## 3.5 Water Resources

### 3.5.1 Existing Conditions

Ground Water Resources

There are no wells known to exist on the project site that have been used for potable water. At present, sixteen (16) exploratory groundwater wells have been established on the site, shown on Figure 3.5-4, Well Location Map. Four (4) wells were drilled and tested and twelve (12) additional wells have been drilled (and not tested) to date in the Applicant's search for adequate groundwater resources for the purpose of providing potable drinking water to the proposed development. General data regarding all sixteen wells are listed in Table 3.5-1. These wells are located in bedrock as is the groundwater aquifer. There is no apparent presence of a sand and gravel aquifer on the site.

The project Applicant has committed to completing well exploration and well testing at the site that will reflect the hydrogeological data to demonstrate an adequate water supply for the full-build project scenario. The Final EIS for Lost Lake Resort will include this information.

As of the date of this report, a 72-hour pump test has been completed on Wells O, P, DD and HH with a combined proven yield of 468 gpm. Additional well yield estimates by the well driller are listed in Table 3.5-1. This table also shows the depth of bedrock and locations of water seams in the wells. The boring logs for these wells also show this information and are located in Appendix M1 - Lost Lake Resort Water Supply Report. The fracture trace analysis was used to establish preliminary locations of thirty three potentially viable well sites on the subject property. At the present time the applicant is proceeding with drilling additional wells on the property for additional water supply.

The bedrock wells mentioned above were drilled and completed the Lower Walton Formation within the Sonyea Group and the Upper Walton Formation within the West Falls Group. The bedrock found within these formations is shale, sandstone, and conglomerate. As indicated in Section 3.1 Marcellous Shale is mapped within the property. The Lost Lake wells were completed between the depths of 695 ft bgs and 1005 ft bgs and typically the Marcellous Shale formation is found 5,000 to 8,000 feet below the ground surface. Therefore, the Marcellous Shale formation is generally found more than 4,000 feet below the base of the proposed Lost Lake water supply wells.

Water was collected from each test well just before the pumping test was shut down. The samples were tested by a New York State certified laboratory for the NYSDOH Subpart 5.1 parameters for public water supplies. The water samples meet the New York State Drinking Water Standards, with the exception of turbidity in Well P. The turbidity result for Well P is 6.8 NTU, and the standard is 5.0 NTU. Turbidity is common in newly installed wells and this issue can be resolved with a filtration system should turbidity be found in future sampling during the well permitting process. Lab results are included in Appendix M2.

**Table 3.5.1**
**Well Drilling and Testing Results**

| Well | Drill Date | Total Depth (ft bgs) | Static Water Level (ft bgs) | Depth to Water Bearing Fractures (ft bgs) | Drillers Yields (gpm) | Tested Yields (gpm) |
|---|---|---|---|---|---|---|
| Well A | 08-04-2008 | 805 | overflow | 770 | 6 | NT |
| Well F | 08-06-2008 | 905 | 32 | 750 | 6.5 | NT |
| Well D | 08-11-2008 | 1,005 | 35 | ---- | <1 | NT |
| Well BB | 09-18-2008 | 1,005 | 22 | 320, 780 | 60 | NT |
| Well P | 09-23-2008 | 1,005 | 65 | 376 | 20 | 18 |
| Well CC | 09-29-2008 | 695 | 5 | 325, 695 | 200+ | NT |
| Well DD | 10-07-2008 | 917 | 5 | 110, 345, 420, 490, 685, 715 | 225 | 200 |
| Well O | 10-20-2008 | 1,005 | 7 | 140, 750, 880 | 30 | 50 |
| Well HH | 12-08-2009 | 595 | 5 | 90, 380, 535 | 225 | 200 |
| Well EE* | 12-16-2009 | 1,200 | 55 | 835, 965 | 20 | NT |
| Well FF* | 01-06-2010 | 805 | 6 | 175, 460, 700 | 70+ | NT |
| Well JJ* | 01-15-2010 | 765 | 26 | 692 | 60+ | NT |
| Well II* | 02-03-2010 | 1,205 | -- | 158 | 4 | NT |
| Well N* | 02-24-2010 | 1,080 | -- | 85 | 15+ | NT |
| Well C* | 03-18-2010 | 1,105 | -- | 780 | 1 | NT |
| Well M* | 04-15-2010 | 955 | -- | 600 | 1 | NT |

Notes:
ft bgs - feet below the ground surface;
gpm - gallons per minute;
NT - not tested during a pump test as of yet;
* - Wells drilled after the initial pump tests were conducted;
-- - Static water level not provided, not applicable due to low estimated yield.

Surface Water Resources

The primary surficial water features of the site are a 52-acre lake (known as Lost Lake on local maps and Trout Lake on USGS maps) in the northeastern portion of the property and a lowland/wetland corridor oriented in a NW/SE direction. This drainage corridor contains an unnamed stream that flows to the Bush Kill in the southeastern corner, and ultimately to the Neversink River. Surface water features on the project site have been mapped and are described below. The drainage from the site is generally from woods and brush. The site is bounded to all sides by wooded properties.

The Wetland Delineation Map presented as Figure 3.2-1, depicts United States Army Corps of Engineers (ACOE) regulated wetlands, New York State Department of Environmental Conservation (NYSDEC) wetlands, and isolated wetlands that were field delineated in 2007-2008 by Tim Miller Associates (TMA), Inc. Two tributaries of the Bush Kill traverse across the site. The wetlands and pond in the northern part of the site drain southeast into Bush Kill, connecting to the Basher Kill, which drains into the Neversink River south of the project area in the Town of Mount Hope. The Neversink and Mongaup Rivers drain the central portion of

Sullivan County into the Delaware River, which is located along the southwestern boundary of the county. St. Joseph's Lake, a natural lake, located to the northwest of the project area, drains into Black Brook. Lost Lake, located in the northeastern portion of the project area is a man-made lake created by damming a tributary to the Bush Kill. Drainage from most portions of the site flows in a generally southeasterly direction toward the Bush Kill. These surface water sheet flows were considered in the drainage study discussed below and in the design of the stormwater management system.

A surface water sample was collected from stream D-1-22-3 upstream of its confluence with the Bush Kill in the southeastern portion of the site on December 21, 2009 and tested for a standard array of water parameters. Analytical results indicate the water quality is excellent and unaffected by any manmade wastewater. The results are shown in Table 3.5-2 below.[1]

**Table 3.5-2**
**Surface Water Sampling Analytical Results**

| Parameters | Location At Bush Kill |
|---|---|
| Sodium (Na) | 5,000 ug/L (U) |
| Nitrate as N | 0.050 mg/L |
| Chloride | 4.1 mg/L |
| Sulfate | 6.1 mg/L |
| Total Kjeldahl Nitrogen | 1.0 mg/L (U) |
| Total Phosphorus | 0.10 mg/L (U) |
| Specific Conductance | 36 umhos/cm |
| Total Dissolved Solids | 26 mg/L |
| Total Suspended Solids | 1.3 mg/L |
| pH | 6.37 |
| Ammonia | 1.0 mg/L (U) |
| Dissolved Oxygen | 12 mg/L |
| Biochemical Oxygen Demand | 4.0 mg/L (U) |

Notes:
ug/L - micrograms per liter
mg/L - milligrams per liter
umhos/cm - micromhos per centimeter
(U) - The analyte was not detected at or above the State limit

Existing Stormwater Quality

No water quality data associated with the existing on-site surface water resources are available. The drainage area modeled in the Stormwater Pollution Prevention Plan (SWPPP) is generally woodland, brush land, or wetlands. Adjacent properties include woodland and brush land. Run-off from the site is expected to be typical of that from primarily undeveloped and woodland sites, and is not expected to contain any significant concentrations of residential pesticides or fertilizers, coliform bacteria from animal waste, or any pollutants from septic systems or roadways. In accordance with the requirements set forth in Chapter Three of *Reducing the Impacts of Stormwater Runoff From New Development* (NYSDEC, 1992), pollutant loadings for BOD, TN and TP were analyzed for pre- and post-development conditions. This information is provided in Appendix G.

[1] The results of the surface water sample is presented here only to provide general baseflow analytical characteristics of the surface water (in accordance with the DEIS scope) and is not further evaluated herein.

Existing Stormwater Characteristics

The extent of the existing watershed was limited to the areas impacted by or tributary to the project area. Based on this evaluation, the contributing watershed consists of approximately 3008± acres, of which approximately 65% are located within the property boundaries of the site. Based on the most recent orthoimagery for the project area (2004), the watershed is primarily forested with two significant water bodies (regulated wetlands and Lost Lake) and a narrow corridor of impervious area surrounding St. Joseph's Road.

The topography of the watershed generally conveys the majority of runoff to the south originating from localized ridge lines and flowing through several on-site tributaries before ultimately discharging to the Bush Kill. Slopes in the watershed range between 0 and 35%, with approximately half varying from 0-8%, while the other half varies from 8-15%. In addition, there are a few localized areas of steeper slopes, which range from 15-35%. The project area watershed has been broken down into twelve sub-basins each with its own discharge point or point of interest (POI). Refer to Figure 3.5-2 for the Pre-development Drainage Area Map.

