

3.16 Utilities - Wastewater

3.16.1 Existing Conditions

Wastewater Treatment Alternatives

The wastewater treatment requirements for the subject site are limited to individual residential septic systems for the three homes located on the north side of Depot Hill Road. Flows for the homes are not known, however, based on a total bedroom count of nine bedrooms at approximately 110 gallons per day (gpd) per bedroom, flows are approximately 990 gpd. Each of the four main barns and the administration building has a single toilet facility believed to be serviced by small individual septic systems near each building. Flows are unknown; however given the staffing level of less than 6 full time employees, the wastewater flows are estimated to be less than 100 gpd per building; thus, for the four main barns and administration building flows are estimated to be less than 500 gpd. Total wastewater for the existing use is estimated at:

$$990 \text{ gpd} + 500 \text{ gpd} = 1,490 \text{ gpd}$$

Water consumption figures are estimated to be 10,000 gpd for the existing Keane Stud operation, with the majority of this attributed to consumption by the horses. The horses urinate in stall bedding or in the fields and thus there is no correlation between the water consumption and the potential wastewater generation for the Keane Stud operation. No SPDES permit currently exists for the Keane Stud operation.

The Town of Amenia has no existing sewer district, collection system or sewage treatment plant. During the Town's recent Comprehensive Planning Process, development of a sewage treatment system for the hamlet of Amenia was identified as a critical requirement for business growth of the hamlet. The Town has formed a Wastewater Committee to assess the issue, and proposed a sewer district. The town has estimated that flow requirements for the sewer district will be 160,000 gpd to accommodate existing demand and make room for anticipated commercial growth in the Hamlet. This estimate was generated by the Town to accommodate both existing demand and anticipated demand due to new growth within the hamlet, which is a Town priority. Depot Hill Farm has formally requested to be a participant in the process, refer to correspondence in Appendix D. Although the proposed sewer district boundaries have been prepared, the schedule for the sewer district implementation has not been determined at this time.

Also, Silo Ridge, a proposed resort community, is proposing as part of their development project to construct a 400,000 gpd wastewater treatment plant on lands owned by Silo Ridge north of Route 44 on DeLavergne Hill. The primary user of this WWTP will be the resort community proposed for the Silo Ridge site. In addition to the 211,000 gpd projected water usage indicated in its DEIS, Silo Ridge has built into its design excess capacity of 160,000 gpd to accommodate future flows from the hamlet of Amenia, should the municipality form a sewer district and construct a collection system. The primary limitation to the Silo Ridge facility is its location on a hillside above both Silo Ridge and the hamlet of Amenia which will require significant pumping to convey wastewater to the plant. The Town of Amenia must identify a suitable pump station location to make this alternative viable. The schedule for the construction of this plant is

dependent upon approval of the site development plan for Silo Ridge, currently before the Town of Amenia Planning Board, and obtaining a SPDES permit from the NYSDEC for discharge from the plant.

3.16.2 Potential Impacts

For the purpose of this DEIS, only alternatives for wastewater treatment that are expected to be available at the time of the Depot Hill Farm build-out in 2010 have been considered as viable alternatives. The following alternatives have been considered:

- Alternative 1: Construction of an on-site sewage treatment system
 - Alternative 1.a: Construction of on-site sewage treatment plant (STP)
 - Alternative 1.b: Construction of on-site treatment wetlands.
- Alternative 2: Construction of wastewater treatment plant on adjacent parcel

Depot Hill Farm is proposed to be designed to be highly efficient with use of low flow plumbing fixtures. Average flow rates for all toilets will be rated at 1.3 gallons per flush or less and average flow rates for all bathroom faucets and/or all shower heads will be rated at 2.0 gallons per minute or less.

Although Depot Hill Farm prefers to connect to a central municipal system, this option is not deemed feasible at this time. A central infiltration system for each neighborhood was initially considered but, due to the area required for each field and the goal to preserve significant open space and maintain both working stud farm and equestrian complex, this option has been ruled out. Also, the proposed Depot Hill Farm project site is primarily composed of hydrologic class C and D soil types and is not ideal for infiltration type sewage systems. Individual septic systems will not be constructed due to the proposed high density design of the neighborhoods.

