Appendix H

Preliminary Wastewater Collection and Treatment System Engineering Report for Raleigh and Heiden Properties Development Project

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PRELIMINARY
WASTEWATER COLLECTION AND TREATMENT SYSTEM
ENGINEERING REPORT
FOR
RALEIGH AND HEIDEN PROPERTIES
DEVELOPMENT PROJECT

Heiden Road and Park House Road
Town of Fallsburg
Sullivan County * New York

Date: May 31, 2011
Rev:

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1. Introduction

The following evaluates and summarizes wastewater treatment options for the proposed Raleigh and Heiden Properties development located on Heiden Road (County Road No. 161) in the Town of Fallsburg, Sullivan County, New York. The project will consist of the proposed construction of 236 single-family housing units in four (4) separate clusters, varying from 47 to 68 homes per cluster. In addition, the existing 230 room Raleigh Hotel will abandon and remove an existing on-site sand filter wastewater treatment system and interconnect with the proposed system serving the above-noted homes.

The project will generate approximately 131,000 gals/day of domestic wastewater upon full buildout of the 236 homes in conjunction with the hotel.

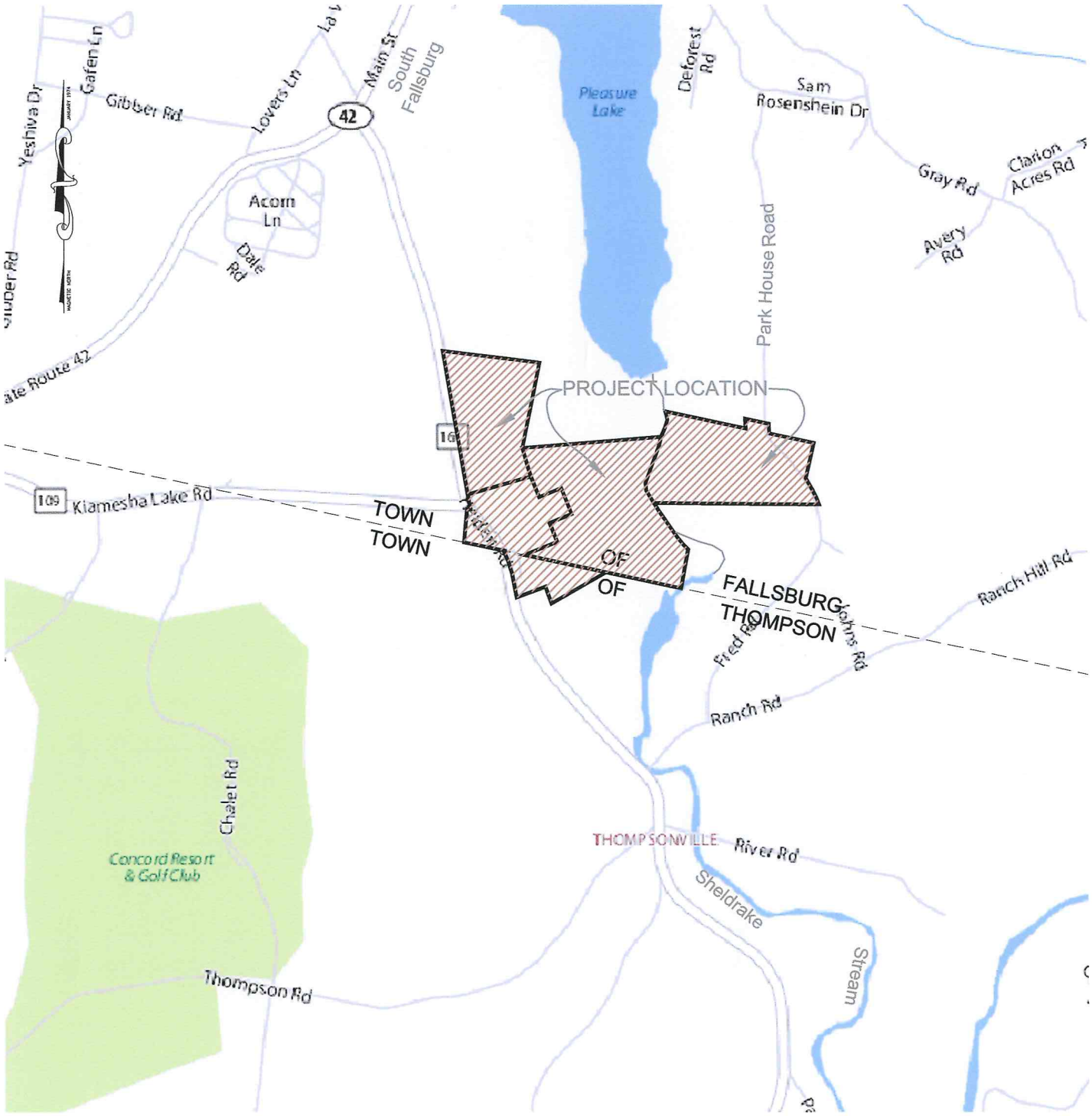
This report also evaluates the options of connecting to the Town of Fallsburg Municipal Wastewater Treatment Facility located in South Fallsburg.