Existing Flooding

Based on a review of the Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) for the Town of Forestburgh, Sullivan County, New York, the proposed project is located in an unmapped portion of the county. Therefore, there are no FEMA regulated floodplains located within the project area. A recent study indicates that a portion of the 100-year storm flood plain extends onto the site near the Bush Kill. This study has not been formally accepted by FEMA, however, Digital Flood Insurance Rate Mapping (DFIRM) has been provided by the NYS Department of State and is depicted on the engineering drawings. It is anticipated that by the start of construction, the DFIRM lines will be the official FEMA boundary.

Existing Stormwater Conditions and Discharges

A Preliminary Stormwater Pollution Prevention Plan and Erosion and Sediment Control Report for Lost Lake Resort has been prepared by the project engineer (see Appendix G1). The analysis in the Preliminary SWPPP provides a description of existing stormwater drainage conditions, and proposed drainage conditions following project construction. For preliminary design purposes, the project has been divided into twelve drainage areas identified as Points of Interest (POI) A, B, C, D, E, F, G, H, I, J, K, and L.

Stormwater management, design, and construction for the project will be consistent with the *New York State Stormwater Management Design Manual*, April 2008 and the NYSDEC Division of Water, *New York State Standards and Specifications for Erosion and Sediment Control*, August 2005. Erosion and sediment control during project construction will be accomplished through an integrated network of sediment traps, silt fencing, rock and vegetative linings among other BMPs. It is expected, however, that the Applicant will request a waiver from the NYSDEC to allow construction of the project to exceed the five acre limit on open disturbances. Specific stormwater management practices for the project are further described in Section 3.5.2 Potential Impacts, below.

All calculations to determine pre- and post-development stormwater flow were performed utilizing the Penn State Virginia Tech Urban Hydrology Model (VTPSUHM) computer software. Under the SCS TR-55 method 90% water quality (WQv), 1 (Cpv), 2, 10 (Qp), 25, 50 and 100

(Qf) year storm events were modeled and compared for pre-development runoff and post-development conditions runoff. Table 3.5-2 summarizes the stormwater flows for the full build-out of the residential area of the project with on-lot controls (i.e. drywells or rain gardens) in place. These on-lot controls are further described in Section 3.5.2 Potential Impacts, below.

**Table 3.5-3**
**Summary of Stormwater Flows:**
Lost Lake Resort (cfs)

| Description | 1-Yr | 2-Yr | 10-Yr | 25-Yr | 50-Yr | 100-Yr |
|---|---|---|---|---|---|---|
| **Rainfall** | **3.0"** | **3.5"** | **5.7"** | **6.0"** | **7.0"** | **8.0"** |
| Pre-Development | 1,266.3 | 1,816.4 | 4,017.8 | 4,844.0 | 5,486.5 | 6,464.7 |
| Post w/WQv Ponds | 1,235.9 | 1,759.6 | 3,799.1 | 4,586.0 | 5,185.9 | 6,098.1 |
| Difference | -30.4 | -56.8 | -218.7 | -258.0 | -300.6 | -366.6 |
| % Reduction from Pre-Development | 4 | 3 | 5 | 5 | 5 | 5 |

Source: Brinkash Associates, Inc. 2010.

Existing Stormwater Quality and Pollutant Loading

Included with this document, as Appendix G1 & G2, is the Preliminary Stormwater Pollution Prevention Plan and Erosion and Sediment Control Report prepared by the project engineer. This report provides the preliminary outline for a stormwater pollution prevention plan (SWPPP) for Lost Lake Resort. This section of the DEIS summarizes the findings of that report. This analysis evaluated existing (pre-construction) and post-construction stormwater runoff characteristics, including existing and post-development peak rates of stormwater discharge for the 1-, 2-, 10-, 25-, 50- and 100-year 24-hour rainfall events. This analysis is the basis for the assessment of potential impacts on surface water resources anticipated from the proposed action and was the basis for developing the mitigation measures proposed as part of the project. A description of each such drainage basin is provided in Appendix G1. The descriptions include specific characteristics (e.g., size and composition) of all drainage structures and a summary of the path of flow from the project to receiving water bodies.

In addition to peak flow requirements and in accordance with the Unified Stormwater sizing criteria set forth in Chapter 4 of the *New York State Stormwater Management Design Manual,* April 2008, water quality (WQv) and channel protection volumes (Cpv) were calculated and mitigated. Finally, in accordance with the requirements set forth in Chapter Three of *Reducing the Impacts of Stormwater Runoff From New Development* (NYSDEC, 1992), pollutant loadings for BOD, TN and TP were analyzed for pre- and post-development conditions. The results of the study are summarized below and the supporting calculations are included in Appendix G2 of this document.

The current *New York State Stormwater Management Design Manual*[2] was prepared by the NYSDEC to provide standards to applicants for the design of stormwater management practices (SMPs) that will protect the waters of the State of New York from the impacts of urban stormwater runoff. The current version of this manual (April 2008) was used to analyze pre- and post-development runoff quality and to select treatment methods for the post-development runoff. A project specific stormwater management plan, defining all measures and procedures to be implemented so as to ensure compliance with prevailing discharge standards, is included

[2] NYSDEC, April, 2008. New York State *Stormwater Management Design Manual*. Http://www.dec.state.ny.us/website/dow/toolbox/swmanual/

in this document (Appendix G1). Such measures, where necessary, include conveyance systems (swales), dry wells, detention ponds and flow control devices. All proposed measures and procedures will be selected in accordance with the current NYSDEC *Design Manual* standards.

### 3.5.2 Potential Impacts

Wastewater Treatment

*Flow Projections*

As shown in Table 3.5-3 the average daily flow and peak flow is separated into phases, facility and unit type. This information is also shown in the Proposed Water and Wastewater Systems Report by Alfred Benesch & Company attached in Appendix K.

**Table 3.5-4**
**Anticipated Average Daily Wastewater Flows and Peak Wastewater Flows**
(Table continues on more than one page.)

| Phase | Item | # of Units | Flow Rate per Unit (gpd) | Average Daily Flow (gpd) | Peaking Factor | Peak Flow |
|---|---|---|---|---|---|---|
| **Phase 1** | House Lots | 400 EDU* | 320 gpd/EDU | 128,000 | | |
| | Sales Office | 3 people | 15 gpd/person | 45 | | |
| | 9 Hole Golf Course | 100 people | 5 gpd/person | 500 | | |
| **Phase 1 Subtotal** | | | | **128,545** | **3** | **385.635 gpd or 268 gpm** |
| **Phase 2** | House Lots | 235 EDU | 320 gpd/EDU | 75,200 | | |
| | Pool | 50 people | 10 gpd/person | 500 | | |
| | 9 Hole Golf Course | 100 people | 5 gpd/person | 500 | | |
| **Phase 2 Subtotal** | | | | **76,200** | **3** | **228,600 gpd or 159 gpm** |
| **Phase 3** | House Lots | 397 EDU | 320 gpd/EDU | 127,040 | | |
| | Driving Range | 50 people | 5 gpd/person | 250 | | |
| | Clubhouse | 100 people | 25 gpd/person | 2,500 | | |
| | Restaurant | 50 seat | 35 gpd/seat | 1,750 | | |
| **Phase 3 Subtotal** | | | | **131,540** | **3** | **394,620 gpd or 274 gpm** |
| **Phase 4** | House Lots | 399 EDU | 320 gpd/EDU | 127,680 | | |
| | Cabins | 15 EDU | 320 gpd/EDU | 4,800 | | |

**Table 3.5-4**
**Anticipated Average Daily Wastewater Flows and Peak Wastewater Flows**
(Table continues on more than one page.)

| Phase | Item | # of Units | Flow Rate per Unit (gpd) | Average Daily Flow (gpd) | Peaking Factor | Peak Flow |
|---|---|---|---|---|---|---|
| | Condominiums | 20 EDU | 320 gpd/EDU | 6,400 | | |
| | Tennis Courts | 10 people | 5 gpd/person | 50 | | |
| **Phase 4 Subtotal** | | | | **138,930** | **3** | **416,790 gpd or 289 gpm** |
| **Phase 5** | House Lots | 450 EDU | 320 gpd/EDU | 144,000 | | |
| | Wildlife Observation Center | 25 people | 5 gpd/person | 125 | | |
| **Phase 5 Subtotal** | | | | **144,125** | **3** | **432,375 gpd or 300 gpm** |
| **Phase 6** | House Lots | 401 EDU | 320 gpd/EDU | 128,320 | | |
| | Cabins | 15 EDU | 320 gpd/EDU | 4,800 | | |
| | Condominiums | 20 EDU | 320 gpd/EDU | 6,400 | | |
| | Beach & Boat Deck | 25 people | 10 gpd/person | 250 | | |
| **Phase 6 Subtotal** | | | | **319,770** | **3** | **419,310 gpd or 291 gpm** |
| **Phase 7** | House Lots | 320 EDU | 320 gpd/EDU | 102,400 | | |
| | Spa | 10 people | 170 gpd/person | 1,700 | | |
| | Bushkill Park | 25 people | 5 gpd/person | 125 | | |
| | Hotel | 50 room | 120 gpd/room | 6,000 | | |
| | Conference Center | 10,000 sf | 0.1 gpd/sf | 1,000 | | |
| **Phase 7 Subtotal** | | | | **111,225** | **3** | **333,675 gpd or 232 gpm** |
| **CUMULATIVE TOTAL (7 PHASES)** | | | | **870,335** | **3** | **2,611,005 gpd or 1,813 gpm** |

Source: Alfred Benesch & Company, 2010
* EDU: each dwelling unit

As shown in the table above and discussed in the Proposed Water and Wastewater Systems report in Appendix K, the project average daily flow (ADF) of wastewater for the proposed Lost

Lake development is 870,335 gallons per day (gpd) or 604 gallons per minute (gpm). The peak daily flow (PDF) is 2,611,005 gpd or 1,813 gpm, using a peaking factor of 3.0.