System flows were determined using Table 3 - Expected Hydraulic Loading Rates on page 12 of NYSDEC's "Design Standards for Wastewater Treatment Works Intermediate Sized Sewage Facilities", 1988, and the discussion of allowances for a 20% reduction in these unit figures for water saving fixtures on page 10 of them publication.

Using the per-unit loading rates and flow reduction found in the above reference, flow rates for a 4-bedroom home would be: 475 gpd, less 20% = 380 gpd. It is estimated that the equestrian complex would contribute approximately 1,000 gpd of domestic sewage. Total sewage flows generated onsite would then be:

137 4-br homes x 475 gpd/home x 0.8 water saving credit	= 52,060 gpd
Equestrian Complex Tack Shop 1,500 sf x 0.1gpd/sf x 0.8 water saving credit	= 120 gpd
Equestrian Complex Cafe 30 seats x 35 gpd/seat x 0.8 water saving credit	= 840 gpd
Total	= 53,020 gpd

Per New York State Building Codes, Depot Hill Farm must be designed with low-flow plumbing fixtures. Average flow rates for all toilets will be rated at 1.3 GPF or less and average flow rates for all lavatory faucets and/or all shower heads will be rated at 2.0 GPM or less.

3.16.2.a Alternative 1a: Construction of an on-site water treatment facility

Construction of an on-site sewerage system, for use exclusively by Depot Hill Farm, is a viable alternative for management of wastewater generated by the project. A homeowner's association with condominium agreements, or other permissible legal entity, will be created to own, operate and maintain the development's wastewater facilities. Operation of the treatment facility would be performed by a NYSDEC certified treatment plant operator.

The proposed location for such a facility is at the southwestern corner of the property southeast of existing Barn 3. The location allows the collection system to primarily operate under gravity flow, with discharge of treated effluent to the on-site unnamed tributary of Amenia/Cascade Brook. This tributary, classified as a Class C stream, water index # CONN-15-11-2-a, is a tributary with perennial stream flow to Amenia/Cascade Brook, which in turn flows to the Tenmile River in the Housatonic River Drainage basin. A half-acre of land is needed to accommodate the plant, and the subject site has adequate land available for a sewage treatment facility in the proposed location

In determining the discharge limits for the proposed treatment facility, the NYSDEC's Division of Water Technical and Operational Guidance Series (TOGS) 1.3.1 – Total Maximum Daily Loads and Water Quality-Based Effluent Limits was reviewed, along with its amendments. This guidance document outlines the methodologies used and assumptions that may be made to determine discharge limits. Acknowledging that the assimilative capacity analysis approach is limited, specifically in cases where field data is limited and assumptions must be made from other discharges to low or intermittent streams, TOGS 1.3.1 approves the use of the intermittent stream effluent limit (ISEL) approach in establishing discharge limits. By definition, effluent meeting ISELs is of such quality, that its discharge does not negatively impact receiving waters, and may even improve water quality through dilution of existing in-stream contaminants. The following table, Table 3-73, summarizes the design discharge limits for the proposed wastewater treatment facility.

