III. EXISTING CONDITIONS, IMPACTS AND MITIGATION

G. Stormwater Management

G. Stormwater Management

1. Existing Conditions

a. Onsite and Offsite Drainage Patterns

Offsite Drainage Patterns

Westchester County is comprised of six major drainage basins. The Project Site is located within the Croton River Drainage Basin, which has a contributing drainage area of approximately 183 square miles. Within the Croton River Drainage Basin, there are several minor basins. The Project Site is situated within the Brook Drainage Basin, which has a contributing drainage area of approximately 7.4 square miles. Within this sub-basin, the Hunter Brook is the major tributary conveying surface water runoff to the New Croton Reservoir. The Hunter Brook is classified by the New York State Department of Environmental Conservation (NYSDEC) as C(ts) and is, therefore, considered a "Protected Stream".

As illustrated on Flood Insurance Rate (FIRM) Map 36119C0037F (refer to Exhibit III.G-1), the Project Site is located within Zone X which is above the 100 year flood limit of the Hunter Brook and its tributary identified as the Sherry Brook.

Site Design Consultants prepared detailed hydraulic studies of the Hunter and Sherry Brooks. The <u>Hunter Brook Flood Study (Hunter Brook North Watershed)</u>, dated March 2009 and the <u>Sherry Brook Flood Study (Tributary to the Hunter Brook North Watershed)</u>, dated August 2009 were reviewed by the Applicant's engineer to gain a more comprehensive understanding of the hydraulic characteristics of the watershed immediately downstream from the Project Site. The following descriptions of the onsite and offsite drainage conditions is based on review of the referenced reports, study of the site's existing topography and supplemental field reconnaissance by the Applicant's engineer in September 2011.

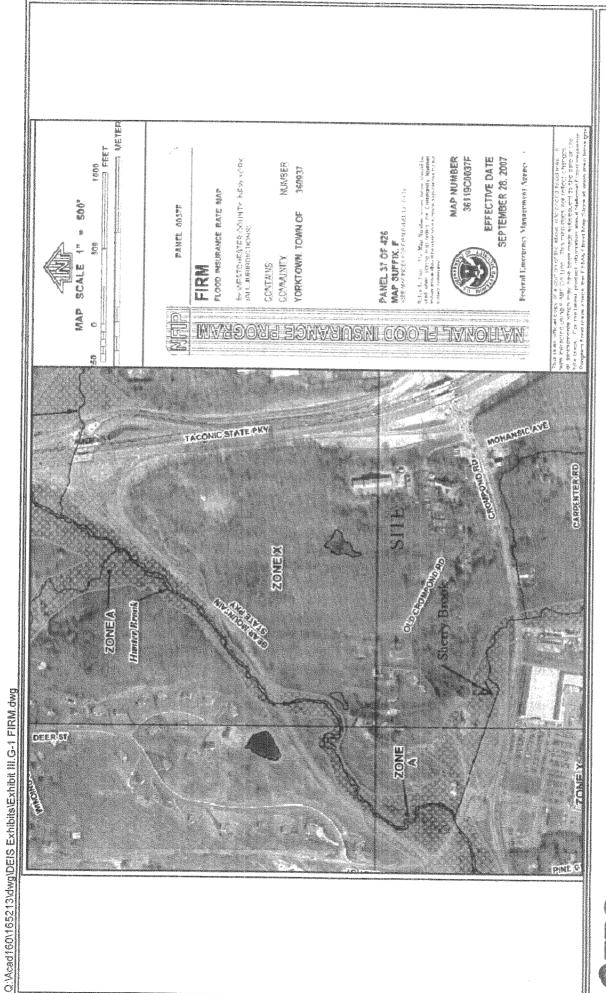
Most of the stormwater runoff from the Project Site drains westward to an onsite intermittent stream. The stream discharges from the site to an existing storm drainage system that conveys runoff across Old Crompond Road. The surface water drains to a large wetland area, known as the Crompond Wetland, which is situated between Old Crompond Road and Route 202/35. The wetland drains southwesterly to where it merges with the Sherry Brook.