The projected wastewater flow is based on a flow of 320 gpd/EDU (each dwelling unit) for the residential lots and the recommended hydraulic loading rates in the NYSDEC Design Standards and Ten States Standards as well as other sources.

*Collection and Conveyance System / Treatment Facility*

The proposed sewage treatment system will use a grinder pump low pressure collection system to direct the wastewater to the treatment facility. Three pump stations will be required to move the wastewater to the treatment facility in areas of lower elevation to higher elevation. Each residence will have a grinder pump. This system will be designed to meet the requirements of the NYSDEC Design Standards Manual. This system will be installed during the construction of Phase 1.

The proposed Sewage Treatment Plant is to be located approximately 3,000 feet south of St. Joseph's Road and approximately 50 feet from the eastern most property boundary. This treatment facility will discharge into the Bush Kill, which is located south of the treatment building and shown in the Proposed Water and Wastewater Systems report in Appendix K. This location is adjacent to and east of proposed single family residence lots. This system is designed to produce minimal odor and noise impacts, if any at all. Figure 3.5-5 shows the general layout of the treatment plant (as fully built) in relation to existing site features.

The sewage will be treated by an activated sludge treatment facility. The facility will be a packaged plant that can be expanded upon as the phases of the development progress. Phase 1 is anticipated to produce a wastewater flow of 128,545 gpd. A NYSDEC State Pollutant Discharge Elimination System (SPDES) Permit will be obtained in connection prior to construction of this facility. The Applicant will request the SPDES permit provide effluent limits for three different flow rates to account for the increasing amounts of wastewater that will be produced as the construction of the development progresses. Previously, preliminary effluent limits were requested for the flows of 100,000 gpd, 250,000 gpd, and 550,000 gpd. These flows have since been increased. Final SPDES effluent limits will be established accordingly with flows approved by NYSDEC. Final SPDES limits will be determined by the NYSDEC after the approval of the final DEIS. The initial preliminary limits obtained from the NYSDEC are included in Appendix K and are shown below in Table 3.5-5.

| Table 3.5-5<br>Preliminary Effluent Requirements | |
|---|---|
| **Parameter** | **NYSDEC Preliminary Effluent Limits** |
| | Where 3 limits listed, for flows of 0.55 mgd, 0.25 mgd & 0.1 mgd respectively |
| Biological Oxygen Demand (BOD5) | daily max. limits of 10, 15 & 30 mg/l |
| Total Suspended Solids (TSS) | daily max. limits of 10 mg/l, 15 mg/l & 20 mg/l |
| Ammonia | daily max. limits of 2 mg/l, 3 mg/l & 6 mg/l |
| pH | 6.5 to 8.5 |
| Settleable Solids | 0.1 ml/l |
| Phosphorus | 0.5 mg/l (30 day avg.) |
| Disinfection | Recommended seasonally per Class B(T) stream, typically May 15 - Oct 15 |
| Total Residual Chlorine | 0.01 mg/l if chlorine disinfection is used |
| Dissolved Oxygen (DO) | $\geq$4 mg/l |
| Temperature | $\leq$70 Deg. Far. |
| Source: December 9, 2009 email from NYSDEC to Alfred Benesch & Company, provided in Attachment E in DEIS Appendix K, *Proposed Water and Wastewater Systems* Report for Lost Lake Resort. | |

A properly run and maintained waste water treatment plant will discharge effluent that meets or exceeds NYSDEC nutrient load limits. These limits have been established by the State in order to prevent any direct and indirect negative impacts on the receiving waters. Natural resources, including wetlands, streams and ecological communities onsite and downstream of the Bush Kill will not experience any significant adverse impacts with the identified volume of wastewater treatment plant effluent or the nutrient loads as the discharge limits ultimately set by NYSDEC will be based on previous technical analysis and experience by the State to minimize potential impacts the maximum extent practicable. Based on the full design of the waste treatment system, the Applicant will receive final permit limits to which it must comply as determined by the NYSDEC and Delaware River Basin Commission (DRBC), through the wastewater SPDES permit application process.

*Ownership and Operations*

A NY State transportation corporation will be established to own and be responsible for the operation and maintenance of the collection system and the treatment plant proposed for the development. This entity will be responsible for compliance with all applicable water quality standards and the effluent limits set forth by the NYSDEC.

Post-Development Stormwater Conditions

Potential impacts to the on- and off-site surface water resources that might be expected to result from the proposed action include sedimentation during construction, post development increases in pollutant loading in stormwater, post development flooding from increased peak rates of stormwater discharge, and bed and bank erosion in receiving watercourses resulting from increased stormwater discharge velocities. The NYSDEC regulations require that all construction activities that disturb greater than five acres of land for residential development or

one acre for commercial development must prepare a full stormwater pollution prevention plan, including water discharge quality and quantity control components.

Accordingly, a preliminary SWPPP has been prepared and included as Appendix G1 to this document. Coverage under the NYS State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges for Construction Activities (NYSDEC General Permit No. GP-0-10-001)[3] must and will be obtained. Existing drainage channels will be interrupted by the construction of the roads. The flow in these channels will be caught in the proposed stormwater sewer system and directed to the detention ponds. The detention ponds will release runoff to existing channels which have been analyzed by the project engineer to handle the anticipated flows. The existing channels will be improved as necessary in size and lining to afford proper stormwater conveyance with erosion protection in place.

The proposed development outlined in the preliminary SWPPP does not change the overall drainage gradients. Stormwater ponds will hold storm event flows to less than pre-developed conditions thereby controlling the amount of peak discharge at each point of interest. Each stormwater pond outlet will have rip-rap protection to reduce flows to non-erosive velocities before water flows overland. Each pond will have an emergency spillway that will be protected with grass or rip-rap, depending on the velocity at which the water flows over the spillway. Roadside swales and diversion channels will be grass or rip-rap lined depending on the velocities of a 10 year storm. All protections will meet or exceed NYSDEC *Design Manual* requirements as the implementation and maintenance of these protections are required by the General Permit Conditions to be reviewed and field inspected by qualified professionals. It is anticipated that these protection measures will be inspected by consultants hired by the Applicant, the Town, and the NYSDEC.

On-lot stormwater management facilities will be utilized to collect and control the run-off from the proposed roof-tops of the residential units and infiltrate the 100-year and smaller storm events where possible, while detention basins will be provided to attenuate the flows from the pavement and driveways. On-lot facilities will consist of drywells, or alternatively rain-gardens on those lots where soils provide insufficient infiltration capabilities.

*Sedimentation During Construction*

Without appropriate mitigation incorporated into the proposed action, disturbances on the project site will have the potential to increase the volume and velocity of stormwater through land clearing and conversion of existing land forms into impervious surfaces and landscaped areas. If not controlled, these activities may lead to accelerated erosion and sedimentation during and after construction. Sedimentation of the receiving water bodies will likely result in decreased light penetration and nutrient enrichment, increased turbidity, increased transport of pollutants that are adsorbed to the sediment particles, shielding of pathogens from disinfection, and clogging of gills and filters in aquatic organisms. In order to reduce stormwater-induced impacts from the project, it is essential that the applicant design and construct adequate erosion and sediment control practices to mitigate these potential impacts. This is described under “Mitigation Measures” below. The site plans accompanying this document include an Erosion & Sediment Control Plan for Phase 1.

[3] All references in this DEIS to project conformance to the SPDES General Permit shall mean the most current permit. "An owner or operator of a construction activity that is eligible for coverage under GP-0-10-001 must obtain coverage under the permit prior to the commencement of construction activity." (NYSDEC) The stormwater design conforms to GP-0-10-001, effective January 29, 2010.

*Post-Construction Increases in Pollutant Loading in Stormwater*

Conversion of existing vegetated areas into impervious or landscaped areas as a result of the proposed project may, without appropriate mitigation, increase levels of certain pollutants in stormwater. The discharge of these post-construction increases in pollutants may have a adverse impact on water quality in receiving waters and groundwater. Accordingly, the project engineer has prepared the preliminary SWPPP which includes measures to be implemented to treat post-construction increases in pollutants in stormwater discharged from the development. The components of the plan are described in "Mitigation Measures" below.

Groundwater Resources

*Project Groundwater Demand*

The water demand for the Lost Lake Resort development has been calculated by the project engineer, Alfred Benesch & Company, as tabulated in Appendix K. The average daily demand has been calculated as 897,055 gpd for a full build scenario, or using a factor of 2.0 the maximum daily demand is 1,794,110 gpd. The average daily demand for Phase 1 has been calculated to be 132,545 gpd and the maximum daily demand (or twice the average daily demand) was calculated as 265,090 gpd.

