3.2 Surface Water Resources

3.2.1 Existing Conditions

Surface Water Resources

The terrain on-site slopes gently from Route 303 towards the west side of the property and the existing rail line. The existing surface water drainage follows the topography and generally drains from east to west across the site. No streams or open water bodies are located on the property. A NYSDEC regulated wetland is located in the northwest portion of the site. Wetlands are further described in Section 3.4 Ecology. Existing surface water features and drainage areas are shown on Figure 3.2-1 Local Drainage Features. The existing on-site drainage and wetlands are shown in Figure 3.2-2 Existing On-site Drainage.

The site is located in the Hackensack River Drainage Basin, with drainage from the site and nearby land generally flowing towards the west and the south. This drainage pattern reflects a series of north-south trending ridges and valleys, including Hook Mountain which lies east of the site, between the project area and the Hudson River (see Figure 3.2-1 Local Drainage Features).

The nearest NYSDEC regulated stream to the site is Tom's Brook, located approximately 1000 feet northwest of the project site. This brook begins at the northwest corner of NYSDEC Wetland HS-8, and flows generally west to DeForest Lake, eventually flowing south to the Hackensack River. Tom's Brook is classified as a Class C stream. According to the NYSDEC, the best usage of Class C waters is fishing. The waters shall be suitable for fish, shellfish, and wildlife propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.

No disturbance to any wetland or wetland regulated adjacent area is proposed, with the exception of developing a walking path through a portion of the wetland and wetland adjacent area.

Existing Stormwater Runoff Conditions

The project engineer has prepared a pre-development drainage map that shows existing stormwater run-off conditions at the project site. Pre and Post-development stormwater conditions are shown in full sized maps provided in the Stormwater Management Report and Water Quality and Quantity Design report prepared by Atzl, Scatassa & Zigler P.C. (Drainage Report) attached as Appendix C. Existing drainage conditions are also shown in Figure 3.2-2 Existing On-site Drainage.

Currently four (4) drainage areas or watersheds are mapped on the site and are designated as WS #1 through WS #4 and totals approximately 110 acres, which includes onsite and offsite drainage areas. As described above, the drainage map indicates stormwater generally drains from east to west across the site. Drainage is controlled at the western edge of the site by the CSX Rail line (formerly Conrail) at the western property border, where stormwater flows from south to north along the rail line. Stormwater currently flows into NYSDEC wetland HS-8 in the northwest corner of the site, and eventually to a 30-inch culvert or discharge point under the CSX Rail line. The culvert is designated as the point-of-interest (P.O.I.) in the SWPPP.

TR-55 software was used to calculate the curve numbers (CN) and the time of concentrations (Tc) for each of the four watersheds. TR-20 software was used to calculate the peak flows and to route the flows through the retention systems in the post-development conditions (existing wetland and proposed ponds). Refer to the Stormwater Management Report and Water Quality and Quantity Design report (Drainage Report) provided in Appendix C).

Existing runoff rates from the project site have been calculated for the 1-year, 2-year, 10-year, 25-year, 50-year and 100-year storm events. All assumptions for land cover types, soil groups, slopes and curve number calculations are provided in the project engineer's stormwater management report (Appendix C). Table 3.2-1 summarizes the peak pre-development stormflows.

Table 3.2-1
Peak Pre-development Flow Summary for 24-Hour Design Storms
(Cubic Feet per Second)

Design Point	1-Year	2-Year	10-Year	100-Year
WS #1	4.2	7.8	15.7	30.2
WS #2	2.5	5.1	10.9	22.0
WS #3	13.4	24.4	48.2	91.7
WS #4	50.4	86.2	160.8	294.0
Total [1]	**70.5**	**123.5**	**235.5**	**438.0**
At the Wetland [2]	70.0	122.6	234.1	435.1
At the P.O.I. [3]	44.5	70.0	127.7	265.1

Source: Stormwater Management & Water Quality Design, ASZ, 2008
1. Total flow generated from entire watersheds in the existing condition.
2. Flow Reduced due to swales/reaches.
3. Flow reduced due to the existing wetland.