2. Project Description

The project is situated on the Raleigh Hotel and former Heiden Hotel properties lying along the easterly side of Heiden Road (a.k.a. Thompsonville Road and County Road No. 161), and bounded along the easterly side by Park House Road (Town Road No. 62) in the Town of Fallsburg. The total tract comprises 226.33 acres in Fallsburg, with a 11.22 acre parcel situated in the adjacent Town of Thompson containing the current hotel entrance drive and portion of proposed access road to housing clusters #2 and 3. (Refer to Figures 2-1, 2-2 and 2-3)

Access to the project will be provided at multiple points, including the above-noted Raleigh Hotel entrance drive that will be shared by the hotel and clusters #2 & 3; two (2) additional entrances off Heiden Road located approximately 1,500' and 2,400' north, respectively, of the Raleigh entrance to serve housing clusters #1 and 2; and a primary and emergency/secondary drive off Park House Road to serve cluster #4. (Refer to Figure 2-4)

The current project site consists of a mixture of existing Raleigh Hotel facilities, including numerous structures, swimming pool, recreation courts, parking lots and drives; former Heiden Hotel ancillary bungalows, outbuildings, pools and courts (that hotel burned down several years ago), and wooded, undeveloped areas. Pleasure Lake, with an area of approximately 220 acres, is located immediately north of the project site with its outlet stream (Sheldrake Stream) flowing in a southerly direction through the property, physically separating the westerly side project (clusters #1, 2 & 3 plus hotel) from the easterly side project (cluster #4). Sheldrake Stream (Water Index No. D-1-38) is tributary to the Neversink River.