As stated in Section 3.5.1 above, the projected estimated yield of the four (4) tested wells is 468 gpm. The four wells that have undergone a 72-hr pump test are: Wells O, P, DD, and HH. The proposed Lost Lake project demand for Phase 1 is calculated as needing an average daily demand of 132,545 gpd or 92 gpm of water, while the maximum daily demand is approximately 265,090 gpd or 184 gpm of water. These four (4) wells will be able to provide sufficient water to meet the needs for Phase 1 of the project. However, as stated above the applicant has committed to completing well exploration and well testing at the site that will reflect the hydrogeological data to demonstrate an adequate water supply for the full-build project scenario. The Final EIS for Lost Lake Resort will include this information .

At full build out the project will require an average daily demand of approximately 897,055 gpd or 623 gpm, while the maximum daily demand will require approximately 1,794,110 gpd or 1,246 gpm. The current wells on the property will not meet the demands of the full build-out of the Lost Lake development. To meet these demands more wells are being explored and drilled and will be tested with a 72-hour pump test.

The estimated water demand above is calculated for potable drinking water needs for the proposed homes, club house, sales office, pool, restaurant, cabins, condominiums, tennis courts, hotel, beach and boat dock, spa, conference center, and golf course but does not include the needs for irrigation for the proposed Lost Lake development. Groundwater sources are most suitable for potable drinking water. However, surface water can be used for purposes such as irrigation for the proposed golf course.

Since fire flow volume will be provided in the water storage tanks on the site, it is not considered part of project demand. The total required water storage volume of 1,017,055 gallons is equal to total daily demand of 897,055 plus 120,000 additional volume for fire flow.

Use of Lost Lake for Irrigation

The Lost Lake Resort is proposing a golf course with approximately 45 acres of managed turf and the applicant intends to use Lost Lake to serve as the source of irrigation water. An evaluation was conducted to ascertain whether the potential drawdown of the water level of Lost Lake would result in adverse effects on surface waters, particularly on the adjacent wetlands. This information is provided in DEIS Appendix U. The change in elevation of Lost Lake was calculated month by month for a normal precipitation year and 10% probability low precipitation year. Put simply, the elevation change resulting from taking water for irrigation for the golf course was determined by adding the monthly input from precipitation and overland flow and subtracting the water losses from evaporation and irrigation withdrawal.

The projected water use was modeled after Double Diamond's Eagle Rock Resort 18-hole golf course in Hazelton PA. The two regions have a similar precipitation average (47.9 inches at Hazelton, PA and 49.3 inches at Monticello and Rock Hill, NY). The Eagle Rock Resort golf course uses approximately 13,121,000 gallons of irrigation water per season (April through October). The average yearly rainfall, as provided from the Rock Hill weather station from 1957 to present, is 49.3 inches of precipitation per year.

The water balance results show the projected change in the water level of Lost Lake to be -3.7 inches and -3.0 inches in the months of July and August respectively, in drought conditions, and -2.1 inches and -1.4 inches during those months for a normal precipitation year. These are the months when water withdrawals for irrigation will be the greatest. (Tables 2 and 3 in Appendix U list the projected water level changes by month.) This is a very minor fluctuation in lake level and is not expected to show any discernible effect to the existing flora and fauna around the Lake, especially considering that during dry periods it has been observed that the lake level drops due to natural conditions and there is periodically no discharge from the Lake during mid summer.

The applicant plans to solely use the water from Lost Lake for irrigation. Two other potential irrigation sources, however, include the use of wastewater treatment plant effluent and groundwater, the latter being a much less desirable use for groundwater. Treated effluent from the STP in the full build scenario would be sufficient to augment the irrigation of the golf course. However, given the long term build out anticipated for this type of project and the much smaller volume of STP discharge that would occur in the foreseeable future, use of treated effluent for irrigation is not being considered at this time. Likewise, groundwater will only be used if the first two sources are insufficient and this use is also not being considered at this time. Sufficient surface water is available to provide for golf course irrigation with minimal potential affect upon Lost Lake, its associated wetland fringe and downstream tributaries.

*Groundwater Recharge Analysis*

A recharge analysis was completed to estimate the amount of water available for recharge from the Lost Lake Resort property only. This analysis provides a conservative estimate of available groundwater within the site boundaries. The actual area contributing groundwater to the on-site wells will be larger, due to bedrock fractures extending beyond the property boundaries.

The project site is likely underlain by a system of subsurface minor faults and fractures. The fractures, if tapped successfully, will potentially pick up recharge from a large area, including the area beneath nearby surface water bodies. The faults and fractures that form the valleys

surrounding the project site may extend for miles and intercept additional fractures well beyond the property. Precipitation falling anywhere within this area naturally drains towards the valleys from the higher elevations. As previously noted, between 15 and 40 percent of precipitation becomes groundwater through recharge and is potentially available to wells tapping these interconnected fractures. The following table provides an estimate of the amount of water available for recharge for only the subject property assuming 25 percent rate of precipitation recharge.

**Table 3.5-6**
**Recharge Calculations Pre-Construction**
Lost Lake Resort

| | |
|---|---|
| Acres | 2,080 |
| Square Feet | 90,604,800 |
| Average rainfall per year (inches) | 49.58 |
| Average rainfall per year (feet) | 4.13 |
| Cubic feet of precipitation per year | 374,197,824 |
| Gallons of precipitation per year | 2,799,194,112 |
| Amount lost to evapotranspiration and runoff (75%) | 2,099,395,584 |
| Amount, in gallons, available for recharge per year | 699,798,528 |
| Amount, in gallons, available for recharge per day | 1,917,256 |
| Amount, in gallons, available for recharge per minute | 1,331 |

Source: Tim Miller Associates, Inc.,
Note: Rainfall figures are an average of annual rainfall amounts for Liberty, New York, from Table 1 in the Soil Survey of Sullivan County, NY.

This quantitative analysis of the recharge potential for the project site is only an estimate, since the recharge area for subject property could conceivably take into account an area that is considerably larger than the local watershed itself. The location, width, and the interconnection of fractures, all affect the amount of groundwater available in any given location.

Using a fairly conservative recharge rate of 25 percent (the percentage of precipitation available to recharge groundwater) results in about 1,917,256 gpd available from the site alone or 1,331 gpm. This recharge rate exceeds the full build-out estimated project maximum daily demand of 1,794,110 gpd or 1,246 gpm leaving the post-construction recharge amount to be 123,146 gpd or 86 gpm. The available groundwater resources appears to be adequate for existing onsite water demand, as shown by this recharge analysis (shown in Table 3.5-6 above).

The watershed area for the Lost Lake property is shown in Figure 3.5-3, Watershed Map and has been calculated to be approximately 3,005 acres. Using this area it is possible to calculate the recharge for the watershed area that impacts the property. The following table provides an estimate of the amount of water available for recharge for the watershed area assuming 25 percent rate of precipitation recharge.

| Table 3.5-7<br>Recharge Calculations Pre-Construction - Watershed Area | |
|---|---|
| Acres | 3,005 |
| Square Feet | 130,897,800 |
| Average rainfall per year (inches) | 49.58 |
| Average rainfall per year (feet) | 4.13 |
| Cubic feet of precipitation per year | 540,607,914 |
| Gallons of precipitation per year | 4,044,028,032 |
| Amount lost to evapotranspiration and runoff (75%) | 3,033,021,024 |
| Amount, in gallons, available for recharge per year | 1,011,007,008 |
| Amount, in gallons, available for recharge per day | 2,769,882 |
| Amount, in gallons, available for recharge per minute | 1,154 |
| Source: Tim Miller Associates, Inc.,<br>Note: Rainfall figures are an average of annual rainfall amounts for Liberty, New York, from Table 1 in the Soil Survey of Sullivan County, NY. | |

Under drought conditions, sufficient groundwater will be available for the project, as well as for existing development. The Town of Forestburgh and Sullivan County do not have specific aquifer testing requirements that relate to drought conditions. More regionally, the Susquehanna River Basin Commission requires an analysis of recharge accounting for 1-in-10 year annual drought conditions or "*60 percent of the average annual recharge rate (which approximates a 1-in-10 year annual drought*)"[4]. A 40 percent reduction in annual recharge will result in 1,661,929 gallons per day available in the contributing drainage area to the project site. This amount is equivalent to 1,154 gallons per minute (GPM). Therefore, the drought condition watershed area recharge rate exceeds the average project water demand of 623 gpm.

*Pump Test*

As described in Section 3.5.1, four (4) wells have been drilled and tested with a yield of approximately 468 gpm, which proves 268 gpm with the best well out of service. The New York State Department of Health typically requires that projects demonstrate the maximum daily demand with the “best well out of service”. This cumulative yield was determined from 72-hour pump tests started on November 9, 2009 and December 19, 2009 and the yield of these wells is suitable to provide water through Phase 1 of the proposed Lost Lake Resort property. Further investigation and drilling of wells is underway to provide water supply for the full build out of the project.