Detailed information pertaining to the existing watersheds and site drainage features is also provided in the stormwater management report prepared for this project (Appendix C).

3.2.2 Potential Impacts

Direct Impacts to Wetlands and Surface or Ground Waters

No roads, buildings or other direct impacts to existing surface water features are proposed. No direct impacts to wetlands, surface water or groundwater are anticipated. As described above, a one-half mile long footpath constructed of woodchips is proposed as a passive recreation amenity. The wood chip footpath will cross through a portion of the wetland and the wetland adjacent area. The location and design of the wood chip footpath is subject to review and approval by the NYSDEC, prior to their issuance of the wetland permit as required for the project.

Future Runoff Conditions

The proposed increase in impervious coverage (13.8 acres) on the project site would result in increases in the rate of stormwater runoff in the absence of appropriate stormwater controls. Minor changes to the existing drainage patterns of the site will also occur as the land is regraded to construct buildings, parking areas, and roads. In the developed condition, the size and configuration of drainage areas (WS #1 through WS#4) has been somewhat modified. Specifically, drainage areas WS #1 and WS #2 have been subdivided into smaller drainage

areas, given the proposed development and introduction of pavement and stormwater management facilities. If not properly mitigated, the on-site development could result in downstream erosion and possible flooding due to uncontrolled increases in stormwater flow rates.

In order to offset changes in stormwater flow, the design of the development incorporates three (3) pocket ponds, one (1) micro pool, and a water quality swale that will run along the southern and western edges of the property. These stormwater management features will discharge to the wetland adjacent area and eventually into the on-site wetland in the northwest portion of the site. The existing wetland provides additional water quality treatment for the stormwater flowing through it. Although the SWPPP does not include the wetland as a stormwater management feature for water quality, the wetland was considered in the estimates of overall stormwater discharge flow rates from the site. Figure 3.2-3 illustrates the post -development drainage conditions.

The three (3) pocket ponds and one (1) micro pool reduce the estimated post-development peak flow rates for all of the 24-hour design storms, to rates lower than existing run-off conditions. Therefore, the project has been designed to meet the NYSDEC requirement to maintain or reduce peak stormwater run-off rates compared to existing conditions. The Post-development run-off rates are summarized in Table 3.2.2, below.

Water Quality

The introduction of impervious surfaces and residential uses may influence the quality of stormwater runoff compared to a site's undeveloped condition. The concentrations of specific pollutants resulting from the development may increase, including phosphorus, nitrates and total suspended solids.

The stormwater management plan is required to incorporate structures and methods designed to satisfy provisions specified in the 2008 version of the NYSDEC Stormwater Management Design Manual.

The NYSDEC Stormwater Management Design Manual presents sizing and performance criteria for developing site-specific stormwater management practices (SMP) that can provide acceptable water quality treatment for stormwater runoff. An acceptable SMP will capture and treat 90 percent of the average annual runoff volume from stormwaters and be capable of removing 80 percent of the Total Suspended Solids and 40 percent of the Total Phosphorous in the runoff water.

As the NYSDEC manual requires that 90% of the average annual runoff volume be treated, this requirement was used to determine the water quality storage volumes for the project site. The sizing and design of the water quality ponds were based on these calculated volumes.

The use of an approved erosion and sediment control plan will incorporate Best Management Practices to comply with NYS regulations for suspended sediment control in runoff water from construction sites. With proper stormwater management and the use of erosion control BMPs, site development can occur while minimizing or avoiding impacts to downstream receiving waters. The proposed plans are designed to comply with the requirements of the SPDES General Permit for Stormwater Discharges so that such potential impacts are mitigated prior to stormwater discharge into the receiving stream.

As described under "Mitigation" below, the proposal as submitted will mitigate against potential soil erosion and sedimentation by the phasing of site construction, use of rapid site stabilization after grading, provision of lawn and landscaping in disturbed areas, and the use of extended detention basins and other BMPs. These basins are designed to remove up to 80 percent of the remaining suspended sediment load after site stabilization. Sediment loading post construction is not expected to represent an adverse environmental impact to the receiving waters.

