3.6 Water Resources

3.6.1 Existing Conditions

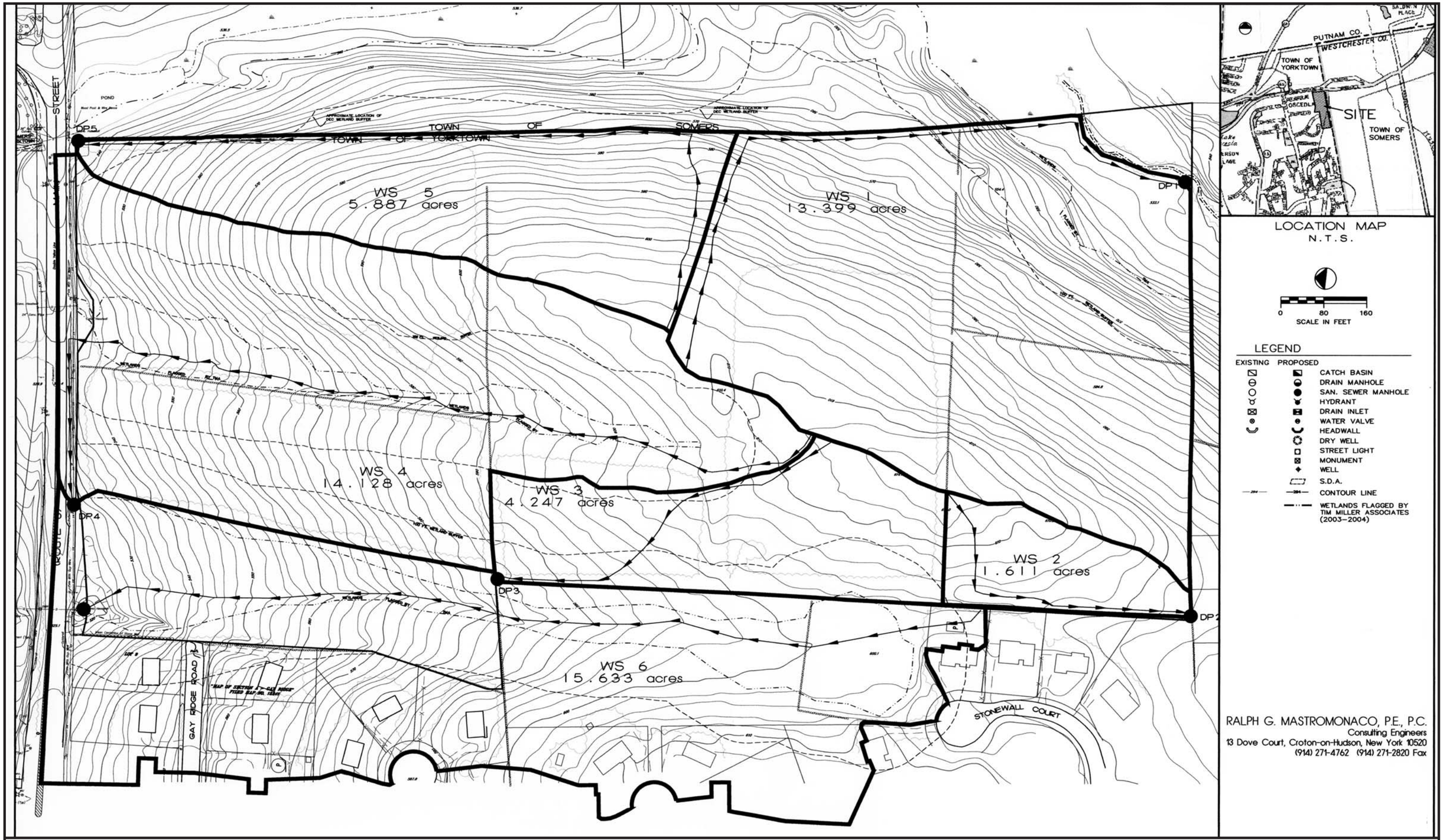
The majority of the subject site is drained by two linear drainageways flowing generally from south to north, which appear as shallow depressions in a generally flat topography. Most of the site eventually drains under Route 6 to a watercourse that is a tributary to the Peekskill Hollow Brook.

Approximately 13.4 acres of the southeast corner of the site drains to the south and east, to New York State Wetland A-2. Wetland A-2 drains through a series of tributaries and New York State DEC wetlands, and ultimately to Hallocks Mill Brook, which is a tributary of the Muscoot Reservoir. Activities on this portion of the site related to changes in drainage patterns, impervious surfaces and clearing and grading activities are subject to review by the New York City Department of Environmental Protection, under the Rules and Regulations for the Protection of the New York City Watershed.

Existing runoff from the project site has been calculated for the 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 Appendix E, Drainage and Hydrology Report. For purposes of this analysis, the drainage area was divided into five major drainage areas, as shown on Figure 3.6-1.