The 72-hour pump tests that have been completed are in compliance with the New York State Department of Health (NYSDOH) and the New York State Department of Environmental Conservation (NYSDEC) and the Delaware River Basin Commission (DRBC). Owners of offsite wells within approximately ¼ mile of the proposed test wells on the property were notified to have their wells monitored during the pump test. Letters requesting permission to monitor their wells were sent to these off-site property owners via U.S. Postal Service certified return receipt. A questionnaire regarding individual well construction was included with the permission letter. Tim Miller Associates, Inc. (TMA) did not receive any response and therefore phone calls were made to private residences, where numbers were available. After no further response, TMA

[4] Aquifer Testing Guidance, Sesquehanna River Basin Commission, Policy No. 2007-1, December, 2007

went door to door to contact the homeowners directly. In the event homeowners were not home, the letter seeking permission and questionnaire were left at the homes. No positive responses were obtained from either the mailing, the phone calls, or the hand delivery. Therefore, TMA was unable to monitor off-site wells during the pump tests. The letter, questionnaire, and list of contacted property owners is included in Appendix M1. Surface water bodies within 500 feet of the proposed test wells were monitored for water level fluctuations during the pump test and surface water bodies with 200 feet of the proposed test wells will be monitored for groundwater under direct influence of surface water (GWUDI) as mandated by the NYSDOH. The locations of the surface water monitoring locations are shown on Figure 3.5-4.

As indicated, two (2) separate 72-hour pump tests were completed on the four (4) proposed production wells. On November 9, 2009 the first 72-hour pump test was started on Wells O, P, and DD. During this pump test Wells D, BB, and F were monitored. Two (2) wetland monitoring points were also monitored just west of Well-DD and Well-O, locations are shown of Figure 3.5-4. The three (3) tested wells were pumped simultaneously for 72-hours and their yields were proven as follows: Well-O = 50 gpm, Well-P = 18 gpm, and Well-DD = 200 gpm.

To develop the required supply with "the best well out of service", a back up well was drilled near Well-DD. A new 8-inch well was drilled as Well-HH. On December 19, 2009 a 72-hour pump test was conducted on this well to prove it's yield. During the test Wells-O, P, and DD/CC were monitored for influence. This pump test proved that Well-HH has a proven yield of 200 gpm. Therefore, between both tests the proven yield on the project site is currently 268 gpm with the best well out of service.

During each 72-hour pump test, on-site wells were monitored for influence. The data shows that influence of the pumping wells is limited to areas that are defined by the fracture traces, specifically areas limited to the northwest and southeast of the test wells. The data observed from the well points located in the wetlands west of the test wells indicated that the pumping test had no adverse influence on the wetlands hydrology. Specific information regarding the pump test is provided in Appendix M1, Lost Lake Resort Water Supply Report.

At the completion of each 72-hour pump test water was collected from each test well. The samples were transported (same day) in iced coolers to a New York State certified laboratory for analysis using the parameters specified by the New York State Department of Health (NYSDOH) Supart 5.1 parameters for public water supplies. The quality of the water sampled generally meets the NYSDOH drinking water standards expect for turbidity in Well P. The turbidity result for Well-P is 6.8 NTU, the standard is 5.0 NTU. This can be resolved with a simple filtration system. Sodium in Wells O and P was found to be 29,000 ug/L and 65,000 ug/L. Though there is no real standard for sodium there is a guidance that if the water contains more than 20,000 ug/L of sodium that water should not be used by people on severely restricted sodium diets. A table comparing the results to the NYSDOH standards is included in Appendix M1. The laboratory results are included in Appendix M2.

*Geothermal Systems*

A geothermal system or geothermal heat pump is defined as a central heating and/or cooling system that pumps heat to or from the ground, depending on the need and the season. This system uses a heat pump to transfer the heat from either the ground into the structure to be heated or to take the heat from the structure and pump it into the ground. The proposed

geothermal system for the Lost Lake Resort property is associated with heating the pool. This system will use a closed loop geothermal system so that no pollutants are introduced into the aquifer.

### 3.5.3 Mitigation Measures

Turf, including home lawns, roadsides, and golf courses, is often the most intensively managed land use in the developed landscape. Substantial inputs of fertilizers, pesticides and water to maintain turf have led to a perception that turf systems are a major contributor to non-point source water pollution. In addition, studies in lakes demonstrate that human development of lake shores can alter the physical habitat and nutrient cycles of the lake. The Applicant has formulated a Preliminary Water Quality Management Plan attached in Appendix L as a management tool to avoid excessive practices. This plan describes a monitoring plan comparing pre to post development to assist in the management of the golf course, Lost Lake recreational areas, and landscaped areas within the Amenity Village to ensure that no downstream adverse impacts are caused by the development.

A water sampling protocol has been established and is presented in Appendix L. Six (6) surface water sampling locations have been chosen to divide the site into manageable drainage units. Three (3) of the deep drinking water production wells will be used for monitoring. Also, two (2) shallow groundwater monitoring wells will be installed south of the Maintenance Building, which is the presumed downgradient location for shallow groundwater flowing through the overburden. Prior to the commencement of construction, two (2) rounds of pre-development sampling events will be completed to establish a baseline water quality assessment for the site. The sampling will include selected production wells, the two (2) shallow groundwater wells and the six (6) surface water location. Post-development sampling will continue bi-annually during the following periods: Spring during the month of March or April, and Fall during the month of September or October. For each sampling event (pre- and post-development), the following constituents will be analyzed: pH, Dissolved Oxygen, Nitrate-Nitrite, Total Sodium, Total Dissolved Solids, Total Suspended Solids, Chloride, Total Phosphorous, Total Kjeldahl Nitrogen, Sulfates, Ammonia-Nitrogen, Volatile Organic Compounds (VOCs, EPA 524.2 list), Herbicides (specific to the Golf Course) and Pesticides (specific to the golf course).

Tree removal will be the minimum feasible to construct the required infrastructure and buildings, driveways, roadways and stormwater facilities. Forest buffers of 100 feet will be placed around all regulated wetlands and streams on the site creating an extensive protective buffer that will remain in perpetuity. This will allow the ecological systems that currently exist to continue to function as they currently do providing woody debris and cover for macro invertebrates, fish and other residing organisms, and will maintain water temperatures. Natural landscaping mimicking the existing vegetation community types on the site and in the local area will be incorporated into replanting plans for the site. On individual house lots, treatment of the area disturbed by construction but outside of the immediate area of typical homeowner activities (called the "Transition Zone" in the Lost Lake Resort *Design Guidelines*) will be restored to a naturalized state, thereby limiting the creation of lawn. The *Design Guidelines* stipulate goals for limiting the area of disturbance on house lots, acceptable treatments for the immediate landscape around the house and the transition zone, and preservation of the undisturbed forested areas. Therefore, by minimizing managed lawn areas the likelihood of pollutants entering the Bush Kill will be reduced. Providing a natural forest setting surrounding the homes and roadways will drastically decrease the pollutant loading on the Bush Kill in the same manner as a natural forest: evapotranspiration, interception of rainfall, sequestering of nutrients, etc.

Turfgrass surfaces, such as a golf course, provide enhanced groundwater recharge, decreased runoff, and enhanced biodegradation of synthetic organic compounds. This conclusion is qualified by the assumption that chemical use is performed by well trained and educated golf course superintendents who handle and use the products in accordance with manufacturer instructions.

Based on the evaluation of the proposed development with special focus on the golf course and other managed landscaped areas, the potential risks to the surface and ground water quality of the area will be managed to acceptable levels by the implementation of the various aspects of the Water Quality Management Plan outlined in Appendix L. Particular management measures proposed to be established and implemented for the golf course to address the specific resources of this site are:

- a Turf and Pest Management Plan
- an Integrated Pest Management (IPM) strategy Best Management Practices (BMPs) for operations at the maintenance facility
- Standard Operating Procedures (SOPs) for chemical storage, handling, management
- a Spill Prevention and Response Plan (SPRP) to establish appropriate remedial response actions before they are needed
- Preliminary Nutrient Management Plan to schedule fertilizer applications
- Water Quality Monitoring Plan for water quality testing and monitoring

The risk of impacting surface or groundwater will be minimized using chemical management techniques and the Water Quality Monitoring plan, both discussed in detail within the Revised Preliminary Water Quality Management Plan in Appendix L. Much of the site soils are underlain by a fragipan, which is a hydraulically restrictive soil horizon. It is unlikely that fertilizers and pesticides, applied at minimal rates, will leach into the groundwater. The permanent turfgrass surface of a golf course is recognized as almost eliminating runoff except during the most intense rainfall events, and provides substantial water quality improvement benefits through the attenuation and biological degradation of many inorganic and organic compounds.

The water quality management plan to be developed for Lost Lake Resort will include an Integrated Pest Management (IPM) strategy, which is the application of an interconnected set of methods for managing pests, including pest prevention techniques, pest monitoring methods, biological controls, pest attractants and repellents, biopesticides, and pesticides. The goal of the IPM is to minimize the use of chemicals that could potentially affect surface and ground water, and is a decision based program that relies principally on monitoring information to determine pest densities and outbreaks.

Pesticide and fertilizer applications on all areas managed by Lost Lake Resort, Inc. will be applied by licensed individuals in accordance with applicable State l regulations, 6 NYCRR Part 325. This regulation requires that the person applying the pesticide and fertilizer must be trained and certified by NYS.