The Sherry Brook flows from south to north and crosses beneath Route 202/35 through a 5' x 5' box culvert approximately 650 feet west of the intersection of Route 202/35 and Old Crompond Road. From this point, Sherry Brook flows westerly some 1,500 feet to its confluence with the Hunter Brook at Stoney Street. The box culvert discharges to an open concrete flume. The brook then flows into an at-grade inlet chamber protected by a sloped steel trash rack. The chamber is connected to a 44" x 72" CMP pipe arch, which conveys Sherry Brook to the Hunter Brook.

Overland flow from the Crompond Wetland enters the Sherry Brook pipe arch through a 36 inch pipe inlet approximately 540 feet west of the 5' x 5' box culvert. The Sherry Brook Flood Study indicates that there is field erosion associated with this culvert as it is partially blocked by debris, rendering the pipe ineffective during high flows.

The Highway Department had been notified of the need for maintenance. Based on observations made by the Applicant's engineer during the September 2011 field reconnaissance, the 36-inch pipe inlet is almost completely blocked with sediment and debris (see Exhibit III.G-2). Immediate cleaning of the inlet is required in order to restore its hydraulic capacity.

The Study further states that Route 202/35 creates an impoundment of the brook resulting in detention and that the 44" x 72" pipe arch does not have capacity to convey the 100-year flow. This results in excess runoff that bypasses the pipe arch and is conveyed downstream through the Crompond Wetland by overland flow. Evidence of significant erosion and flow bypass, along with partial blockage of the trash rack for the inlet chamber to the pipe arch, was observed by the Applicant's engineer during the September 2011 field reconnaissance.





Onsite Drainage Patterns

The Project Site is 18.75 acres, of which approximately 10.15 acres were previously disturbed by existing development. The land covers of the site are summarized in Table III.G.1.

Table III.G.1	
Existing Land Cover	
Land Cover Description	Area
Wooded (1)	8.60
Open Vegetated (non wooded) Space (2)	7.25
Pavements and Buildings ⁽²⁾	2.90
Total Site Area	18.75
Note:	Colombia de Alaba de La de Aligenta de Principa de Aligenta de Ali
(1) Wooded area includes 1.04 acres of freshwar	ter wetlands.
(2) Existing land previously disturbed = 10.15 a	cres

The site topography ranges from Elevation 475 in the southeast corner to Elevation 384 at the southwest corner of the property. The easterly portion of the site that was previously developed slopes gently from east to west. The western portion of the site remains undisturbed, is generally characterized by deciduous woodlands and slopes more steeply toward an intermittent stream, which flows through the site from north to south. The majority of the site (11.86 acres) drains to the intermittent stream that discharges at the southwest corner of the site. Runoff from the northeast portion of the site (3.58 acres) drains northbound offsite via overland flow to the DOT stormwater basin that is located approximately 650 feet north of the site to where it discharges to the Hunter Brook. Offsite areas to the east drain toward the site but runoff is intercepted by a NYS DOT drainage ditch within the right-of-way for the Taconic State Parkway that parallels the site's east property line. The ditch flows northward and discharges to DOT lands north of the Project Site. A minor area from offsite drains onto the southeast corner of the Project Site. Refer to Exhibit III.G-3, which illustrates the existing onsite drainage conditions.

Stormwater runoff discharging from drainage areas DA-E1 and DA-E4 flows offsite across Old Crompond Road through an existing 24-inch square culvert and an 18-inch circular culvert, respectively. From these culverts the runoff flows some 2,400 feet overland through the Crompond Wetland to Sherry and Hunter Brook as described above.

