ("MOU") dated 15 March 2005 split this reserved capacity in two equal parts with 250,000 gpd reserved for the project site. The remainder is reserved for flows coming into the project site from the eastern connection point on Paint Shop Road. This reservation will not be exceeded by the design flows provided above.

According to the 1996 Town of Poughkeepsie Sewer Master Plan Outline, the Hudson River Psychiatric Center has an existing agreement with the Town of Poughkeepsie for the discharge of 0.50 MGD of wastewater to the joint City/Town of Poughkeepsie treatment plant. According to the 1996 Master Plan, the average daily wastewater flow from the Hudson River Psychiatric Center is 0.29 MGD.

According to a 1973 agreement between the City and Town of Poughkeepsie, the Town is allowed to discharge 3.5 MGD of wastewater to the joint City/Town sewage treatment facility. The joint City/Town WWTF serves the City of Poughkeepsie and the northwestern portion of the Town of Poughkeepsie. This service area includes the Hudson Heritage project site. Taking into account proposed extension of sewer service to unsewered areas of the Town of Poughkeepsie, the 1996 Master Plan projected an estimated daily wastewater flow of 3.1 MGD from the Town to the joint City/Town WWTF, which is less than the 3.5 MGD reserved allocation.

Wastewater flows from the project site will be conveyed to the joint City/Town WWTF via the Hyde Park sewer trunk line. The 1996 Master Plan did not identify any specific issues or concerns regarding the condition and hydraulic capacity of the existing Hyde Park sewer trunk line to convey existing and future peak wastewater flows.

5.0 IMPACTS & MITIGATION

The environmental impacts and mitigation of impacts for the proposed sewerage system is discussed in this section of the report.

5.1 Sewer Collection and Conveyance

Environmental impacts from the collection system are minimal. Generally, collection system components are to be installed concurrent with other proposed utilities in areas disturbed by construction of roadways and buildings. Collectively, mitigation efforts during construction include silt fencing or sedimentation basins. Specific measures are to be detailed in the Erosion and Sediment Control and Stormwater Pollution Prevention Plans (SWPPP). Capital improvements to the Town-owned collection system downstream of the project site are not required as a result of the proposed project.

Bypass pumping will be required to construct new sewer infrastructure in areas where existing sewer infrastructure is to be impacted by construction. Bypass pumps will be sized to accommodate peak flows to ensure no sewer backups occur. Bypass pumping is expected to be needed during the following times:

1. Relocation of the 30" sewer main from the Culinary Institute of America connection point to the existing meter pit.
2. Connection of new sewer main to the existing meter pit.
3. Construction of the new sewer main along Paint Shop Road.

All efforts are anticipated to be made to minimize the time bypass pumps are needed.

The project site has no active wastewater flow. The wastewater flowing from offsite follows a known path through the system. During construction of the new sewer infrastructure it is possible that unknown sewer connections may be discovered. Any flows observed from unknown connections should be groundwater infiltration and these connections shall be cut and capped, or otherwise removed, to eliminate the infiltration.

5.2 Wastewater Treatment

The City WWTF has capacity reserved for this site pursuant to the Agreement. The proposed site plan's estimated average daily flow provided in Section 4.1 of this report does not exceed the reserved capacity for the site as stated in the MOU. The City of Poughkeepsie has issued a letter outlining their ability to serve this project and is enclosed with this report in Appendix B. Capital improvements to the WWTF are not required as a result of the proposed project.

5.3 Odor Control

Any odors from the proposed improvements are considered temporary as a result of construction. The potential for odors to be detected outside the property line as a result of bypass pumping and general excavation is low. The greatest potential for odors would occur during the removal and hauling of the old collection piping to disposal. It is not anticipated that odors would be significant enough and/or consistent enough to warrant mitigation efforts above and beyond efforts made for other construction.

5.2 Noise Control

Noise that is generated from the collection system should be limited to the initial construction only. The noise level from a collection system is not detectable over quiet neighborhood ambient noise.

6.0 REFERENCES

1. *Design Standards for Intermediate-Sized Wastewater Treatment Systems*, 2014, NYSEDC – Division of Water, Bureau of Water Permits.
2. *Recommended Standards for Wastewater Facilities*, 2014 Edition - Policies for the Design, Review, and Approval of Plans and Specifications for Wastewater Collection and Treatment Facilities: A Report of the Wastewater Committee of the Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers.
3. *New York State Building Code*, latest applicable Edition, New York State Department of State.
4. *New York State Plumbing Code*, latest applicable Edition, New York State Department of State.