While there are no regulations regarding homeowner use of these materials, the Preliminary Water Quality Management Plan states that the use of fertilizer and lawn chemical applications will be limited on residential areas not managed by Lost Lake Resort, by the Declaration of

Exceptions, Reservations, Covenants, Restrictions and Conditions for the Lost Lake Resort and Development (see Appendix E1). This document addresses, among other things, residential landscaping and prohibits the use of phosphate fertilizer and requires that a New York State Certified applicator will apply lawn chemicals and the chemicals used will have no greater concentration that a "Caution" toxicity rating. Current standard practices for applications of contemporary pesticides at appropriately low dosages, and in accordance with a site-specific management plan, will ensure the substances will not migrate to any great extent and will break down rather quickly after application. Correspondingly, the use of herbicides and insecticides at this site in the future is not expected to present an adverse impact to groundwater or surface water quality. Because of treatment of stormwater flows and the low anticipated levels of these substances, no significant adverse impacts on water bodies or watercourses is anticipated.

The storage of pesticides and chemicals will be stored by personnel with the experience to handle such chemicals and with experience in golf course management. A maintenance building is proposed to the east of the practice range on the northern portion of the site. The stormwater management plan and sanitary facilities will be designed to prevent any adverse impact from discharges to watercourses. The monitoring plan proposed with the Preliminary Water Quality Management Plan in Appendix L also provides a measure to monitor the subsurface and surface water in the area of the maintenance building.

Preliminary Stormwater Pollution Prevention Plan

To mitigate the potential adverse impacts on water resources identified above, the applicant has developed a preliminary SWPPP that is incorporated into the proposed action. The preliminary SWPPP has been prepared to comply with the NYSDEC State Pollution Discharge Elimination System General Permit for Stormwater Discharges GP-0-10-001. Temporary and permanent erosion control facilities are proposed.

The temporary erosion and sediment control facilities to be used during construction include, but are not necessarily limited to:

- stabilized construction entrances
- sediment basins
- erosion control matting
- seeding and mulching
- temporary sediment traps, and
- silt fences (filter fabric fences) and/or haybales (as determined by field conditions)[5]

Temporary erosion and sediment control for individual home sites is to be in accordance with the *New York State Standards and Specifications for Erosion and Sediment Control*. Generally, individual home site construction will require stabilized construction entrances and silt fence/haybales to be installed downgradient of disturbed or soil stockpile areas.

Per the *New York State Standards and Specifications For Erosion and Sediment Control*, “The plan must be designed so that suspended, colloidal, and settleable solids are not discharged in amounts that cause substantial visible contrast to natural conditions”. The most effective method to prevent colloidal clay dispersion and off-site discharge is though erosion control (controlling runoff and the stabilization of exposed soils). Runoff controls include temporary

[5] Silt fences and haybales, which are standard erosion control practices, will be detailed on the approved erosion control plans.

diversions to direct stormwater away from disturbed soils, check dams, and installing silt fence or fiber rolls along a slope to redirect erosive energy. Stabilization measures that will be utilized will include the installation of rolled erosion control products (recp's), mulching, and hydroseeding. Sediment control is a secondary management practice that can also reduce the potential for suspended clays from leaving the site. Sediment basins that receive waters laden with colloidal clay particles will have the ability to be temporarily closed off to allow for a greater time for settling out.

SWPPP's are dynamic documents in that they are often modified in response as site conditions vary. Erosion and sediment control measures are reviewed weekly for appropriateness and effectiveness. Additional measures, that may not be included in the SWPPP, can be called for in the field to address specific concerns. It is noted that a complete ("full") SWPPP will be submitted for approval prior to obtaining site plan approval.

In general, the permanent water quality treatment practices and/or erosion and sediment control facilities to be constructed include, but are not necessarily limited to:

- grassed swales,
- grassed swales with check dams,
- dryswales,
- culverts,
- sediment forebays,
- bio-retention areas,
- on-lot stormwater controls including drywells and raingardens,
- detention ponds,
- stone-lined outlet protection, and
- revegetation of all disturbed areas.

The purpose of the Erosion and Sediment Control Plan included with the preliminary SWPPP is to minimize the erosion of exposed areas of soils and to prevent the migration of sediment into surface waters during construction. The SWPPP will ensure that development of the site will not impact surface water resources that receive stormwater from the project site following construction.

The project stormwater management practices will control post construction stormwater discharge to rates lower than pre-development rates during each of the storm events analyzed, and will mitigate the potential for downstream flooding.

The implementation schedule for erosion and sediment control facilities is as follows:

- A complete ("full") SWPPP will be submitted for approval.
- Obtain Site Plan Approval from municipal and regulatory agencies.
- Submit Notice of Intent (NOI) for Stormwater Discharges Associated with Construction Activity under the SPDES General Permit (by Operator).
- Hold Pre-construction conference.
- Install temporary gravel construction entrance/exits as required.
- Install fabric silt fence.

- Thereafter, inspect all erosion and sediment controls weekly and after rainfall events; repair as required.
- Clear/grub sites, mulch all disturbed areas as required.
- Construct temporary drainage swales and temporary sediment traps.
- Strip, stockpile and stabilize topsoil, rough grade building sites.
- Prepare subgrade and construct subbase courses for roads and drives.
- Install utilities.
- Construct final drainage grassed swales and dryswales.
- Lay final surface courses for roads and drives.
- Spread topsoil, fine grade and seed, fertilize and mulch all disturbed areas.
- Water seeded areas and vegetation as required to establish plantings.
- Remove all temporary erosion control measures after sites are stabilized and vegetation has become established.
- Submit Notice of Termination (NOT) form for Stormwater Discharges Associated with Construction Activity under the SPDES General Permit (by Operator).

The proposed stormwater basins have been designed to require minimal maintenance. Short- and long-term maintenance measures are described in the draft SWPPP. The proposed stormwater basins and roads will be privately owned and maintained by Lost Lake Resort. Specifications for the operation, inspection, and maintenance of stormwater control practices are included in the SWPPP provided with this document.

With the implementation of the project specific SWPPP, including the proposed erosion and sediment control plan and the stormwater management plan, no other potential adverse impacts to on-site or downstream water resources are expected to result from the proposed development.

Stormwater Runoff Quality

The NYSDEC *Design Manual* was prepared to provide standards for the design of stormwater management practices (SMPs) to be included in project specific SWPPPs to protect the waters of the State of New York from the impacts of stormwater runoff from new developments. The manual establishes specifications and uniform criteria for the practices that are to be part of a SWPPP.

The Water Quality Control Volume (WQv) is the runoff during the initial stage of a storm event that contains most runoff-related contaminants (salt, sand, etc.) transported from land (particularly impervious surfaces). The manual presents a WQv technique that was designed to improve water quality sizing of SMPs to capture and treat 90 percent of the average annual stormwater runoff volume. The manual states that..."by meeting the WQv requirements through employment of the practices in the manual, a project will, by default, meet water quality objectives."
The Channel Protection Volumes (CPv) to provide 24 hour detention of the post development discharge from the one (1) year, twenty-four hour storm event have been provided to offer

stream channel protection. A minimum of 12 hours of detention time is recommended when discharging stormwaters to NYSDEC protected trout streams.

The primary stormwater management practices proposed for Lost Lake Resort were selected from the NYSDEC *Design Manual* and will meet all State WQv and CPv requirements. Open vegetated channels with check dams (dry swales) and detention ponds are the recommended practices to reduce or remove pollutants in the first flush from impervious surfaces. It is noted that open channels (dry swales) may function as a water quality treatment practice where swales have a longitudinal slope of four percent or less. However, the Applicant's engineer has taken no treatment credit for open swales when calculating water quality volumes for the project's SWPPP. Stormwater management basins have been designed to accommodate the water quality volumes without taking credit for any pretreatment for water quality in open channels on the project site.

The practices designed by the project engineer, including on-lot stormwater management controls, sediment forebays, bio-retention areas and detention ponds, were selected from the current NYSDEC *Design Manual* to meet the WQv requirement. The stormwater collected on developed portions of the property will be conveyed to the permanent stormwater detention ponds and treated using these practices to reduce off-site discharge of post development increases in pollutants.

As further mitigation and as required under current regulations, the applicant will engage a Certified Professional Erosion and Sediment Control Specialist (CPESC) or other qualified individual to oversee implementation of the erosion control and stormwater management elements of the SWPPP, including ongoing inspections through the construction period to monitor the maintenance and effectiveness of all stormwater management practices until the project site has been stabilized.

Low Impact Design Mitigation Measures

Due to the character of the development associated with the proposed Lost Lake Resort, it is anticipated that the use of structural practices will be limited to the greatest extent practicable. This goal will be accomplished by implementing several of the design practices outlined in the NYSDEC publication entitled *Better Site Design* (April 2008). Based on a review of this document, it is believed that the following low impact design (LID) practices can be applied during the development of the Lost Lake Resort.

- Natural Area Conservation - This credit may be granted when undisturbed natural areas are permanently preserved on a site, thereby maintaining their natural hydrologic characteristics.
- Stream and Wetland Buffers - This credit may be granted when stormwater runoff is effectively treated by a stream or wetland buffer that is located substantially within the boundaries of the site.
- Vegetated Open Channels - This credit may be granted when site drainage is achieved using open swales instead of closed conveyance systems. Vegetated swales allow for water quality treatment while extending the time of concentration for the site, lowering peak flows. Only channels with slopes less than 4% may function as a water quality treatment practice, although the project engineer has taken no treatment credit for swales in this project in the engineering design.