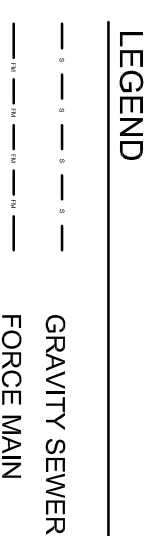
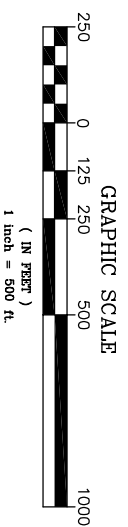
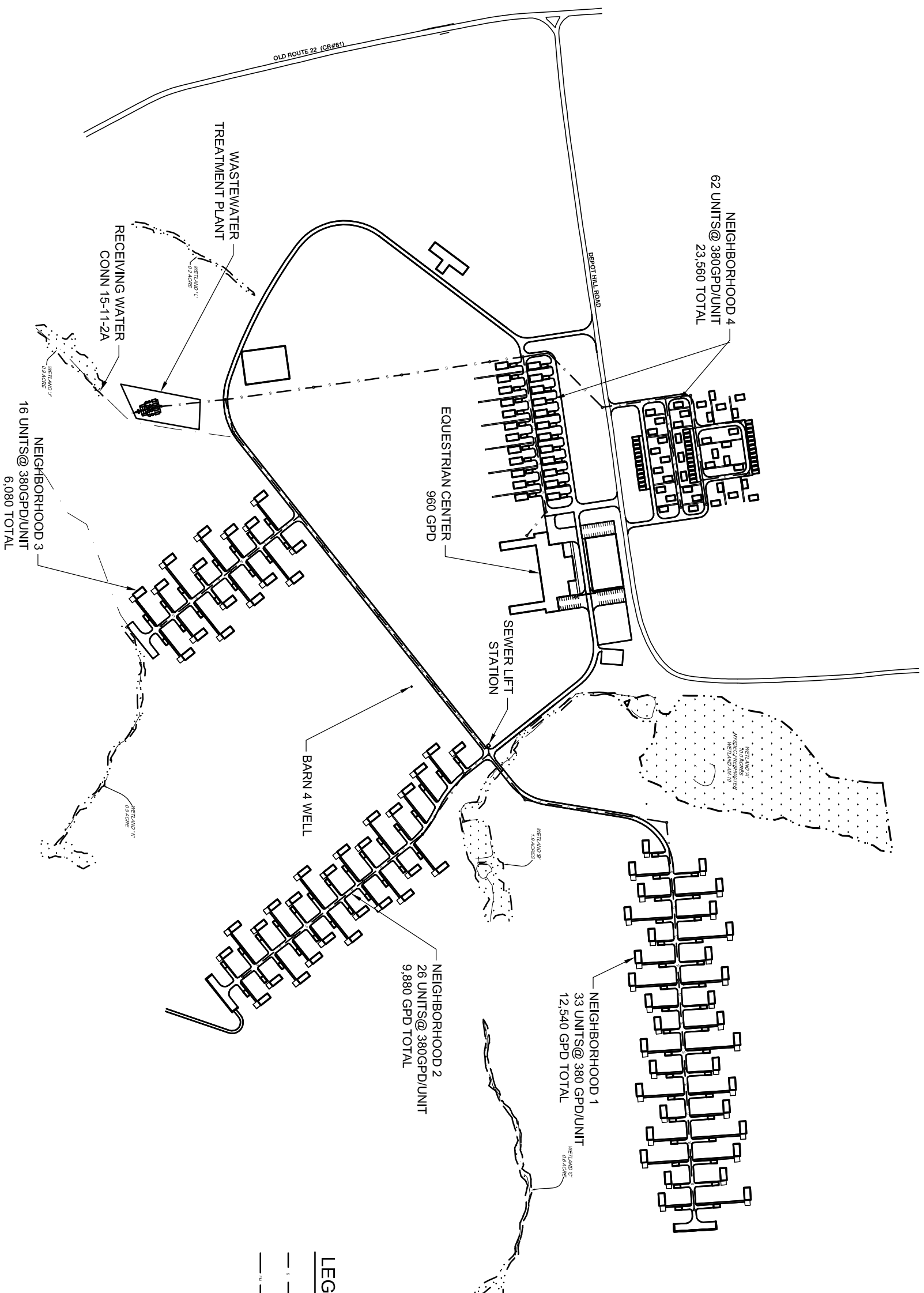
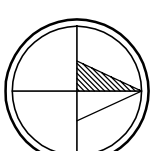
**Table 3-73
Intermittent Stream Effluent Limits**

B.O.D.	5 mg/L
Suspended Solids	10 mg/L
Dissolved Oxygen	Greater Than or Equal to 7.0 mg/L
Settleable Solids	0.1 mg/L Daily Max
pH	6.5 – 8.5
N-NH3	1.0/2.0 mg/L Seasonal
Total Phosphorus	1.0 mg/L
Fecal Coliform	200/100 mL- 30/7 day

It has been suggested that the effluent be reused for the purposes of irrigation, as an alternative to surface water discharge of the treated effluent. This would not be a feasible option for two reasons: First, the growing season is only 4 to 5 months long in the northeast, necessitating a disposal option for the balance of the year. Second, the on-site hayfields will not require watering beyond seasonal precipitation and the planned community garden will be small-scale, requiring far less than would be discharged, so the need for irrigation is not present.