Petroleum hydrocarbon (PHC) pollutants are not a main concern on this project. As stipulated in chapter 4 of the Stormwater Design Manual (2008) an extraordinary level of stormwater treatment is required for land use activities that create hydrocarbons, trace metals or toxicants, these land use activities are defined as hotspots. The project site does not fall in the category as a hotspot and therefore does not need to provide filtration or water quality discussion for petroleum hydrocarbons.

3.2.3 Mitigation Measures

Stormwater Runoff Quality Treatment Measures

The applicant has submitted plans that conform to the criteria established by the NYSDEC. These plans include the use of erosion controls, phased site development and stormwater management practices (SMPs) that are acceptable to the NYSDEC and described in their Stormwater Management Design Manual (April 2008). Stormwater management facilities and features are shown on Figure 3.2-3 Post-Development Drainage Map. The setbacks from wetlands and waterbodies are also shown on the figure.

All proposed stormwater facilities will result in peak stormwater flow rates that will be maintained at or below pre-development levels. The stormwater management report (Appendix C) provides details on the post-development drainage conditions, run-off reduction measures, stormwater management facilities and their design details.

The proposed stormwater management utilizes NYSDEC recommended practices to best provide acceptable water quality treatment prior to the stormwater runoff being discharged from the project site. The project proposes to utilize three (3) pocket ponds, one (1) micro pool and an approximately 1,175 foot long water quality swale at the southern and western perimeter of the site.

The proposed stormwater management design will also provide channel protection as well as overbank and extreme flood attenuation by moderating runoff flow rates. The proposed pond discharge outlet points, where the collected stormwater runoff will be discharged from the ponds, ultimately flows through the existing on-site wetland and to the single design point for the site, the culvert under the CSX Rail Line, at the western edge of the site.

Erosion and Sediment Control Measures

A comprehensive erosion control plan will be employed to minimize the potential adverse impacts resulting from the proposed clearing, excavation and grading necessary to undertake the proposed project. Erosion control plans for this project are included as part of the site plan drawings. The plan shall incorporate various measures to reduce erosion during construction and trap sediment to prevent it from being carried from areas being actively graded. The measures will be installed in accordance with the New York "Standards and Specifications for Erosion and Sediment Control", dated April 2005. Several key measures that are proposed to

improve the quality of stormwater discharged from the site and reduce the impact on downstream waters or other offsite areas, incorporate methods to improve soil stabilization, runoff control, sediment control, and fugitive dust control including:

1. Soil covers/temporary seeding
2. Silt fences
3. Curb inlet protections
4. A stabilized construction entrance
5. Dust control measures

- **Soil Covers/Temporary Seeding.** Any exposed soils that are exposed and left bare and are not being graded for a period of 7 days will be temporarily stabilized. Mulching or hydroseeding will be applied to ground with low slopes that have been stripped of natural vegetation. Riprapping, matting or sodding will be applied to soils for permanent stabilization if conditions warrant.

- **Silt Fences.** Silt fence will be installed at the toe of slopes below areas to be graded. Silt fence allows water to pass through the fabric while trapping most of the sediment in the runoff. A double row of silt fence will be installed in locations where the topography is sloped toward surface water resources.

- **Curb Inlet Protections.** All proposed drain inlets will be provided with drain inlet protection during construction. Stone, hay bales, fabric or excavated depressions will be established around inlets to filter sediments from the runoff.

- **Stabilized Construction Entrance.** The construction entrance will be provided with a lined stone pad of appropriate dimensions to reduce the transport of soil to adjacent roadways.

- **Dust Control Measures.** Dust during construction activities will be controlled through a combination of temporary stabilization measures, including the use of vegetative covers or spray-on tackifiers for disturbed areas not subject to traffic, mulching (including gravel mulch) and seeding, compaction of disturbed soil, water sprinkling, and the use of stone covers (crushed stone or coarse gravel) on construction roads. Dust generation will also be limited through phasing of the project that will limit the overall area of exposed soils in each phase. All on-site vehicle speeds will be limited to 15 MPH on unpaved construction roads through the use of traffic controls.