SCALE: 1" = 2000 FT

RALEIGH HOTEL - HEIDEN ROAD PROPERTIES

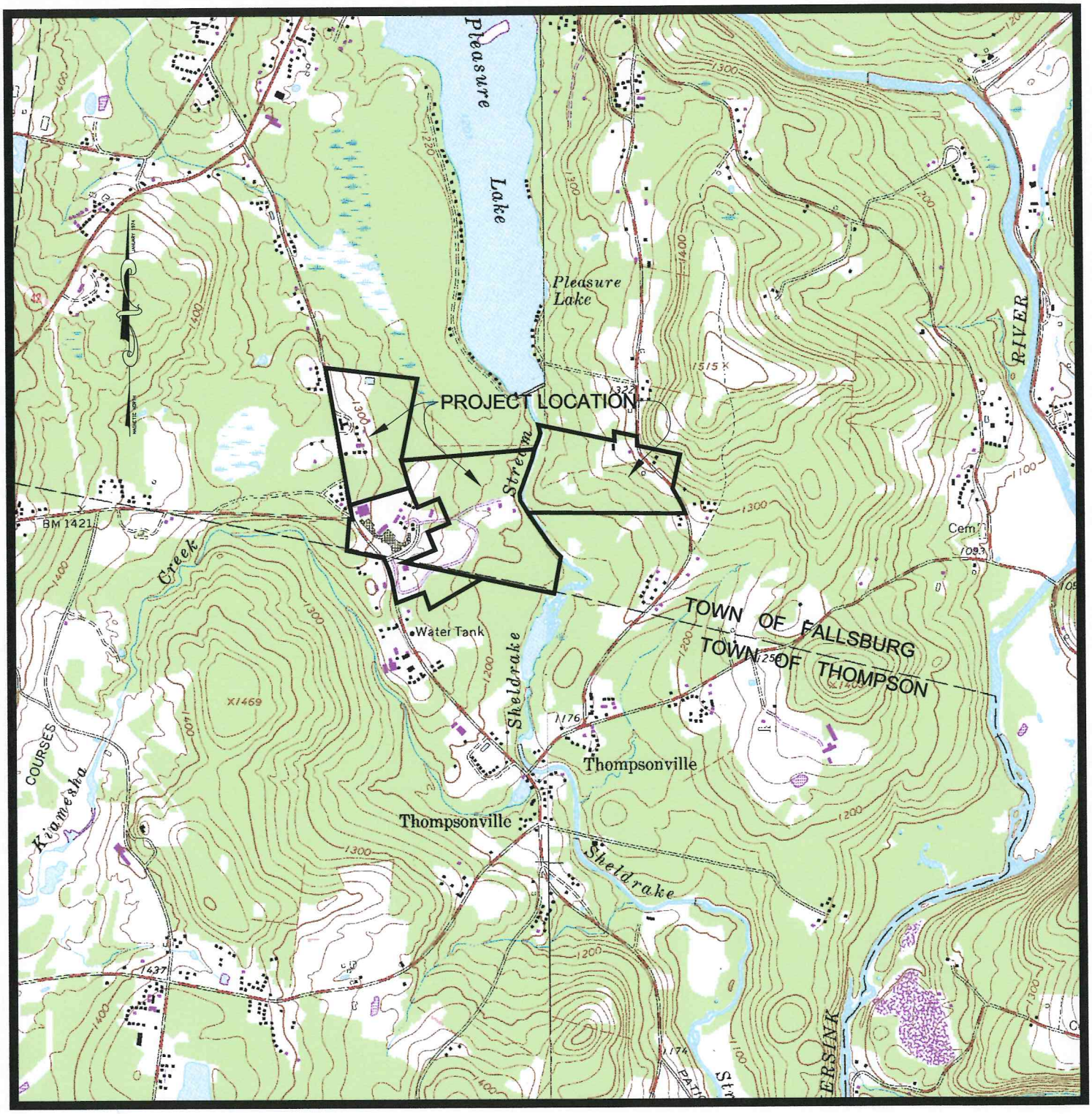
(T) FALLSBURG - (T) THOMPSON

SULLIVAN COUNTY NEW YORK

FIGURE 2-1

LOCATION MAP

MAY 2011



SCALE: 1" = 2000 FT

RALEIGH HOTEL - HEIDEN ROAD PROPERTIES

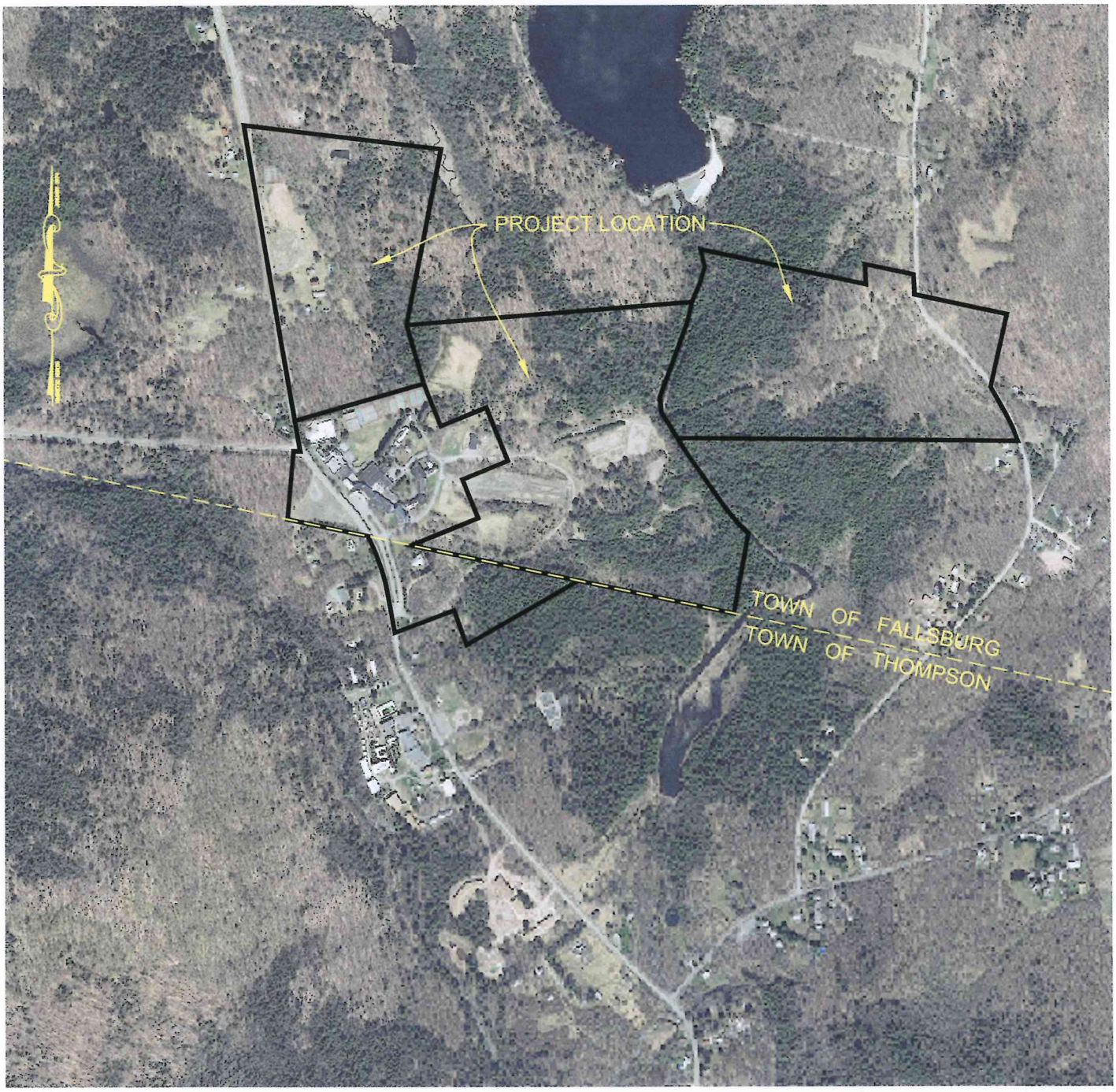
(T) FALLSBURG - (T) THOMPSON

SULLIVAN COUNTY NEW YORK

FIGURE 2-2

USGS VICINITY MAP

MAY 2011



SCALE: 1" = 1000 FT

RALEIGH HOTEL - HEIDEN ROAD PROPERTIES

(T) FALLSBURG - (T) THOMPSON

SULLIVAN COUNTY NEW YORK

FIGURE 2-3

AERIAL PHOTO

MAY 2011

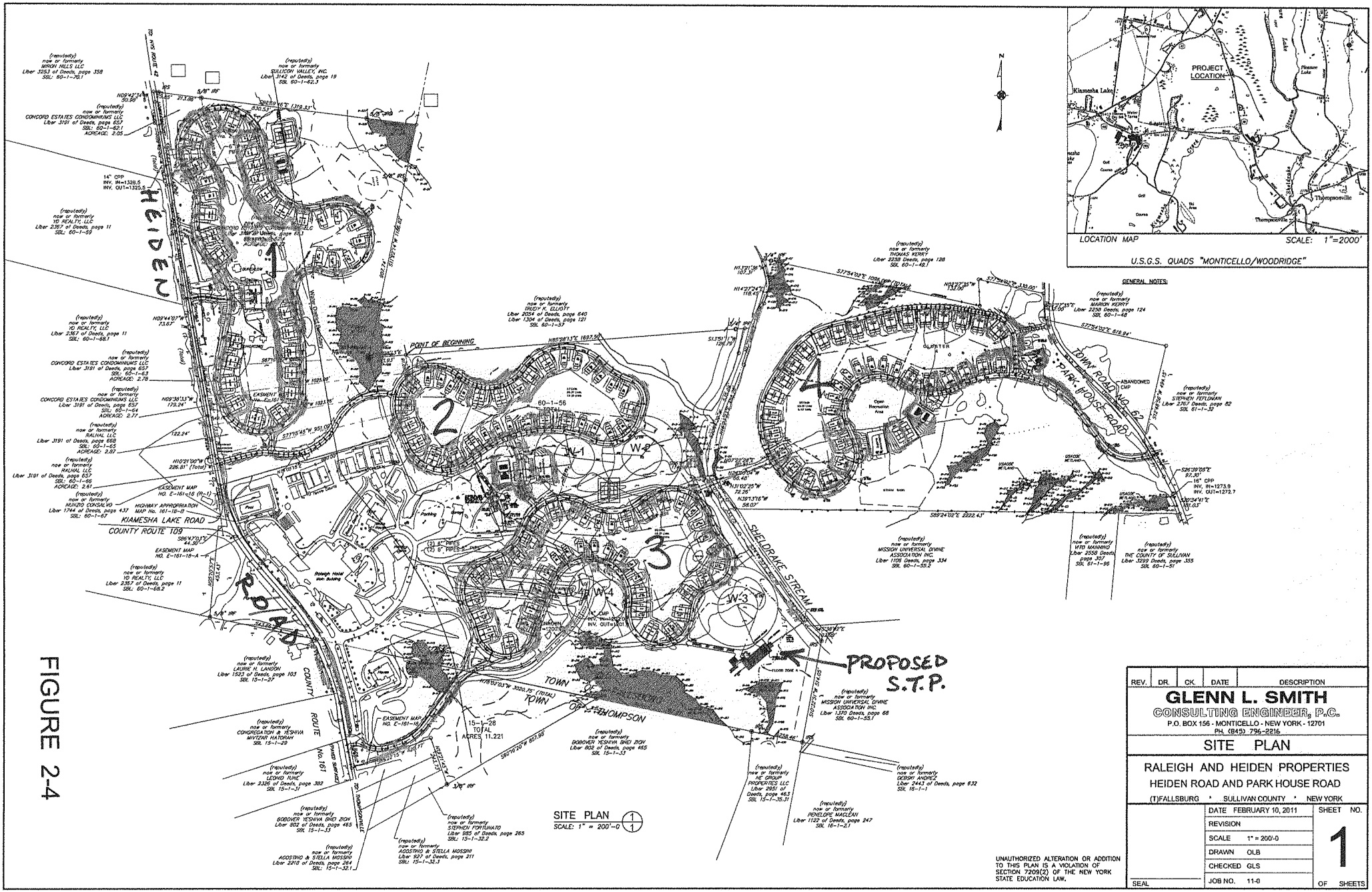

HEIDEN ROAD
KIAMESHA LAKE ROAD
COUNTY ROUTE 109
COUNTY ROUTE No. 161
TOWN ROAD No. 62
PARK HOUSE ROAD
SHELDRAKE STREAM
POINT OF BEGINNING
TOWN OF THOMPSON
PROPOSED S.T.P.
W-1
W-2
W-3
W-4
60-1-56
15-1-28
TOTAL
ACRES 11.221
SITE PLAN
SCALE: 1" = 200'-0
LOCATION MAP
SCALE: 1"=2000'
PROJECT LOCATION
Kiamesha Lake
Thompsonville
U.S.G.S. QUADS "MONTICELLO/WOODRIDGE"
GENERAL NOTES:
UNAUTHORIZED ALTERATION OR ADDITION TO THIS PLAN IS A VIOLATION OF SECTION 7209(2) OF THE NEW YORK STATE EDUCATION LAW.
REV. DR. CK. DATE DESCRIPTION
GLENN L. SMITH
CONSULTING ENGINEER, P.C.
P.O. BOX 156 - MONTICELLO - NEW YORK - 12701
PH. (845) 796-2216
SITE PLAN
RALEIGH AND HEIDEN PROPERTIES
HEIDEN ROAD AND PARK HOUSE ROAD
(T)FALLSBURG * SULLIVAN COUNTY * NEW YORK
DATE FEBRUARY 10, 2011