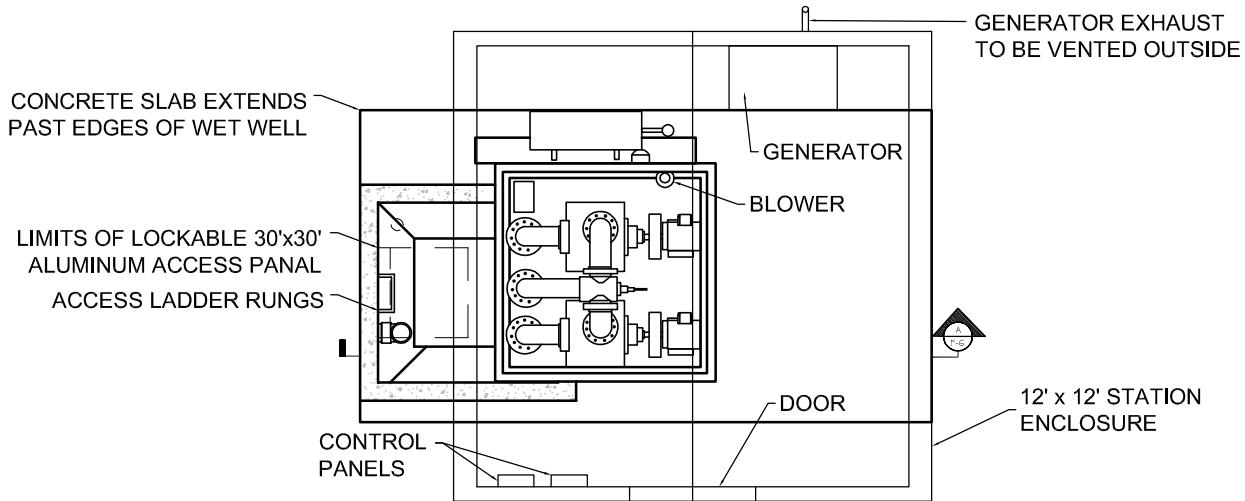
Treatment will begin by providing removal of solids and floatables at a 1,000-gallon septic tank located outside of each residential unit and a 1,500 gallon tank at the Equestrian Complex. Effluent from the septic tanks will flow via 4" PVC gravity laterals to the collection system. Each unit will tie into a 4" PVC gravity flow line to be installed down the center of the proposed road. Effluent from the septic tanks will flow by a 4-inch gravity lateral to 4" PVC collection system to an equalization tank. The proposed new collection system and pump stations would be built to the 10 States Standards and NYSDEC standard. All new gravity sewers would be no less than 4 inches in diameter with slopes of at least 0.5%. This 4-inch diameter pipe is sufficient for carrying the effluent design flow for the development. The force mains would be no less than 4 inches in diameter. The sewers would be laid along the proposed road, no less than 10 feet from the proposed potable water lines. Approximately 12,650 feet of 4" PVC gravity sewer and 880 feet of 4" HDPE force main will be installed. Manholes would be installed at each change in grade or alignment and/or at a distance of no greater than 400 feet. The schematic system design is shown in Figure 25.A.

Sewage from Neighborhoods 1 and 2 on the eastern section of the property will flow to an adequately sized duplex suction lift pump station east of the riding arena. See Figure 25.B. The proposed station will consist of a wet well, above grade pumping equipment, a 4" polyethylene force main, station controls, a backup generator, and a 12-foot by 12-foot enclosure designed to complement the style of the surrounding buildings for the proposed project to minimize visual impacts. Pump station (PS) #1 would be sized for sewage flows from Neighborhoods 1 and 2 and would be designed for 95 gpm and would have a back up generator. A residence time of no more than 30 minutes would be allowed in the wet well. Sewage collected in the 2,000 gallon low-profile wetwell would be pumped through 880 feet of force main to a manhole on the ring