Topsoil will be spread following final grading operations and the ground surface will be promptly revegetated using trees, shrubs, ground covers and grasses as set forth in the landscape plan.

The sediment and erosion control plan will be part of the site plan approval and construction bid documents. Therefore, the contractor will be obligated to provide weekly and rain-event inspections by a qualified professional to assure the maintenance of each sediment and erosion control measure throughout all construction phases of the project as specified in the New York SPEDES Stormwater General Permit. The inspections will continue until the site has undergone final stabilization and the designated project operator has filed a “Notice of Termination” with the NYSDEC.

Stormwater Pollution Prevention Plan

A site specific Stormwater Pollution Prevention Plan (SWPPP) has been prepared for the project and is provided as Appendix C Stormwater Management & Water Quality Design report. The SWPPP will be submitted to the NYSDEC for review and approval and is prepared to address the requirements of the NYSDEC general permit for construction (GP-0-10-001). The objective of the SWPPP is to control the runoff of pollutants from the project site during and after construction activities by complying with the NY State Pollutant Discharge Elimination System (SPDES) Stormwater Permit for construction activities. A site specific pollutant loading analysis will be prepared prior to final site plan approval. The SWPPP will implement the following practices:

- Reduce the potential for erosion and sediment loading to waterbodies during construction;
- Control of the impact of stormwater runoff on the water quality of the receiving waters;
- Control of the increased volume and peak rate of runoff during and after construction, and;
- Maintenance of stormwater controls during and after completion of construction.

The SWPPP will specify the selection, sizing and siting of the SMPs to protect water resources from stormwater impacts. The designs of the proposed SMPs were determined using current engineering methodologies that apply appropriate sizing criteria to avoid the overburdening of stormwater conveyance structures. The applicant shall retain the services of an engineer for scheduled inspections and report preparation as to the implementation of the measures identified in the SWPPP for the proposed project.

Long Term Operation, Maintenance, and Inspection

Stormwater management facilities, including the proposed detention basins and stormwater swales must be properly operated and maintained if they are to function as intended over a long period of time. The Orchard Ridge Homeowners Association will maintain the two stormwater management ponds and the stormwater swale. Typical SMP maintenance tasks include routine inspections for structural conditions, debris removal, mowing, structural repairs as well as control of nuisance plant and animal species. Plans can be based on and developed by reference to recent standard regulatory documents, including the NYSDEC Stormwater Management Design Manual (April 2008) and the US EPA National Management Measures to Control Nonpoint Source Pollution from Urban Areas (November 2005).

Sediment can accumulate in an extended detention facility over time. Sediment buildup should be properly removed from the forebay areas prior to accumulations reaching fifty percent of the design depth in order to preserve the available stormwater management capacity of the pond. While more frequent clean-out may be needed in the forebays and around outlet control structures, a typical clean-out cycle for the lower stages of an extended detention facility should range from 5 to 10 years.

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Figure 3.2-1: Local Drainage Features Map

Orchard Ridge

Town of Clarkstown, Rockland County, New York

Base Map: USGS 7.5-minute Topographic Map, Haverstraw Quad

Scale: 1" = 2,000'