REVISION
SCALE 1" = 200'-0
DRAWN OLB
CHECKED GLS
JOB NO. 11-0
SEAL
SHEET NO. 1 OF SHEETS

FIGURE 2-4

The project development upon full buildout will consist of the following components:

Cluster #1:	55 Dwelling Units in 13 singles and 21 duplex homes.
Cluster #2:	47 Dwelling Units in 19 singles and 14 duplex homes
Cluster #3:	66 Dwelling Units in 16 singles and 25 duplex homes
Cluster #4:	68 Dwelling Units in 8 singles and 30 duplex homes

Existing Raleigh Hotel to remain at 230 rooms

3. Wastewater Flow and Organic Loading

3.1 Flow

Upon full buildout of the proposed homes the projected average daily wastewater flows will be approximately 90,000 gpd (0.090 MGD). Additionally, the Raleigh Hotel complex will generate approximately 38,000 gpd (0.038 MGD),and related swimming pools usage and childrens day camps will generate approximately 3,000 gals. more, for a total flow of approximately 131,000 gpd (0.131 MGD or 91 gpm)

The peak hourly design flow is estimated to be 473,000 gpd (0.473 MGD or 328 GPM)

Refer to Table 3-1 for flow computations.

Table 3-1
Wastewater Design Flow Computations

The following summarizes the estimated average wastewater flow volume to the proposed treatment facility as generated by a maximum of 236 single-family housing units situated in four (4) separate clusters; and the existing 230-room Raleigh Hotel complex.