1. Design Point 1 receives drainage from 13.39 acres and is wooded. Design Point 1 discharges to DEC Wetland A-2.
2. Design Point 2 receives drainage from 1.61 acres and is wooded. Design Point 1 discharges to a natural flow path that ends at the intersection of two existing stone walls.
3. Design Point 3 receives drainage from 4.25 acres and is mostly old field cover. Design Point 3 discharges to an intersection of two existing stone walls at the western property line, and ultimately through Wetland A to Route 6.
4. Design Point 4 receives drainage from 14.13 acres and is a mix of wooded and old field areas. Design Point 4 discharges to a culvert under Route 6.
5. Design Point 5 receives drainage from 5.89 acres and is a mix of wooded and meadow areas. Design Point 5 discharges to an existing depression where runoff leaves the site. These flows ultimately reach a culvert under Route 6 associated with an offsite wetland.

Runoff quantity was calculated using TR-55 to determine runoff curve numbers and the US Army Corps HEC-1 program to study flow rates. Table 3.6-1 describes the existing peak flows at the evaluated design point. The location of these design points is shown on Figure 3.6-1.



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JS:\0326 Santucci Rte 6 Yorktown\DEIS Graphics\Figure 3.6-1 Existing Drainage Areas.cdr

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Figure 3.6-1: Existing Drainage Areas
Yorktown Farms Subdivision
Town of Yorktown, Westchester County, New York
Source: Ralph G. Mastromonaco, P.E., P.C., 11/10/04
Scale: As shown

Table 3.6-1 Summary of Existing Peak Rates of Runoff (Cubic Feet Per Second)					
	DP-1	**DP-2**	**DP-3**	**DP-4**	**DP-5**
2 year	6	1	4	11	5
10 year	15	2	8	23	10
25 year	22	3	11	32	14
50 year	29	4	14	40	18
100 year	33	5	15	45	20
Source: Ralph G. Mastromonaco P.E., P.C., 2004					

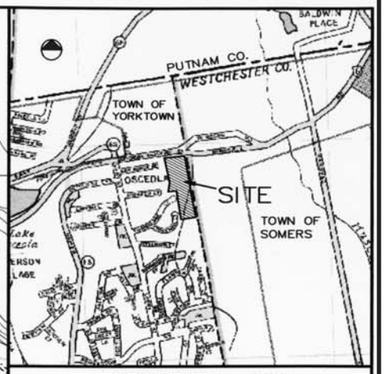
3.6.2 Proposed Conditions

The applicant is proposing the conversion of 5.8 acres of a 43.2 acre undeveloped parcel to create impervious surfaces associated with the construction of 34 single family homes on lots ranging in size from 0.5 to 4.5 acres, a soccer field and associated parking area and a road network. An additional 18.8 acres will be regraded and revegetated with road embankments, lawns, landscaping and stormwater quality basins. A Proposed Drainage Area Map was developed from the Preliminary Grading Plan and is included as Figure 3.6-2.

This change in the perviousness of the site will result in increases in the rate of runoff as well as the volume of runoff generated by this site. Regrading for the creation of building sites and roads will also result in some changes to the drainage patterns of the site. If not properly mitigated, these activities could cause stream erosion and flooding due to these increases, and change the hydrology of associated wetlands and floodplains. In order to offset these changes, the applicant is proposing the construction of five stormwater management basins.

The Stormwater Pollution Prevention Plan for the project is designed to control the increased rate of runoff from the project area and thus eliminate any adverse downstream impacts. Stormwater management basins will reduce the peak rate of runoff from the developed site to a rate of flow equal to or less than that which runs off the project area in its present condition. The Stormwater Pollution Prevention Plan has been designed to meet the requirements of the Town of Yorktown, the New York State DEC and the New York City Department of Environmental Protection (NYCDEP). Thus the rate of flow leaving the site will be less than or equal to the existing rate, so that the existing culverts and swales adjacent to and under Route 6 will not be impacted. For the portion of the site that drains to the Muscoot Basin, flows are moderated to avoid similar impacts to Wetland A-2 and the downstream watercourses that are tributary to that reservoir.

In order to determine the volume of storage required to detain the 100 year storm recurrence interval event, hydrographs were developed for the proposed drainage areas. Hydrographs are also developed for the 2-, 10-, 25- and 50-year storms. Proposed peak rates of runoff are shown on Table 3.6-2 below.



LOCATION MAP
N.T.S.