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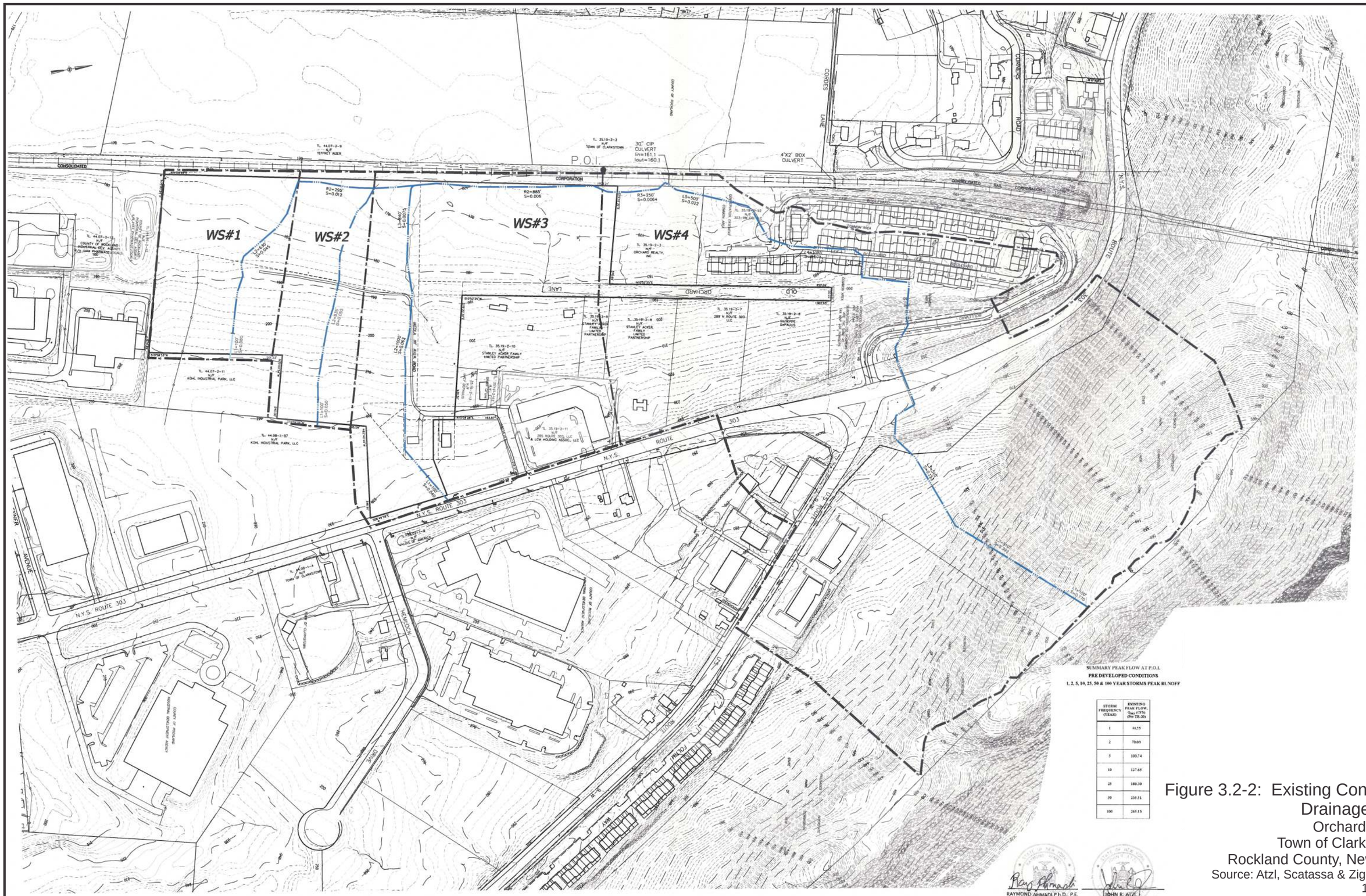

SUMMARY PEAK FLOW AT P.O.I.
PRE DEVELOPED CONDITIONS
1, 2, 5, 10, 25, 50 & 100 YEAR STORMS PEAK RUNOFF

STORM FREQUENCY (YEAR)	EXISTING PEAK FLOW, Q_{PRE} (CFS) (Per TR-20)
1	44.55
2	70.03
5	103.74
10	127.65
25	160.30
50	235.51
100	265.13

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Figure 3.2-2: Existing Condition Drainage Map
Orchard Ridge
Town of Clarkstown,
Rockland County, New York
Source: Atzl, Scatassa & Zigler P.C., 11/19/08
Scale: 1" = 115'