Cluster #1		
55 Dwelling Units x 4 bedroom/unit = 220 bedrooms		
x 95 gpd/br =	20,900 gpd	
(Note: Use design flow rate of 475 gpd/4 br. home less 20% for water saving fixtures = 380 gpd ÷ 4 br. = 95 gpd/br)		
Cluster #2		
47 Dwelling Units x 4 bedroom/unit = 188 bedrooms		
x 95 gpd/br =	17,860 gpd	
Cluster #3		
66 Dwelling Units x 4 bedroom/unit = 264 bedrooms		
x 95 gpd/br =	25,080 gpd	
Cluster #4		
68 Dwelling Units x 4 bedroom/unit = 272 bedrooms		
x 95 gpd/br =	25,840 gpd	
	Clusters Subtotal	89,680 gpd
Additional Flows		
Swimming Pools – 6 pools total will serve clusters #1, 2, 3 & 4, estimate 20% of project population will utilize pools,		
Then 236 dwelling units x average 8 persons/unit = 1,888 persons x 20% use pools = 378 persons		
Estimate 4 gpcd x 378 persons =	1,512 gpd	
Pools Backwash Wastewater – N/A – Use cartridge filters with no backwash water.		
Day Camps – Estimate average 2 children/dwelling unit using day camps x 236 units = 472 children.		
Using Average Daily Demand of 3 gpd/child x 472 =	1,416 gpd	
	Subtotal Pools & Daycamp	2,928 gpd

Raleigh Hotel

230 Rooms x 120 gpd/room =	27,600 gpd	
Banquet Facility: 460 guests (2 per room) x 20 gpd/guest =	9,200 gpd	
Swimming Pool: Estimate 20% of 460 guests = 92 persons x 10 gpd/person =	920 gpd	
Subtotal		37,720 gpd

Total Estimated **Wastewater Flow: 130,328 gpd**

Average Design Flow, say **131,000 gpd**

Average gals/minute flow = 131,000 gpd ÷ 1,440 mins/day = 91 gpm

Compute Peak Hourly Flowrate

Reference: Figure 1 "10-State Standards/2004 Edition" provides the ratio of peak hourly to design average flow based upon corresponding population.

Population: 236 housing units in 4 clusters x 4 bedrooms/unit =
= 944 bedrooms x average 2 capita/br
= 1,888 persons in residential development

and 230 rooms in hotel x average 2 capita/room
= 460 persons in hotel

Total Population = 1,888 + 460 = 2,348 persons

Then, per Figure 1, use a "Peak Flow Factor" (PFF) of 3.6, so 91 gpm x 3.6 PFF = 328 gpm peak inflow

Peak Hourly Flow = 328 gpm x 60 = 19,680 gals/hr, which equivalent to peak daily flow of 472,320 gpd, Say 473,000 gpd

3.2 Organic Loading

It is anticipated that approximately half of proposed homes in the development will be provided with and/or utilize kitchen sink garbage grinders. Raleigh Hotel rooms will not utilize grinders although kitchen facilities will generate organic solids discharged in the wastewater flow.

As referenced in Table 3-2, an average design BOD_5 concentration of 232 mg/l will be utilized, resulting in a design average BOD_5 loading of 254 lbs/day.

A Suspended Solids concentration of 267 mg/l will be utilized, resulting in an average daily loading of 292 lbs/day of Suspended Solids – Refer to Table 3-2.

Table 3-2
Organic Loadings in Wastewater

BOD_5

a. Estimate half of homes utilize garbage grinders with BOD_5 concentration of 275 mg/l, with remaining homes & pools/daycamp wastewater BOD_5 at 200 mg/l

b. Use Raleigh Hotel average BOD_5 concentration in wastewater generated from guest rooms and kitchen operations of 220 mg/l; then average BOD_5 concentration is:

$$\frac{275 \text{ mg/l} \times 44{,}840 \text{ gpd}}{130{,}328 \text{gpd}} + \frac{200 \text{ mg/l} \times 47{,}768 \text{ gpd}}{130{,}328 \text{ gpd}} + \frac{220 \text{ mg/l} \times 37{,}720 \text{ gpd}}{130{,}328 \text{ gpd}}$$

= 94.6 + 73.3 + 63.7
= 232 mg/l

c. BOD_5 (organic) design loading upon full buildout
= 0.131 mgd x 232 mg/l x 8.34
= 254 lbs/day BOD_5 loading

Suspended Solids

a. Utilize an average daily suspended solids (SS) concentration in wastewater flows generated by proposed homes and Raleigh Hotel 15% above the average BOD_5 concentration of 232 mg/l, or 267 mg/l.

Then SS loading = 267 mg/l x 0.131 mgd x 8.34 = 292 lbs/day

4. Existing Wastewater Treatment Facilities

4.1 Raleigh Hotel STP

The hotel currently discharges all wastewater generated by guestrooms, kitchen and related facilities to a multi-bed open sand filter system, utilizing several large capacity septic tanks for primary solids settling and chlorine disinfection of effluent prior to outfall to Sheldrake Stream. NYSDEC SPDES Permit #NY-0031658 has been in effect for over 40 years regarding this discharge, with a design effluent flow limitation of 112,500 gpd and 30 day mean limits for BOD_5 and Suspended Solids of 15 mg/l and 30 mg/l, respectively, which is considered basic secondary treatment for domestic wastewater.

The known septic tanks in buried locations between the Raleigh Hotel and sand filters consist of a 55,000 gallon tank, three – 14,000 gallon tanks and one 5,000 gallon tank.

A combination of two flow splitter chambers and three (3) dosing siphons convey septic tanks effluent wastewater to a total of four (4) – 50' x 100' and two (2) – 100' x 100' open sand filter beds with a total surface area of approximately 40,000 s.f.

Effluent disinfection is required by the SPDES permit between June 1st and September 15th of each year with no minimum chorine residual limit required.

There is currently no available treatment capacity remaining at the hotel plant that could be utilized for proposed development. Additionally, the existing facility is antiquated and exhibits marginal operating characteristics even for meeting secondary effluent quality limitations to Sheldrake Stream. It is proposed to abandon and demolish the Raleigh treatment system, followed by any necessary restoration procedures, in conjunction with project development to allow construction of residential cluster #3. Raleigh Hotel wastewater flows will be conveyed to the treatment facility option determined most feasible for the entire project, thereby providing a higher degree of tertiary treatment of discharges to Sheldrake Stream as compared to only secondary treatment that is currently provided.