- Overland Flow Filtration to Groundwater Recharge Zones - This credit may be granted when "overland flow filtration zones" are incorporated into a design to receive runoff from rooftops or other small impervious areas. Drywells, or alternatively rain gardens where soils are not conducive to infiltration, located on individual lots will serve as water quality treatments resulting in groundwater recharge.

The key benefit of the non-structural practices listed above is to reduce the overall volume of runoff generated by a project, therefore reducing the required storage and treatment volumes. The last two items are more fully described in the engineer's Preliminary Stormwater Pollution Prevention Plan and Erosion and Sediment Control Report, Appendix G1.

By minimizing the number and size of structural practices required, you also minimize the maintenance cost associated with each facility. Based on the preliminary layout of the proposed Lost Lake Resort, it is anticipated that a combination of LID and structural practices can be developed in order to mitigate the quality and quantity of stormwater runoff in accordance with the regulations established by the Town of Forestburgh and the New York State Department of Environmental Conservation.

POI–'A'
17.65 AC
Tc–A

0' 1200' 2400' 3600'

HORIZONTAL GRAPHIC SCALE
(1"=1200')

POI–'B'
122.12 AC
Tc–B

Tc–C

POI–'K'
42.42 AC

Tc–F

Tc–J

Tc–K

POI–'L'
49.89 AC.

Tc–L

POI–'F'
41.82 AC

POI–'J'
119.66 AC

POI–'C'
1512.67 AC

Tc–D

Tc–E

POI–'D'
64.12 AC

POI–'E'
393.00 AC

Tc–G

Tc–H

Tc–I

POI–'G'
20.60 AC

POI–'H'
15.63 AC

POI–'I'
71.20 AC

LEGEND

POI = Point of Interest
= Drainage Divide
= Time of Concentration Flow Path

**Note:** Colored hatch is for readability only.

Figure 3.5-1: Predeveloped Drainage Map
Lost Lake Resort
Town of Forestburgh, Sullivan County, New York
Source: Brinkash Associates, Inc., 01/07/09
Scale: As shown

File 07093 04/22/10
JS/07093

*Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418*

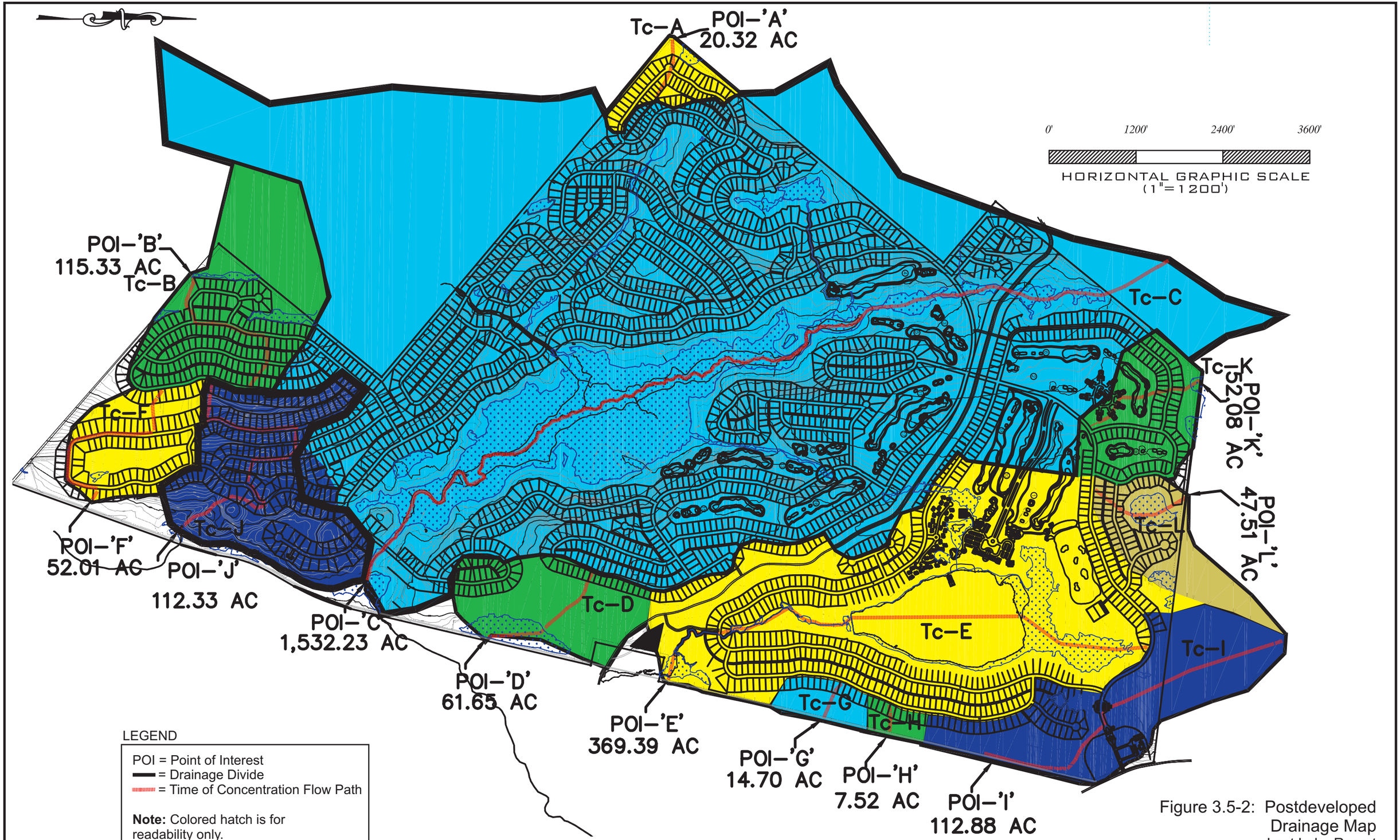
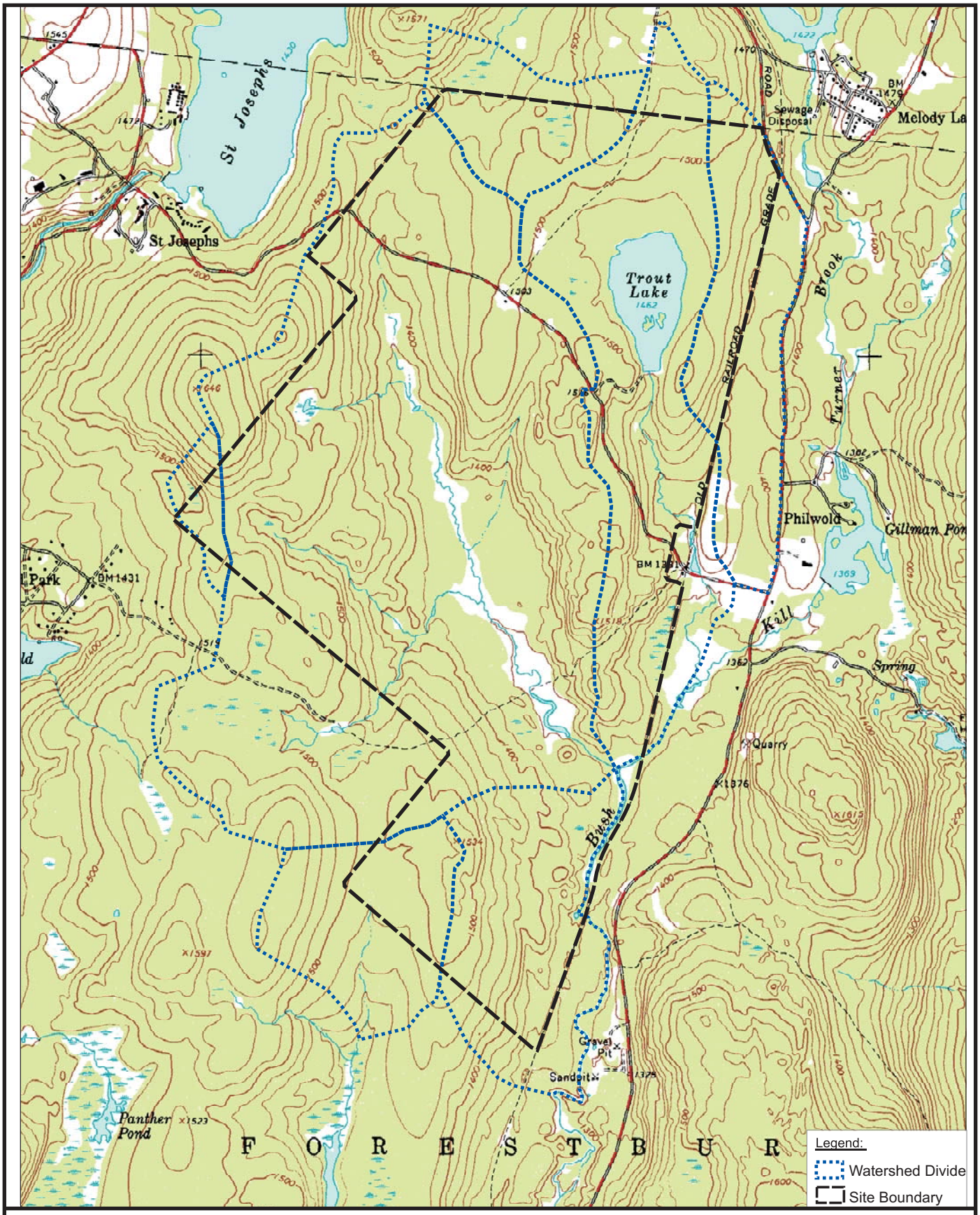