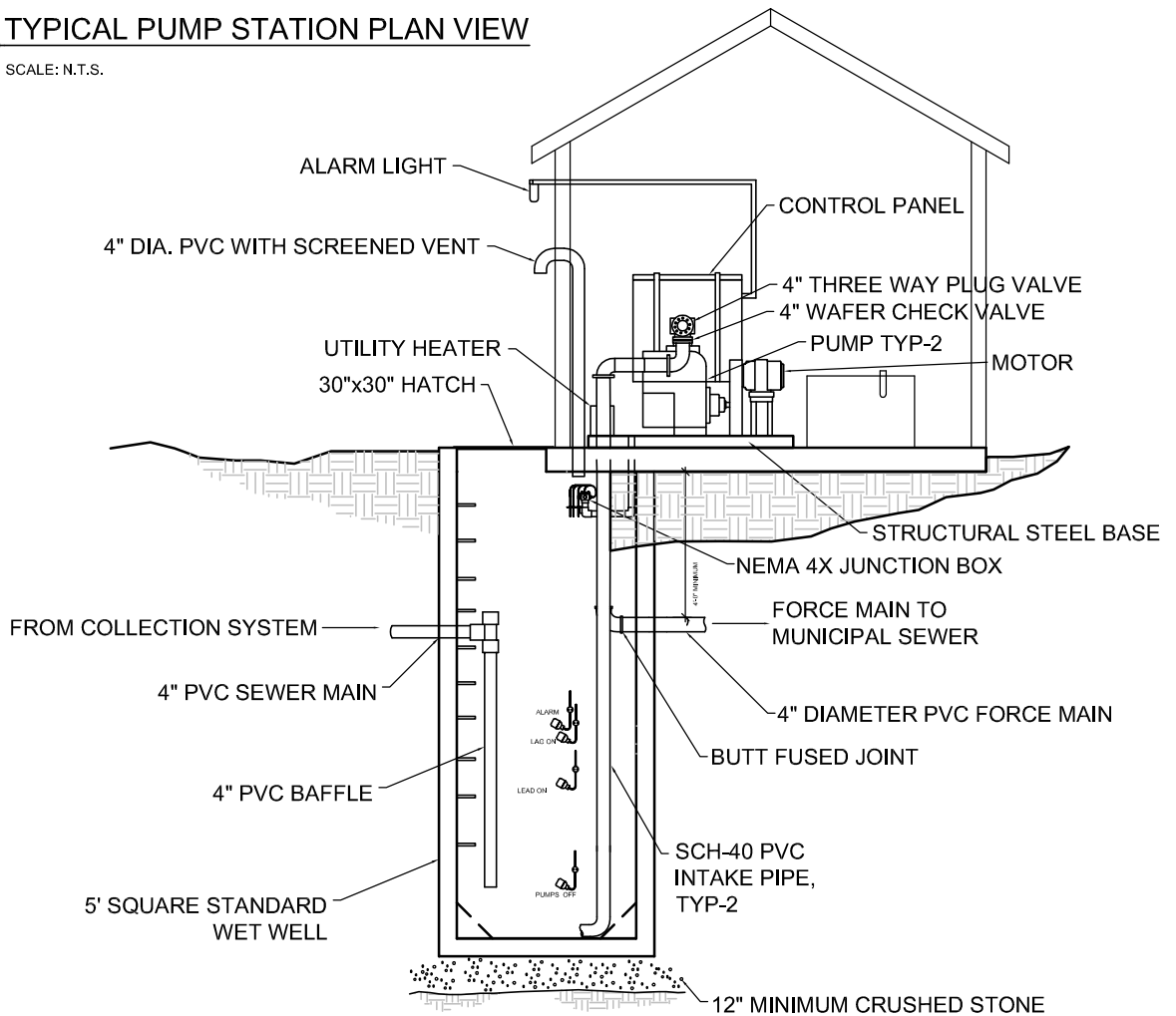


DEPOT HILL FARM
 DUTCHESS COUNTY
 CONCEPT WASTEWATER
 COLLECTION & TREATMENT SYSTEM

1	REVISED NEIGHBORHOODS 2&4 LAYOUTS	1/15/09	DPJ
CRAWFORD & ASSOCIATES ENGINEERING, P.C. 551 Warren Street, Hudson New York 12534 <small>© COPYRIGHT</small>			
DATE	11/19/07	DRAWN BY:	SPN
SCALE	1" = 500'	DESIGNED BY:	MKS
		CHECKED BY:	MKS
		APPROVED BY:	MKS
		H: \WORK\2773\DWGS\WORK DRAW\SEWER	C&A JOB#
			2773.0
			DRAWING:
			FIGURE - 25.A



B TYPICAL PUMP STATION PLAN VIEW
F-6 SCALE: N.T.S.



A TYPICAL PUMP STATION SECTION VIEW
F-6 SCALE: N.T.S.