4.2 Town of Fallsburg Wastewater Treatment Facility

The Town of Fallsburg's closest treatment plant to the project site is the facility located on NYS Route 42 between the Hamlets of South Fallsburg and Old Falls, approximately 3½ road miles away. The plant's current design capacity is approximately 3.25 MGD, with summer season influent flows of approximately 3.15 MGD, leaving minimal if any surplus capacity available for existing town sewer district users. This plant discharges tertiary process treated effluent to the Neversink River.

Based upon approved development plans within the town's consolidated sewer district serving the Woodbourne, Hurleyville, Old Falls and South Fallsburg areas, all of which convey wastewater to this facility, it is anticipated the design capacity may be or has been periodically exceeded during the 2010-2011 summer seasons. For this reason the town's consultants are currently evaluating plant upgrade options to provide a higher design capacity to accommodate existing district users.

The Raleigh-Heiden Hotel properties are not located in or adjacent to the Town of Fallsburg's Consolidated Sewer District bounds, such that any request to the Town Board for an extension of sewer district bounds to encompass the project area for providing municipal sewer service would not likely be considered nor approved. The sewer district limits at their closest point lie in the vicinity of the NYS Route 42-LaVista Drive-Heiden Road intersection, approximately 3,000' north of the project site.

5. Wastewater Treatment Regulatory Requirements

The discharge of treated wastewater from a treatment facility to a stream, river, lake or similar surface water requires a State Pollutant Discharge Elimination System (SPDES) Permit, as regulated by the New York State Department of Environmental Conservation (NYSDEC) pursuant to Article 17, Title 7 of the Environmental Conservation Law, this permit establishes specific effluent limitations and monitoring procedures as related to flow volume and quality. In addition, the Delaware River Basin Commission (DRBC) headquartered in Trenton, NJ performs specific review procedures and recommendations on all permit applications for facilities located in the Delaware River Basin, as the project site is. The NYSDEC is mandated to incorporate DRBC requirements into any SPDES permits issued under both jurisdictions.

Effluent limitations pertaining to flow volume and quality are generally established in accordance with the NYSDEC "Design Standards for Wastewater Treatment Works – 1988" (for Intermediate Sized Sewer Facilities); and the 10-State Standards "Recommended Standards for Wastewater Facilities – 2004 Edition".

Required limits included in finals SPDES permits are based upon applicable characteristics and standards of the receiving stream/surface water at the point of effluent discharge as well as downstream from that point. All existing wastewater discharges to the receiving stream, both upstream and downstream of a proposed discharge are also considered and factored into permit requirements.

The proposed Raleigh-Heiden project "receiving surface water" is Sheldrake Stream, (Water Index No. D-1-38) a relatively large watercourse with an NYSDEC Class B(t)(trout water) rating. It flows through the middle of the project site and is tributary to the Neversink River (also Class B(t)) approximately 2 ¼ miles southeast of the proposed discharge point. NYSDEC design regulations define a Class B water usage as "primary and secondary contact recreation and fishing…and suitable for fish propagation and survival".

Sheldrake Stream is not considered an "intermittent stream" by NYSDEC Design Standards, although it is anticipated that NYSDEC may require the treatment facility design to meet intermittent stream standards, which are the more restrictive limits applied to treatment systems in this region for "intermittent" receiving waters.

6. Proposed Wastewater System Option

6.1 Treatment

The proposed wastewater treatment option to serve the Raleigh and Heiden Property Development includes the construction of an on-site facility to provide tertiary levels of treatment utilizing current technologies in that field to insure meeting or exceeding receiving stream effluent parameters.

The design sizing and construction of treatment processes would be phased as best determined to accommodate the phased development and construction of the housing clusters. The treatment facility would be owned and operated by a sewage Transportation Corporation, with an ultimate design average inflow of 133,000 GPD. No outside users or flow contributors, including septage disposal, will be permitted.

The proposed location of the facility is at the southeasterly corner of the property situated between Heiden Road and Sheldrake Stream, approximately 400' distant from the proposed cluster #3 roadway at its closest point and approximately 175' from the stream to avoid encroachment into the 100-year Flood Zone "A" lying along the stream bounds. (Refer to Figure 6-1) With prevailing winds in this region generally from northwest to southeast, the plant is situated downwind from all proposed homes and the existing hotel. The closest properties with dwellings on Park House Road to the east are in excess of 1,500' distant. These separation distances comply with "1988 Design Standards" Table 1 recommended minimums for various treatment processes, excepting "aerated lagoons", which will not be utilized for this project.

The primary treatment process being considered is a Sequencing Batch Reactor (SBR) with polishing filters to meet tertiary requirements and intermittent stream standards that may be imposed by NYSDEC and DRBC. Effluent flows will be disinfected by either chlorination followed by dechlorination and post-aeration; or ultraviolet (UV) and post-aeration. Sludge generated within the treatment process will be temporarily stored on-site in an aerated tank for periodic removal for off-site disposal.

Refer to Figure 6-2 for the SBR plant layout schematic on the project site.