Appendix A: Figure 1 – Conceptual Collection System Layout

Drawing Name: Z:\projects\81400-81499\81402.00 - Hudson Heritage\DWG\EIS_SEWER_CONCEPT.dwg Date Printed: Aug 02, 2016, 10:34am



LEGEND:

- PROPOSED SANITARY SEWER FORCE MAIN
- PROPOSED GRAVITY SANITARY SEWER MAIN (PRIVATE OWNERSHIP)
- PROPOSED GRAVITY SANITARY SEWER MAIN (TOWN OWNERSHIP)
- PROPOSED GRAVITY SANITARY SEWER MAIN (STATE OWNERSHIP)
- PROPERTY LINE

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HUDSON HERITAGE

SANITARY SEWER CONCEPT PLAN

TOWN OF POUGHKEEPSIE, DUTCHESS COUNTY, NEW YORK

designed KB	checked PB
date 02/18/16	scale 1"=400'
project no. 81402.00	
sheet no.	

FIG 1

Appendix B: City of Poughkeepsie Wastewater Correspondence



Gary E. Beck, Jr.
Building Inspector

THE CITY OF POUGHKEEPSIE
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ENGINEERING DEPARTMENT
62 CIVIC CENTER PLAZA, 2ND FLOOR
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October 13, 2015

Andrew B. Seidel, P.E.
The Chazen Companies
1607 Route 300, Suite 101
Newburgh, NY 12550

Re: Hudson Heritage Project
"Will Serve" Letter
Town of Poughkeepsie, Dutchess County, New York

Dear Mr. Seidel:

In response to your September 14, 2015 request, we offer the following information.

The Sewage Treatment Plant is jointly owned by the Town and City of Poughkeepsie. As such, both municipalities will need to approve the proposed development sewage flow contributions. The respective capacity shares are City 6.67 MGD and Town 3.33 MGD, based on the plant SPDES permit of 10 MGD. A calculation of projected capacity versus the proposed flows appears below.

Sewer Treatment Plant Capacity (Jointly Owned City and Town): 10.0 MGD
City Share: 6.67 MGD
Town Share: 3.33 MGD

Historical Flow Data

(5 year max. ADF)

City of Poughkeepsie:	5.871 MGD (67%)
Town of Poughkeepsie:	2.892 MGD (33%)
2011 Plant ADF	8.764 MGD

Based on this distribution, the existing plant capacity surplus computes to $(10.0 - 8.54 = 1.455)$ 1.455MGD. This surplus capacity is allocated to the Town as indicated below:

Town of Poughkeepsie

Town Share of Plant Capacity:	3.333 MGD
Less: Town 5 year max. ADF:	2.892 MGD
Dutton Projected ADF:	0.01848 MGD
Hudson Heritage Projected ADF*	<u>0.21251 MGD</u>
Remaining Capacity (Town):	0.210 MGD

*Information provided by the developer's consultant indicates the total daily projected flow of the development is approximately 212,510 gpd or 0.21251 MGD. Thus, the proposed development flows have been applied to the respective Town share to determine the remaining capacity for the Town.

Sewage Disposal: The Town municipal sewage collection system serves Town properties and conveys flows to the Joint Water Pollution Control Plant (jointly owned City and Town). It will be the responsibility of the developer to provide the necessary sanitary facilities and improvements to direct sewerage to the existing municipal collection system.

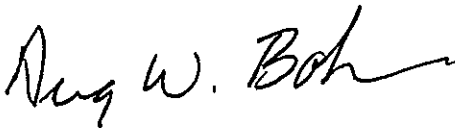
DCBOH approval: It shall be the responsibility of the applicant to submit plans and specifications to the Dutchess County Board of Health. Approvals from this department will be necessary prior to construction.

Conclusion:

Based on this calculation, the present Town share of plant capacity by itself can accommodate the proposed Hudson Heritage Project and still provide for future development needs. It should be noted that this letter simply provides information regarding utilities and does not represent an opinion or approval of the proposed project in terms of site plan and layout, number of units, etc.

Should you have any questions regarding this letter please feel free to contact me at 845-451-4215.

Sincerely yours,

A handwritten signature in black ink that reads "Greg W. Bolner". The signature is written in a cursive style with a long, sweeping underline.

Greg Bolner P.E.
City Engineer