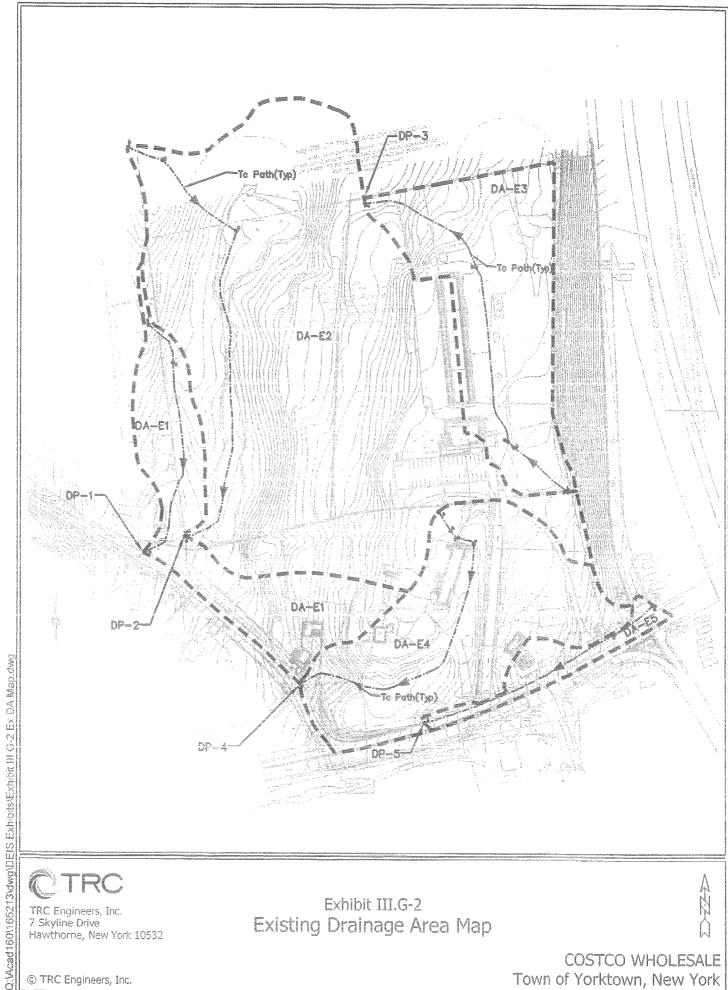




Exhibit III.G-2 Existing Drainage Area Map

> COSTCO WHOLESALE Town of Yorktown, New York

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Based on field observations and discussions with residents of Old Crompond Road, it appears that flow from the site often bypasses the 24-inch and 18-inch culverts and flows west along both sides of Old Crompond Road some 650 feet before reaching the Crompond Wetland. Stormwater runoff reportedly collects in a low area within Tax Lot 26.18-1-15 before passing under Old Crompond Road through a 24-inch culvert.

Flood prone areas associated with the offsite drainage basin have been published in several sources including the above referenced Hunter and Sherry Brook Flood Studies and are summarized below:

- The studies reference the eroded channel associated with the 36" pipe connection to the 44"x72" culvert which conveys the Sherry Brook. The studies indicated that the inlet to the 36" pipe is partially blocked, and that the Town Highway Department was notified of the need for maintenance. The Applicant's engineer discovered during the September 2011 field reconnaissance that the 36-inch pipe inlet is almost completely blocked with sediment and debris (see Exhibit III.G-2). Immediate cleaning of the inlet is required in order to restore its hydraulic capacity.
- The Sherry Brook Study also notes that an impoundment is created on the south side of Route 202/35 where the brook enters the 5'x5' culvert crossing under the highway. They further state that the impoundment acts positively to create detention and that the highway is not overtopped during the 100-year storm.
- The study further states that the piped portion of the Sherry Brook on the north side of Route 202 is not of sufficient size (42"x72" arch pipe) to convey the 100-year storm. Excess runoff merely flows overland to the Hunter Brook. Evidence of significant erosion and flow bypass was observed by the Applicant's engineer during the September 2011 field reconnaissance (see Exhibit III.G-2).
- An article published in the *Yorktowner* from March 28, 1968 was provided to the Town and Applicant from a concerned citizen. The article referenced a construction project to improve drainage conditions associated with the Hunter Brook and Mill Pond. The project included straightening the alignment of the Hunter Brook and dredging silt from the brook and pond.