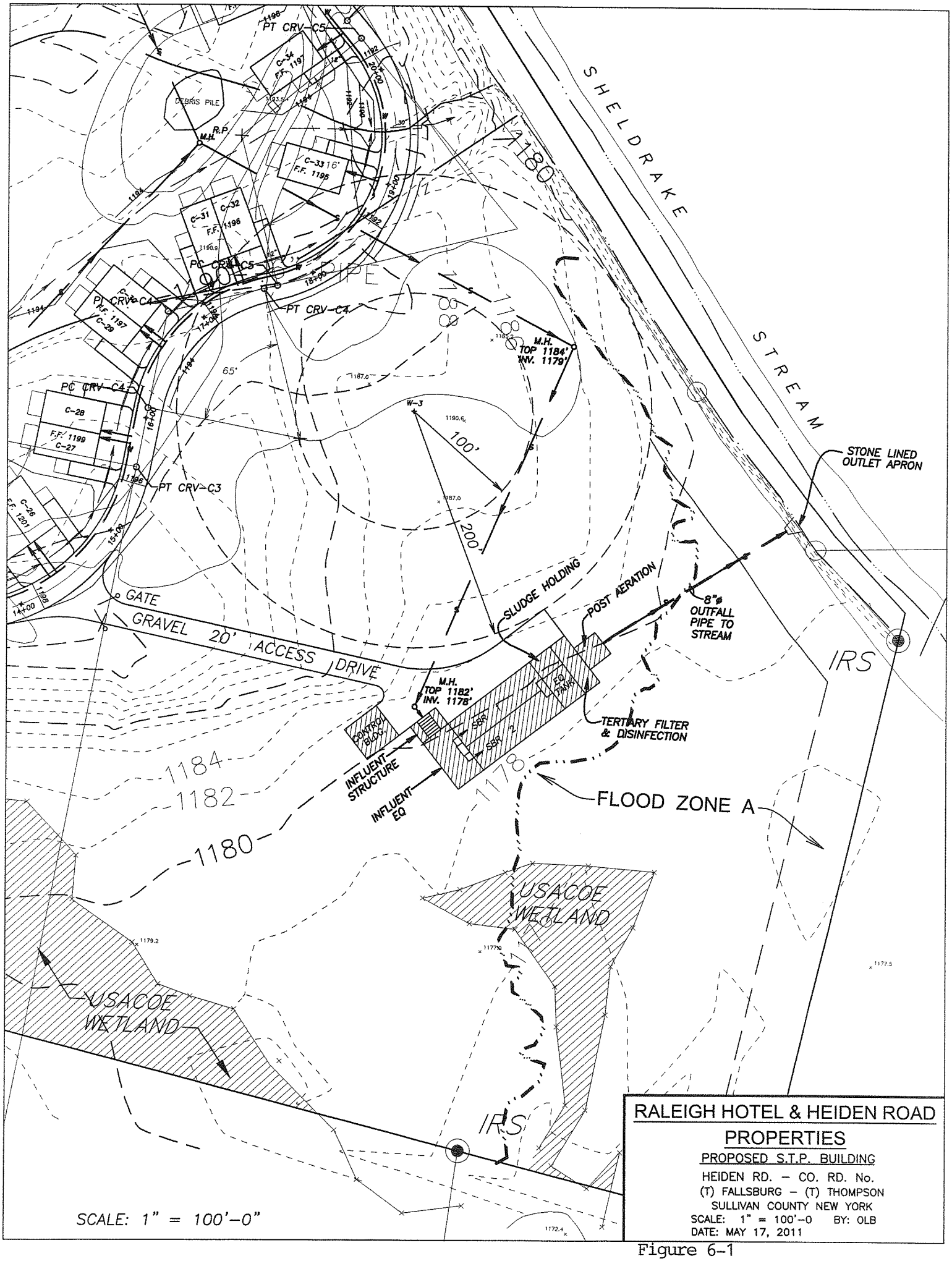
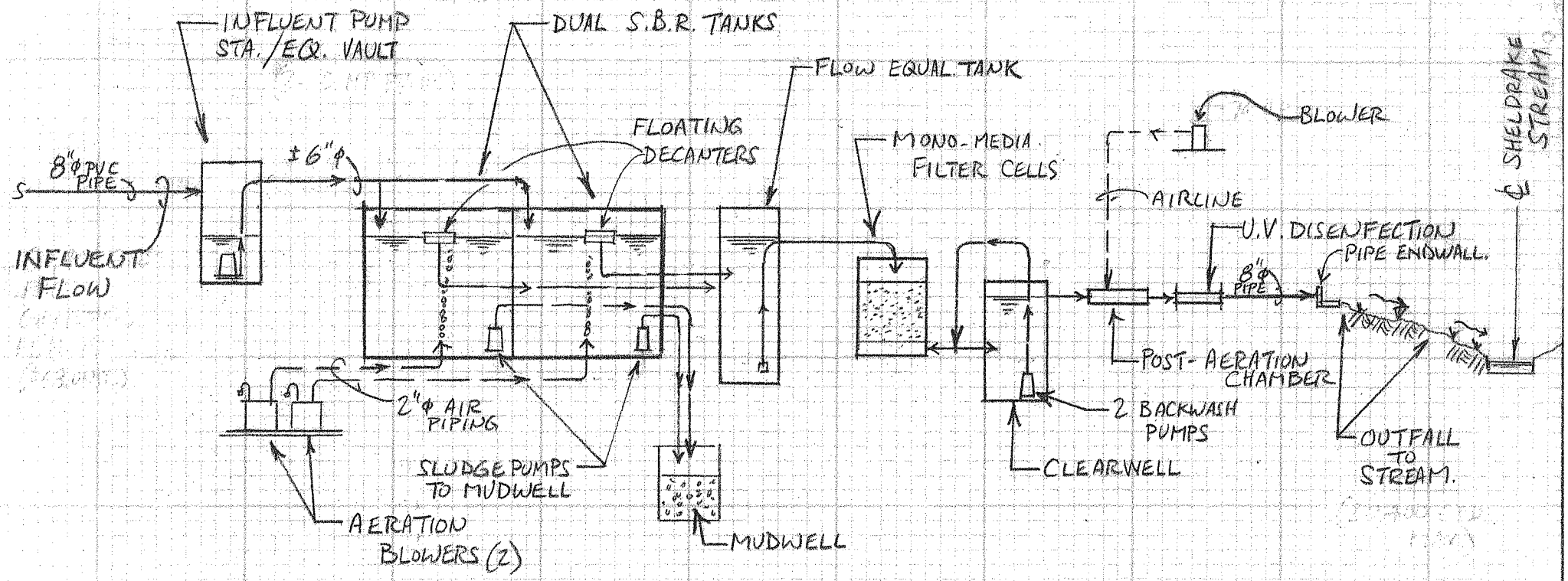