0 80 160
SCALE IN FEET

LEGEND

EXISTING	PROPOSED	
		CATCH BASIN
		DRAIN MANHOLE
		SAN. SEWER MANHOLE
		HYDRANT
		DRAIN INLET
		WATER VALVE
		HEADWALL
		DRY WELL
		STREET LIGHT
		MONUMENT
		WELL
		S.D.A.
294	294	CONTOUR LINE
		WETLANDS FLAGGED BY TIM MILLER ASSOCIATES (2003–2004)

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File 0326 11/15/04
JS:\0326 Santucci Rte 6 Yorktown\DEIS Graphics\Figure 3.6-2 Proposed Drainage Areas.cdr

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Figure 3.6-2: Proposed Drainage Areas
Yorktown Farms Subdivision
Town of Yorktown, Westchester County, New York
Source: Ralph G. Mastromonaco, P.E., P.C., 11/10/04
Scale: As shown

Table 3.6-2 Summary of Proposed Peak Rates of Runoff (Cubic Feet per Second)						
	DP-1	**DP-2**	**DP-3**	**DP-4**	**DP-5**	**DP-6**
2 Year	3	1	4	8	3	26
5 Year	10	2	6	16	6	43
10 Year	14	2	8	21	7	52
25 Year	21	3	10	31	10	76
50 Year	27	4	13	40	16	100
100 Year	32	5	15	44	19	111
Source: Ralph G. Mastromonaco P.E., P.C., 2004						

The percent reductions in peak rates of runoff from proposed to existing conditions are shown on Table 3.6-3 below.

Table 3.6-3 Percent Reductions in Peak Rates of Runoff (%)						
Storm Recurrence Interval	**DA-1**	**DA-2**	**DA-3**	**DA-4**	**DA-5**	**DA-6**
2 Year	50	0	0	27.3	40	16.1
5 Year	16.7	0	14.3	15.8	25	14.0
10 Year	6.7	0	0	8.7	30	11.9
25 Year	4.5	0	9.1	3.1	28.6	5.0
50 Year	6.9	0	7.1	0	11.1	1.0
100 Year	3.0	0	0	2.2	5.0	0.9
Source: Ralph G. Mastromonaco P.E., P.C., 2004						

Water Quality

A report entitled "Pre and Post Development Pollutant Estimates" (Appendix D) was prepared. For that portion of the site that falls within the New York City watershed, the “Simple Method” was used for the prediction of specific, non point pollutant loadings. Pollutant loading rates used are from the New York State DEC, the National Urban Runoff Program and other sources as described in Appendix D. Pollutants examined are total suspended solids (TSS), total phosphorous (TP), total nitrogen (TN) and biological oxygen demand (BOD).

The introduction of impervious surfaces and residential uses influences the quality of stormwater runoff compared to an undeveloped condition. Constituents introduced from automobiles, pet waste, herbicide and pesticide application and atmospheric deposition may increase following the change in cover type and reduction in natural vegetation.

A stormwater pollutant loading analysis was performed for each drainage area under proposed conditions. For runoff in the New York City watershed, the runoff volume from a 2-year 24-hour event was used as the design basis for water quality. The results of the Simple Method analysis is provided below in Table 3.6-4.

Table 3.6-4
Pollutant Removals within New York City Watershed
Yorktown Farms Subdivision

	Suspended Sediment	Total Phosphorus	Total Nitrogen	Oxygen Demand
Total Watershed Existing (lb/day)	345	1.01	5.28	107.1
Total Watershed Proposed (lb/day)	101	0.64	6.54	54.6
% change	-70.72	-37.24	23.86	-49.02

Outside of the DEP watershed area, the New York State DEC requirement of treating 90% of the average annual runoff was used. The New York State DEC requirement of providing 24-hour detention of the 2-year, 24-hour storm event is satisfied as specified in the 2000 Storm-water Design Manual.

As shown in Tables 3.6-3, the only increase in pollutant loading is for total nitrogen, as calculated using the Pollutant Loading Coefficient Method. This increase is statistically very low. Thus it is expected that there will be no impacts to downstream waters if the basins are properly constructed and maintained in the long term. It is of particular note that there is a projected decrease in phosphorus loading.

The stormwater BMP's designed for this project within the DEP watershed meet the DEP requirement of capturing and treating the 2-year storm event from areas where perviousness has changed. The New York State DEC has completed the development of a threshold mean daily loading (TMDL) for the Muscoot Reservoir, based on its designation as an impaired water. Therefore the process for coverage under the current SPDES General Permit for Stormwater may take up to 60 days to allow for careful review of the proposal.

Fertilizer and pesticide use, when applied in accordance with the manufacturer's guidelines, are not anticipated to have an impact on water resources.

These numbers consider the use of an approved sedimentation and erosion control plan, with the suspended sediment removal provided by best management practices. Without proper stormwater management and use of erosion control best management practices, site development can result in impacts to downstream receiving waters. Increases in stream temperature, due to unmitigated stormwater flows off of hot asphalt and roofs, may impact a stream's potential as habitat for cold water species such as trout. Eutrophication of streams and associated ponds could result from increased pollutant loadings, if these loads exceed the natural uptake capacity of the waters and adjacent wetlands. It is therefore required as part of the SPDES General Permit for Stormwater that such potential impacts be mitigated prior to discharge into the receiving stream.