b. Existing Onsite Peak Runoff Rates

Stormwater runoff from the site was analyzed under existing conditions. For the purpose of the analysis, the site has been divided into five drainage areas and five design points, representing locations where stormwater runoff leaves the site. Peak runoff rates were calculated at each of these points for the 1, 2, 10, 25, 50 and 100-year storms. Table III.G.2 summarizes the resultant peak runoff rates. See Appendix D for detailed calculations.

Table III.G.2 Summary of Existing Stormwater Runoff Rates						
Design		Peak Flow (cfs)				
Point	1-year	2-year	10-year	25-year	50-year	100-year
1	9.17	16.01	33.99	47.53	61.90	69.32
2	3.70	7.52	18.09	26.26	35.04	39.61
3	1.47	2.38	5.01	7.04	9.23	10.36
4	3,66	5.55	10.05	13.25	16.54	18.21
5	1.52	1.93	2.80	3.39	3.98	4.27

Note that the site's runoff contribution to the overall Hunter Brook drainage basin is minor. Of the 7.42 square mile Hunter Brook drainage basin, the site comprises only 18.75 acres (0.029 square miles) or 0.39 percent of the total drainage basin. When comparing the site's runoff contribution to the 1880 acre north watershed (the area upstream of the Stoney Street culvert at the approximate location where the site's runoff enters the Hunter Brook) the site is only 1 percent of the north watershed.

2. Potential Impacts

a. Proposed Drainage Conditions

Under post-development conditions, approximately 14.06 acres of the 18.75-acre site will be impacted. Development will result in an increase of approximately 8.01 acres of impervious area. The post-development land surface areas are summarized in Table III.G.3. As a result of the changes in surface conditions, there will be an increase in stormwater runoff from the proposed developed area.

Table III.G.3 Proposed Land Cover					
Land Cover Description	Area				
Wooded ⁽¹⁾	4.45				
Open Vegetated (non wooded) Space	3.39				
Pavements and Buildings	10.91				
Total Site Area	18.75				
Note: (1) Wooded area includes 1.04 acres of freshwater wetlands,					

b. Proposed Stormwater Runoff

A Stormwater Pollution Prevention Plan (SWPPP) has been developed for the Proposed Action and is included in Appendix D of this DEIS. For purposes of post-development stormwater analysis, the site is divided into five drainage areas. A design point is assigned at the point of discharge from each drainage area. See Exhibit III.G-4, Post-Development Drainage Area Map. Discharge at each design point is analyzed for comparison to existing conditions. A

comparative summary of peak runoff rates is provided in Table III.G.4. It is noted that the proposed peak discharge rates at Design Points 2 and 3, where drainage discharges from the site, have been reduced to below the peak rates under existing conditions. It should also be noted that the proposed peak discharge rates at offsite Design Point 1 have been reduced to below the peak rates under existing conditions for all design year storms. See Appendix D for detailed calculations. Exhibit III.G-5 illustrates the onsite storm drain plan.