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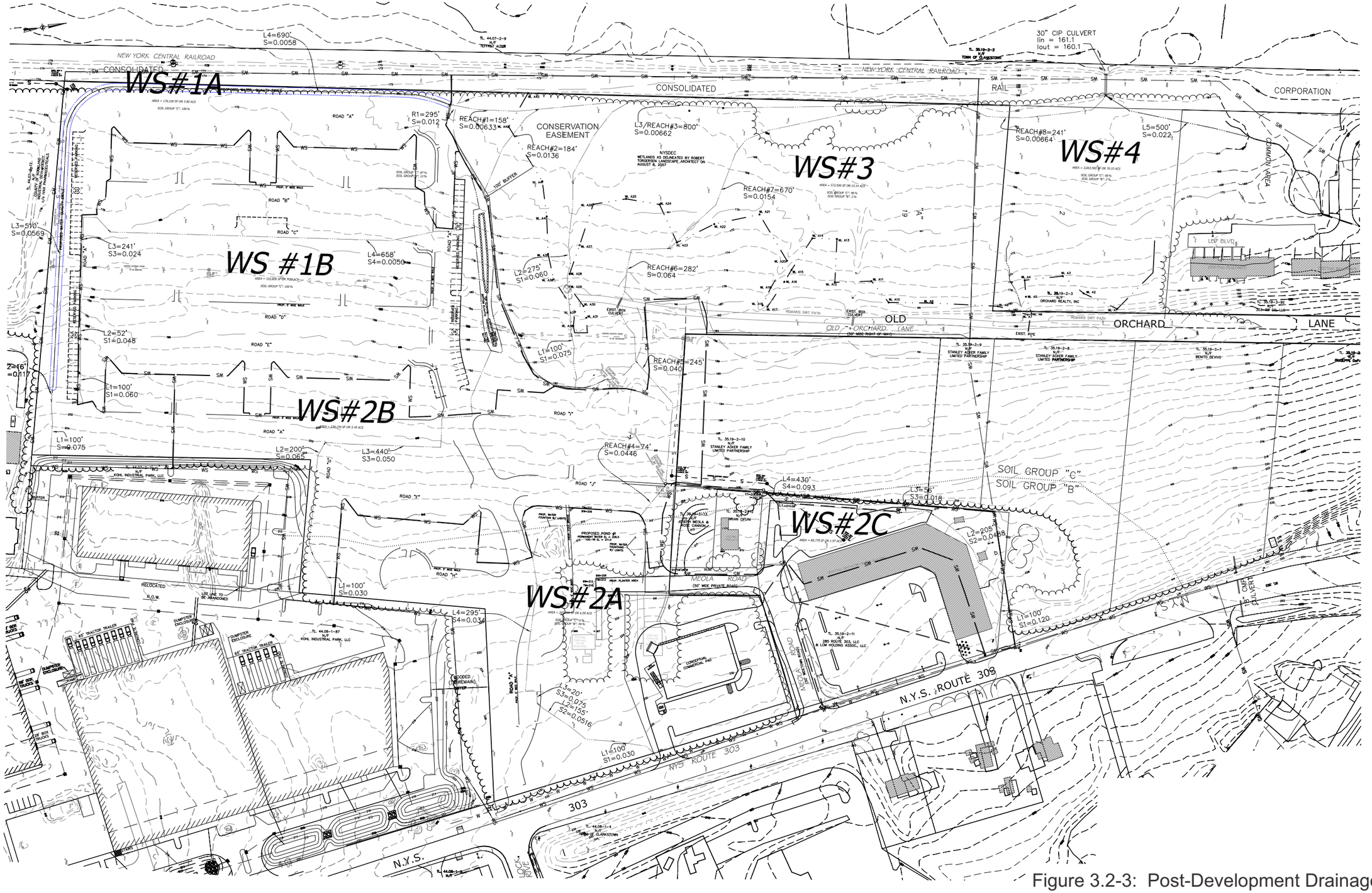

Figure 3.2-3: Post-Development Drainage Map
Orchard Ridge
Town of Clarkstown, Rockland County, New York
Source: Atzl, Scatazza & Zigler P.C., 11/19/08
Scale: 1" = 175'

File 10024 12/06/10
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