SHELDRAKE
STREAM
PT CRV-C5
C-34
F.F. 1197
DEBRIS PILE
R.P.
M.H.
C-33 16'
F.F. 1195
C-31
C-32
F.F. 1196
PC CRV-C5
PT CRV-C4
PC CRV-C4
C-28
F.F. 1199
C-27
PT CRV-C3
C-26
F.F. 1201
M.H.
TOP 1184'
INV. 1179'
W-3
100'
200'
STONE LINED
OUTLET APRON
GATE
GRAVEL 20' ACCESS DRIVE
SLUDGE HOLDING
POST AERATION
8"ø
OUTFALL
PIPE TO
STREAM
IRS
M.H.
TOP 1182'
INV. 1178'
CONTROL BLDG.
SBR
SBR
EQ TANK
TERTIARY FILTER
& DISINFECTION
INFLUENT
STRUCTURE
INFLUENT
EQ
1184
1182
1180
1178
FLOOD ZONE A
USACOE
WETLAND
USACOE
WETLAND
IRS
SCALE: 1" = 100'-0"
RALEIGH HOTEL & HEIDEN ROAD
PROPERTIES
PROPOSED S.T.P. BUILDING
HEIDEN RD. – CO. RD. No.
(T) FALLSBURG – (T) THOMPSON
SULLIVAN COUNTY NEW YORK
SCALE: 1" = 100'-0 BY: OLB
DATE: MAY 17, 2011

Figure 6-1



TYPICAL S.B.R. TREATMENT SYSTEM
SCHEMATIC PROCESS FLOW DIAGRAM

RALEIGH & HEIDEN HOTELS PROPERTY
HEIDEN ROAD • TOWN OF THOMPSON
SULLIVAN COUNTY • N.Y.

DATE: MAY 16, 2011
BY: GLS

Figure 6-2

6.2 Collection System

The majority of wastewater flows generated by the proposed residential development and existing Raleigh Hotel complex will be conveyed by gravity through 8" dia. PVC collection piping and 4' dia. precast concrete access manholes set at a maximum spacing of 400' to the above-noted proposed treatment facility adjacent to Sheldrake Stream.

Of 55 proposed homes in cluster #1 at the northerly side of the project, approximately 36 homes will be served by an 8" dia. gravity main running in a southeasterly direction to clusters #2 and 3. Approximately 19 homes situated at the rear, lower elevation cannot achieve gravity flow interconnection and will require the installation of a sewage pump station and approximately 650' of 4" dia. forcemain piping run to the closest gravity manhole in the system.

All 113 proposed homes in clusters #2 and 3 can achieve gravity flow of wastewater to the proposed treatment plant via the 8" dia. gravity main continued from cluster #1, running in a southeasterly direction through both clusters to the plant.

All 68 proposed homes in cluster #4 will be served by 8" dia. gravity collection lines installed to a sewage pump station situated at the lowest, southwesterly point in that cluster, approximately 300' easterly of Sheldrake Stream. A 4" dia. forcemain pipe will convey wastewater flows for a distance of approximately 600', under Sheldrake Stream, to a gravity manhole in the collection system on the opposite side adjacent to the cluster #3 access road.

Both sewage pump stations will be duplex submersible pump systems on sliderails for easy maintenance access, automatic float controlled in 5' to 6' dia. concrete wetwells. A weatherproof control panel with audible-light alarm panel will be mounted adjacent to the station. The pump station and control/electrical service facilities will be fenced, with locking gates.

The Raleigh Hotel complex is currently served by two to three main sewage collection lines that originate in various locations and combine into a single ± 8" dia. gravity sewerline near the maintenance garage at the rear of the hotel. From that point the existing pipe is installed to various flow splitter boxes, septic tanks and dosing siphons, which convey flows through the hotel's sand filters prior to discharge into Sheldrake Stream.

Upon completion of the first phase new treatment facility to serve the initial housing clusters, the hotel's treatment system will be abandoned and removed. A new 8" dia. PVC sewerline will be interconnected to the existing hotel wastepipe near the maintenance garage and installed for a distance of approximately 400' to the closest gravity manhole installed in cluster #3, for conveyance to the proposed treatment plant.

7. Summary

The proposed Raleigh and Heiden Properties Development consisting of the construction of 236 single-family housing units would best be served by the construction of an on-site wastewater treatment facility with an average daily design capacity of 131,000 gals/day, utilizing advanced secondary-to-tertiary treatment processes as mandated by the NYS Department of Environmental Conservation and Delaware River Basin Commission via issuance of a SPDES permit. This design flow would include approximately 38,000 gpd generated by the existing Raleigh Hotel that is currently treated by an outdated sand filters system that discharges secondary treatment wastewater effluent to Sheldrake Stream. Conveyance of the hotel flows to the proposed plant would insure a significantly increased degree of treatment and hotel flows effluent quality to that stream.

Upgrading and utilizing the existing Raleigh Hotel sand filters system to current NYSDEC and DRBC design standards applicable to the Neversink River drainage basin would not be feasible nor practicable, a completely new treatment process would be required, as is being proposed.

Interconnection to the existing (T) Fallsburg Consolidated Sewer District treatment facility located in South Fallsburg would also be impracticable and impossible without a significant expansion of that facility and large extension of the town's sewer district bounds to encompass the Raleigh and Heiden properties site, neither of which action the Fallsburg Town Board is contemplating nor willing to pursue to accommodate the project at this time.

Respectfully submitted,

_____

Glenn L. Smith, P.E.

GLS/js