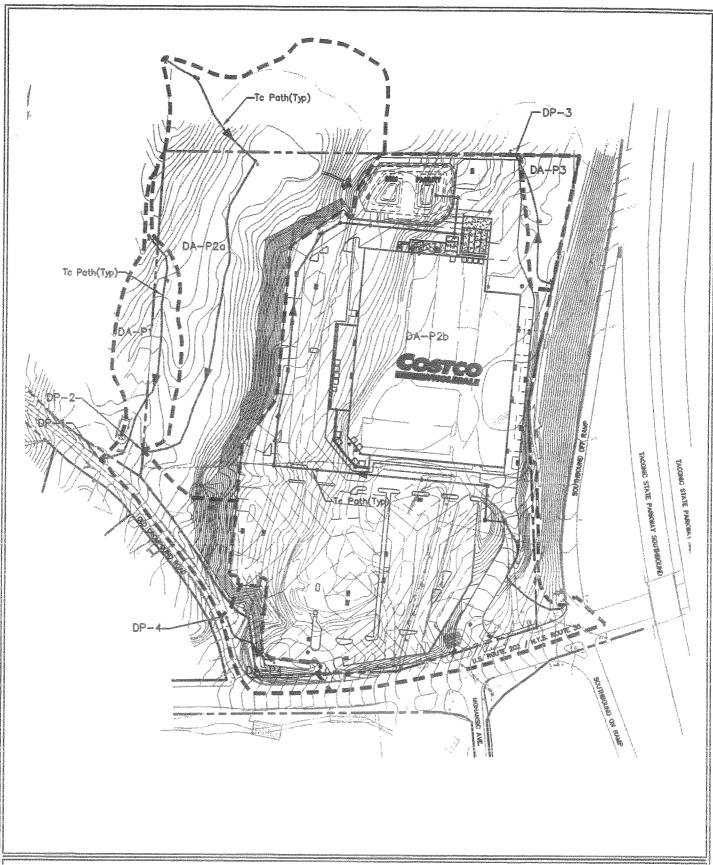




Exhibit III.G-3 Proposed Drainage Area Map

COSTCO WHOLESALE Town of Yorktown, New York

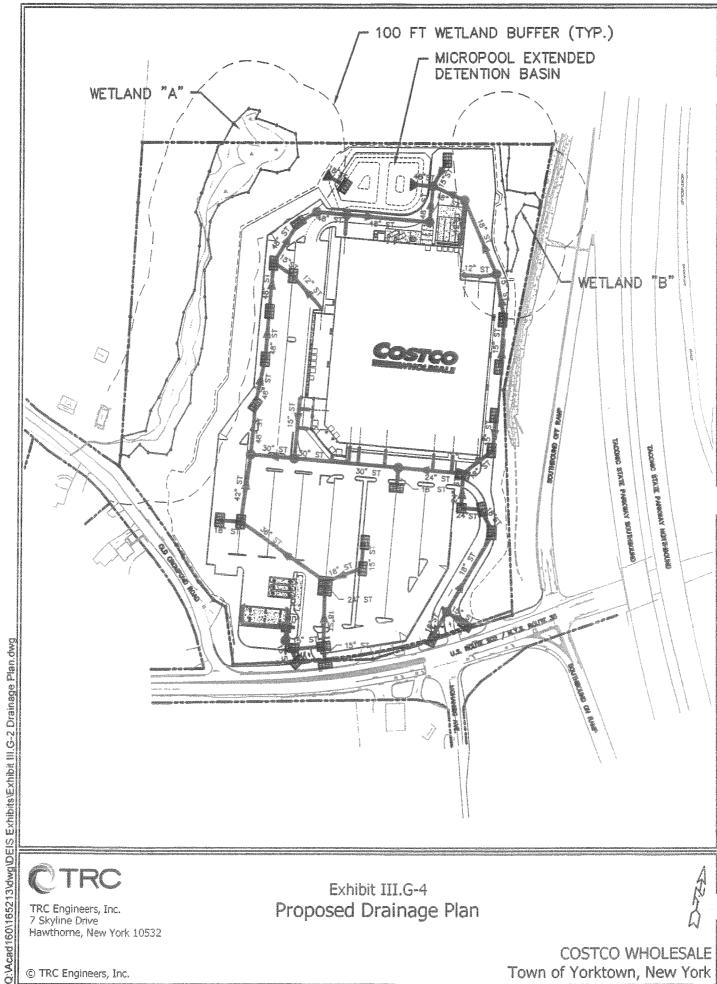




Exhibit III.G-4 Proposed Drainage Plan



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Table III.G.4						
Peak Discharge Rate Comparison Table						
Frequency	(inches)	Point	Rate (cfs)	Rate (cfs)	Reduction	
1-Year Design Storm	(menes)	1	9.17	2.32	75	
		2	3.70	1.61	56	
	2.8	3	1.47	0.02	99	
		4	3.66	0.36	90	
		5	1.52	- V V II-	-	
	3.5	1	16.01	5.41	66	
		2	7.52	5.15	32	
2-Year Design		3	2.38	0.07	97	
Storm		4	5.55	0.62	89	
		5	1.93	_	No.	
	**************************************	1	33.99	18.55	45	
	5.0	2	18.09	17.81	2	
10-Year Design		3	5.01	0.31	94	
Storm		4	10.05	1.25	88	
		5	2.80	3.0	139	
	6.0	1	47.53	26.65	44	
		2	26.26	24.98	5	
25-Year Design Storm		3	7.04	0.53	92	
		4	13.25	1.70	87	
		5	3.39	77	-	
50-Year Design Storm	7.0	1	61.90	32.98	47	
		2	35.04	29.39	16	
		3	9.23	0.78	92	
		4	16.54	2.17	87	
		5	3.98	-	-	
100-Year Design Storm	7.5	1	69.32	36.43	47	
		2	39.61	31.70	20	
		3	10.36	0.91	91	
		4	18.21	2.41	87	
		5	4.27	564	Jan Jan	

Note:

- Design Point 1: Offsite location where intermittent stream discharges to existing culvert under Old Crompond Road.
- Design Point 2: Location where intermittent stream discharges from the site.
- Design Point 3: Location where site runoff discharges from site at north property line.
- Design Point 4: Intermediate onsite location that converge at DP 2.
- Design Point 5: Incorporated into Design Point 2.

c. <u>Construction and Post-Construction Runoff Conditions</u>

Under post-development conditions surface stormwater runoff from the developed site is collected in drain inlets and conveyed to stormwater management practices through an enclosed underground pipe system. The storm pipe system is designed to convey the 100-year storm to the stormwater management facility. A storm pipe system will convey stormwater runoff from DA-P2b and DA-5 to the proposed detention pond.