DEPOT HILL FARM

TOWN OF AMENIA

DUTCHESS COUNTY



CRAWFORD & ASSOCIATES
 ENGINEERING, P.C.
 551 Warren Street, Hudson New York 12534

© COPYRIGHT

PUMP STATION DETAILS

DATE
11/20/07

DRAWN BY: TLJ
 DESIGNED BY: TLJ

H: \WORK\2773.0\dwg\pumpstationdetail.dwg

SCALE
SCALE

CHECKED BY: MKS
 APPROVED BY: MKS

C&A JOB#
2773.0

DRAWING:
FIGURE-25.B

road opposite existing Barn 4; from there it will flow via gravity to the wastewater treatment plant. The pump station will be appropriately sized in the final design based upon final lot layout.

Sewage from Neighborhoods 3 and 4 will flow via gravity directly to the receiving manhole at the treatment facility. Wastewater from the collection system will then be treated by the plant and discharged to the stream. Refer to Figure 25.A.

A septic tank management plan will also be put in place by the COA to haul septage from the septic tanks at each residence, the Equestrian Complex, as well as the sludge from the sludge holding tank at the treatment facility at appropriate intervals. After being pumped by a NYSDEC licensed contract hauler, septage will be treated off site at a NYSDEC permitted facility.

Wastewater treatment at the facility will be achieved by four parallel trains capable of treating 13,350 gpd each. Constructed in phases, each secondary treatment train will consist of flow equalization, Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS) reduction, and nitrification of ammonia in a pair of Bioclere fixed film treatment units piped in series.

In order to meet the intermittent stream effluent levels, tertiary treatment will be necessary. Chemical precipitation and settling to remove phosphorus and effluent polishing using high rate sand filtration will be achieved in two parallel trains, each treating the 26,700 gpd in combined flows from two of the above-mentioned secondary treatment trains. Prior to discharge, ultraviolet disinfection will be utilized to reduce total coliform levels. These treatment processes will ensure that the discharged effluent will meet or exceed the required intermittent stream effluent levels. Figure 25.C depicts the schematic treatment process, the basic plant plan, and the onsite configuration of the proposed treatment system.

Bioclere units have been selected to allow for phased installation as the community demand increases. Pairs of Bioclere units in series will be installed in parallel trains to provide operational flexibility. It is expected that each train will consist of a 5,000 gallon equalization tank and two Bioclere treatment units, measuring 10' in diameter and 18' deep, will be provided for every 13,350 gallons of flow, thus permitting the plant to expand as the site develops. The area required for these units is estimated at 700± square feet. Bioclere units can be installed very close to grade, maintaining a low visible profile. The Bioclere system uses a modified fixed film process to achieve a reduction in BOD and TSS, and when installed in series, nitrification of ammonia components of wastewater. The units are covered, with no exposure to atmosphere of wastewater or processed effluent while under treatment, thereby minimizing odor and noise problems.

Approximately 0.5 acres is needed to accommodate the treatment facility. Figure 25.C shows the proposed schematic wastewater treatment plant layout. Additional design will be completed in the design phase of the project.

The on-site sewage treatment plant will require a SPDES permit from NYSDEC for wastewater discharge. The treatment works will require a Class 2 Wastewater Treatment Plant Operator. According to Aquapoint, the manufacturer of Bioclere systems, the units are typically low-maintenance. Please see Appendix D in the Sewer Feasibility Report, included as Appendix R of the DEIS, for more information regarding Bioclere systems. All maintenance of the

wastewater treatment plant and associated collection system will be the responsibility of the COA.

All onsite improvements for the sewerage works, including the collection and treatment systems, will be designed in accordance with the NYSDEC "Design Standards for Wastewater Treatment Works, Intermediate Sized Sewage Facilities", 1988, and the "Recommended Standards for Wastewater Facilities", 2004. The treatment plant and the collection system will be designed and constructed to meet or exceed all setbacks and separation distances from public and private wells identified in the NYSDEC's design standards and will have no impact on drinking water resources on-site or adjacent to the project site.

The sewerage works described in this alternative will be wholly designed, permitted, and constructed for exclusive use for the proposed development. This alternative provides no potential for a future Amenia Sewer District tie-in.