Figure 3.5-2: Postdeveloped Drainage Map
Lost Lake Resort
Town of Forestburgh, Sullivan County, New York
Source: Brinkash Associates, Inc., 01/07/09
Scale: As shown

File 07093 03/29/10
JS/07093

*Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418*




N
W E
S

# Figure 3.5-3: Watershed Map

Lost Lake Resort

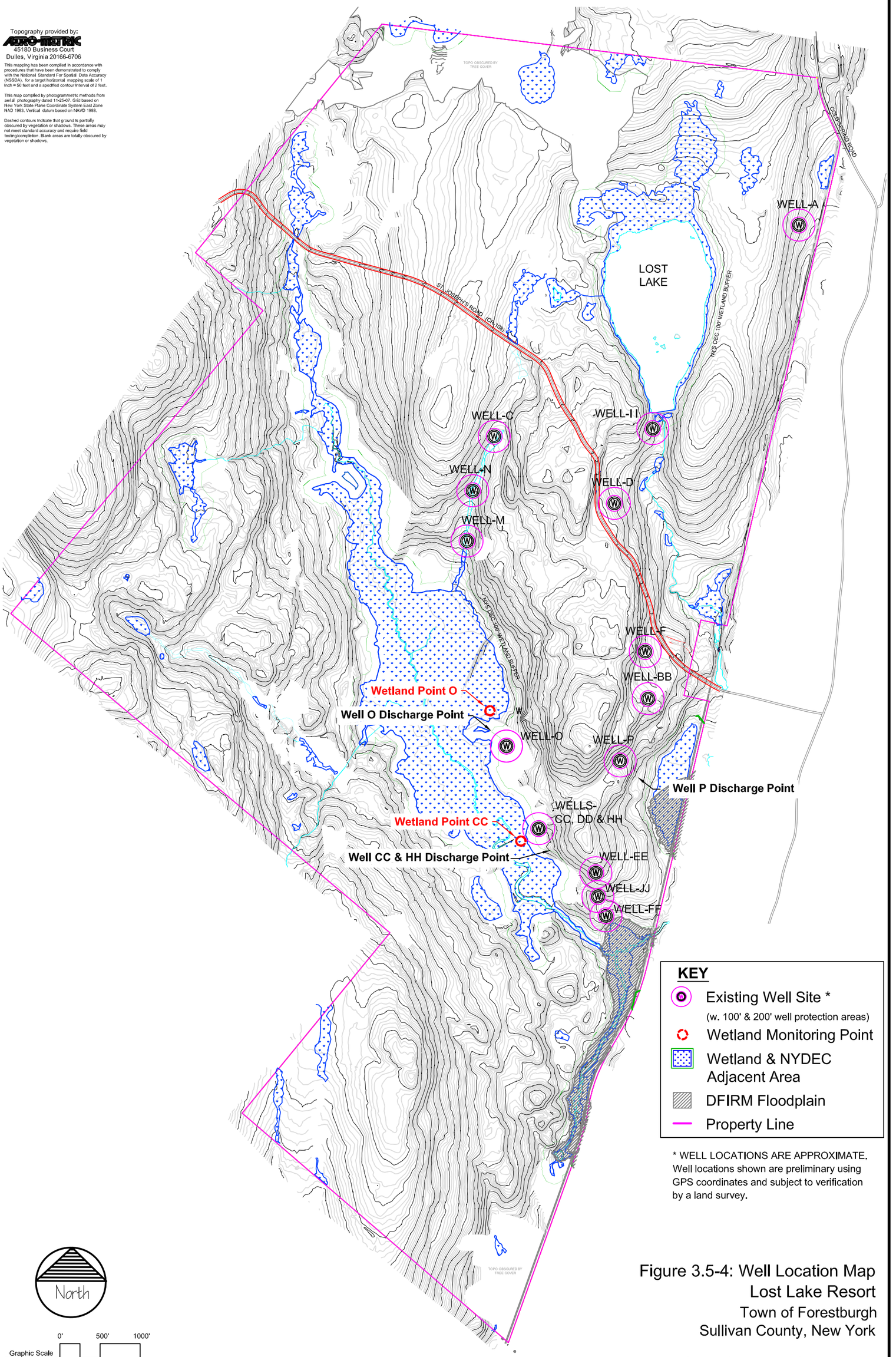
Town of Forestburgh, Sullivan County, New York

Base: Clough Harbour and Associates LLP, 2008

Scale: 1" = 2,250'

File 07093 9/29/09
JS:\07093

*Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418*

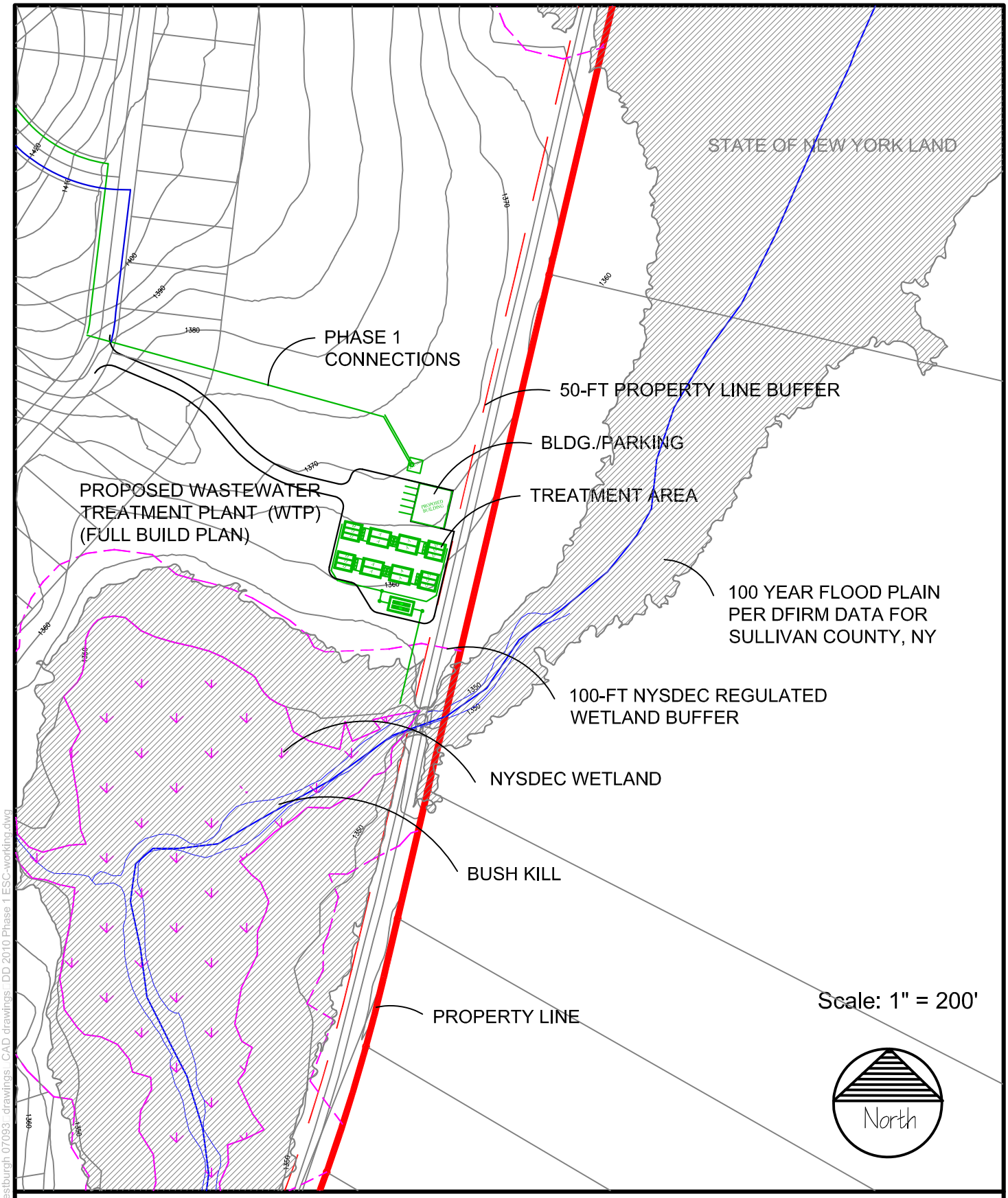



Drawing: T:\ Double Diamond Forestburgh 07093 drawings CAD drawings DD FORESTBURGH-Wells tested and monitored_JS.dwg

# Figure 3.5-4: Well Location Map
## Lost Lake Resort
### Town of Forestburgh
### Sullivan County, New York

Base Map: AERO-METRIC and Brinkash & Associates, Inc.

*Figure Prepared by Tim Miller Associates, Inc., 10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418*




# Figure 3.5-5: Proposed WTP Location

Lost Lake Resort

Town of Forestburgh, Sullivan County, New York

Base Map Source: Brinkash & Assoc., Inc., 1/10

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