As described under "Mitigation" below, the proposal as submitted will mitigate this potential soil loss 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.

3.6.3 Mitigation Measures

Stormwater Runoff Quality Control Measures

The applicant has submitted plans that conform to criteria established by the New York State DEC and the New York City DEP for stormwater management. These plans include the use of erosion controls, phased site development and stormwater quality BMP's and adjuncts.

The stormwater pollution prevention plan utilizes a best management practice "train", with several practices aligned in series to best provide water quality treatment prior to discharge back into the stream corridor. The use of vegetated swales, upland diversions, catch basins with deep sumps, and infiltration trenches are all employed in this plan. As shown on Table 3.6-3, these measures result in calculated pollutant loadings that result in either reductions or minor increases following construction. Within the DEP watershed, Stormceptor units are proposed as adjuncts to further improve water quality via the removal of significant amounts of suspended solids, which will also be a factor in keeping phosphorus concentrations down.

As proposed, the site disturbance and short and long term use of this property as a residential subdivision has the potential to impact water quality and quantity within this watershed. As described above, the applicant is proposing measures to prevent and mitigate these potential adverse impacts so that water quality and hydrologic conditions are maintained or improved following construction. The means used to accomplish this are described in greater detail below.

Erosion and Sedimentation Control Measures

A comprehensive sediment and 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. The plan will incorporate various measures to reduce erosion during construction and trap sediment and prevent it from being carried off areas actively being graded. The measures will be installed in accordance with the New York "Guidelines for Urban Erosion & Sediment Control", dated 1997. Several measures are proposed to improve the quality of stormwater discharged from the site and reduce the impact on downstream waters, including:

1. Sumps in Catch Basins
2. Rip-Rap Energy Dissipaters
3. Silt Fence
4. Storm Drain Inlet Protection
5. Stone Check Dams
6. Temporary Sediment Basins
7. Stabilized Construction Entrance

Sumps in Catch Basins. Each catch basin will be constructed with a minimum 18 inch deep sump. This measure will remove coarse sand and grit from the runoff prior to entering the stormwater drainage system.

Rip-Rap Energy Dissipators. At the discharge points from the stormwater drainage system to the stormwater management basins, rip-rap pads, consisting of angular rocks will be placed to dissipate velocity and reduce the risk of erosion.

Silt Fence. Silt fence will be installed at the toe of slopes below areas to be graded. Silt fence allows runoff to pass through the fabric while trapping sediment. A double row of silt fence will be installed in locations where the topography slopes towards watershed property.

Storm Drain Inlet Protection. All proposed drain inlets will be provided with drain inlet protection during construction. Stone will be placed around the inlets to filter the sediment out of the runoff.

Stone Check Dams. Stone check dams will be installed in all proposed swales to reduce erosion during construction by restricting the velocity of flow. The check dams will be installed so that the crest of the downstream dam is at the same elevation of the toe of the upstream dam.

Temporary Sediment Basins. The Stormwater Management Areas will be utilized as temporary sediment basins during construction. A temporary riser and anti-vortex device will be installed in each basin to restrict the discharge of water and allow sediment to settle. All sediment will be removed from the basins at the end of construction.

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

Vegetation will be cleared only from the areas under active construction. Following final grading, topsoil will be spread and the ground surface revegetated promptly 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 inspect and maintain the sediment and erosion control measures.

Phasing Plan

Total Construction Period and Schedule of Construction

This project is anticipated to be carried out in three continuous phases and is scheduled to be fully built in 2007. While each of the work phases is greater than five acres in size, at no time will more than five acres of the site be unprotected, either by redundant erosion control measures, temporary seeding or structural BMP's. Thus, it is the applicant's opinion that the plan meets the intent of the DEP and DEC regulations. The applicant recognizes that there may be adjustments made to this plan based on discussions and comments from these agencies as the SEQRA process moves forward.

Stormwater Management Plan

As described above, the applicant has submitted a stormwater management plan that meets the goals of the New York State stormwater guidelines. All tributary areas where perviousness has changed are being directed to one of five stormwater management basins designed to store the increased volumes and discharge at a rate that is the same or lower than the existing

condition. The sizes of those basins were calculated using current engineering standards and software. This method prevents impacts as a result of increasing volumes and rates of runoff into channels that are not sized to carry such flows.

Long Term Maintenance

Typically, the stormwater quality basins will require cleaning of the forebay areas every 5 to 10 years. Catch basin sumps may require vacuuming every 2 to 5 years depending on loading rates. The proposed stormwater basins will be designed to require minimal maintenance. The proposed stormwater basins and roads will be offered to the Town upon completion of the project.