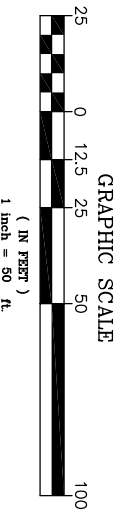
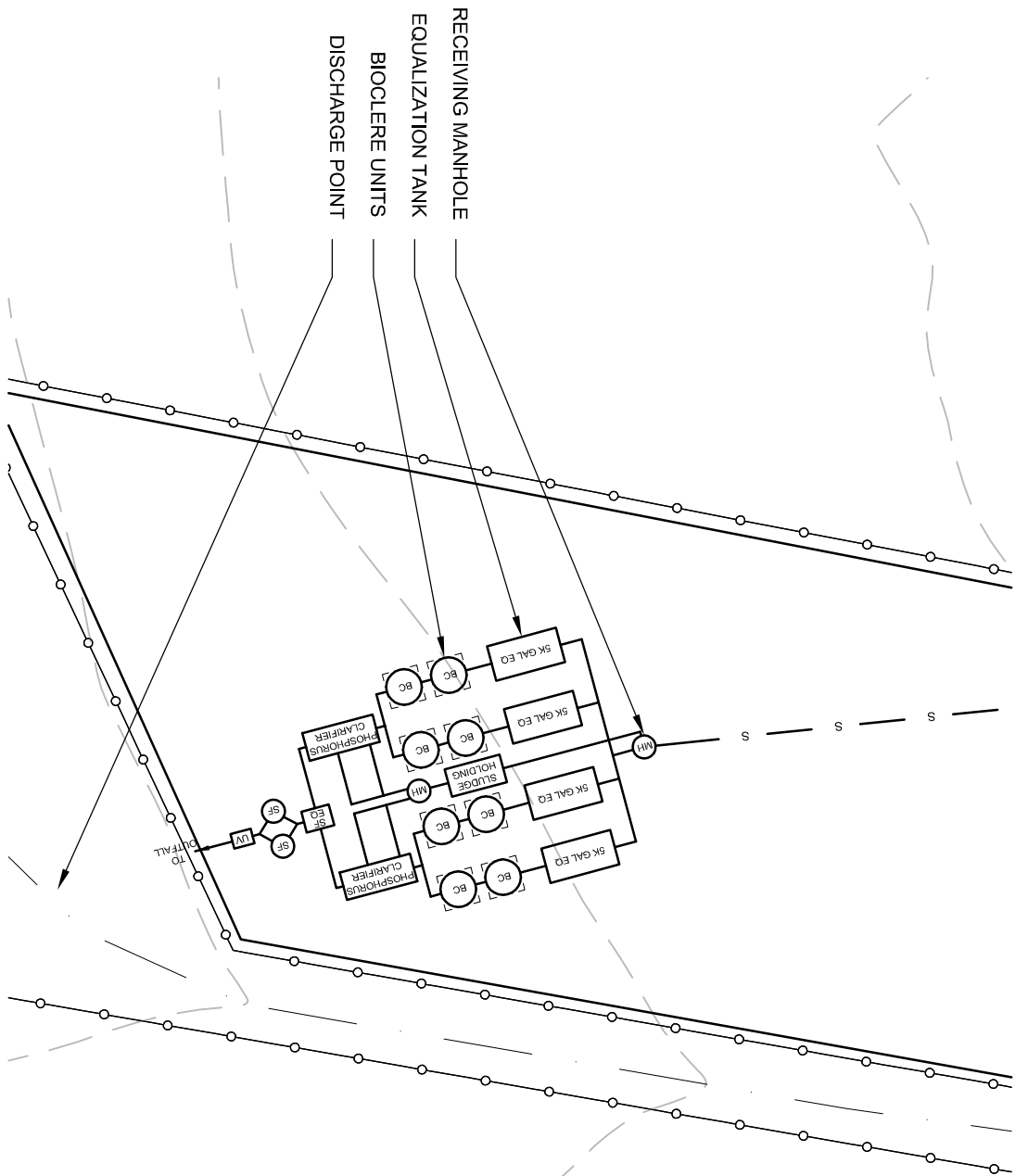
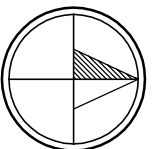
3.16.2.b Alternative 1b: Constructed Wetlands

The preliminary design for the sizing of constructed wetlands (CW) was based on *General Design, Construction, and Operation Guidelines: Constructed Wetlands Wastewater Treatment Systems for Small Users Including Individual Residences*, Gerald R. Steiner, P.E. and James T. Watson, P.E., 1993. Treatment through CW can be preferable for rural sites or those without access to municipal treatment, or where field conditions lack the ability to support traditional systems such as leach fields. CW have been found to be a reliable and affordable alternative to conventional sewage treatment systems. They have the visual appeal of a natural marsh, while providing habitat for wildlife. The treatment of waste is done naturally as the water filters through the system. The area required to site CW was determined using two series cell fields that each have a capacity of a hydraulic loading of 10,000 GPD. Table 3-74 provides a summary of the wastewater flow for each neighborhood and the equestrian center and the corresponding design area of constructed wetlands required to provide adequate treatment.

**Table 3-74
Constructed Wetland Sizing**

	Flow (gpd)	Design Area (sf)
N-1	12,540	16,302
N-2	9,880	13,338
N-3	6,080	7,904
N-4	23,560	30,628
Equestrian Complex	960	1,248
<u>TOTAL</u>	53,020	69,420

These approximate areas do not take into account the extra area required for grading-in the individual wetland areas to provide appropriate hydraulic slope. The area required for treatment would equal 2.0± acres of the site. The area south of Barn 3 is ideal for gravity sewer flow from the majority of the site and would be located away from the main buildings of the project, limiting visibility from the proposed residential areas. More than 2 acres of land is available near the



TOWN AMENIA
DEPOT HILL FARM
DUTCHESS COUNTY

CONCEPT WWTP LAYOUT

CRAWFORD & ASSOCIATES
ENGINEERING, P.C.
551 Warren Street, Hudson New York 12534

© COPYRIGHT

DATE	11/21/07	DRAWN BY:	SPV	I:\WORK\2773\DWGS\PRELIMINARY PLAT
SCALE	1"=50'	DESIGNED BY:	MKS	C&A JOB#
		CHECKED BY:	MKS	2773.0
		APPROVED BY:	MKS	DRAWING: FIGURE 25.C

proposed outfall location. Effluent would be disinfected and dechlorinated prior to discharge to CONN-15-11-2a, a class C stream. The layout of the collection system for the on-site WWTP presented in Figure 25.A is the same for this option as described in Alternative 1a. This alternative is not typically preferred by either the NYSDEC or the DCDOH due primarily to concerns related operation and maintenance of constructed wetlands in the northeast climate.

3.16.2.c Alternative 2: Construction of Wastewater Treatment Plant on Adjacent Parcel

This alternative would require the acquisition of another parcel of land in order to construct a wastewater treatment plant. This parcel would be separate from the two parcels associated with Depot Hill Farm. This option is beneficial because it saves valuable space for Depot Hill Farm as well as eliminates the potential visual impact of having a wastewater treatment plant on-site. However, this option is contingent on finding a parcel of land with physical features that are acceptable for the construction of a wastewater treatment plant, and that is available for purchase at a price that is economically feasible. If this alternative is selected, the site could potentially be available also to treat wastewater from outside of Depot Hill Farm. Currently, several parcels are being investigated. The wastewater treatment plant design would be similar to Alternatives 1.a or 1.b depending on site characteristics.

Another off-site alternative would be to tie-in with Silo Ridge's proposed WWTP. Given the absence of a municipal collection system, it is not feasible for the Depot Hill Farm to tie into Silo Ridge's system as they are more than 1 mile apart horizontally, and several hundred feet vertically.

3.16.2.d Preferred Alternative

The preferred sewage disposal alternative for the Depot Hill Farm is Alternative 1a, discussed above, which proposes to construct a new on-site Wastewater Treatment Plant for the 137 units and Equestrian Complex. The proposed treatment plant would require approximately 0.5 acres of land. Use of CW requires significantly more land area. A new collection system will be constructed to provide service to residences and the Equestrian Complex. Effluent will be conveyed via combination of gravity and force main to the on-site plant for treatment and discharge to perennial stream CONN-15-11-2a.

3.16.3 Mitigation Measures

The preferred alternative, Alternative 1a, is the best option for treating the sewage on-site. The soils' permeability, slope of the site and quantity of sewage created by the new development make this alternative the most viable for treatment. The uncertainty of the Town's future plans for wastewater treatment makes this alternative the most reasonable. The preferred alternative would require the least construction and maintenance. The design of the sewage system and wastewater treatment plant will ensure that no contaminated effluent enters the nearby stream.

This page left intentionally blank.