Stormwater will be treated in a standard stormwater management practice, a Micropool Extended Detention Pond (P-1). The pond is listed in Table 3.3 of the latest (August 2010) version of the <u>New York State Stormwater Management Design Manual</u> (Manual) from the New York State Department of Environmental Conservation (NYSDEC). The Manual states that practices listed in the table are presumed to meet the water quality requirements set forth in the Manual when designed in accordance with the criteria presented in Chapter 6 of the same Manual. The pond includes: a forebay to trap sediment; a micropool and aquatic bench to provide varied ecosystems; and a multistage outlet control structure to provide 24-hour extended detention and control outflows for the various design storms.

With the implementation of the Micropool Extended Detention Pond both water quality treatment and reduction of stormwater peak discharge rates is achieved. The pond is a permanent practice and will continue to regulate water quality and discharge rates over time. Maintenance practices must be employed as described in the Stormwater Pollution Prevention Plan (see Appendix D) to assure continued effectiveness.

During construction, the potential for soil erosion and sedimentation will be controlled through the use of temporary soil erosion and sediment control devices. These devices will be designed and installed in accordance with <u>New York State Standards and Specifications for Erosion and Sediment Control</u> dated August 2005.

The soil erosion and sediment control plan will minimize the downstream erosion hazard by controlling runoff at its source, minimizing runoff from disturbed areas and de-concentrating storm water runoff. The objectives of the erosion control plan will be achieved through the management of storm water runoff during construction.

d. Hunter Brook and Mill Pond

The Project site is located approximately 1,000 feet from the Sherry Brook, 2,400 feet from the Hunter Brook and 4,900 feet from the Mill Pond. Implementation of the temporary soil erosion and sediment control plan is designed to reduce erosion potential and contain sediment within the construction site, thereby preventing any impact to the referenced offsite water bodies. Implementation of the design outlined in the proposed SWPPP

would result in a reduction of peak discharge rates from the site for all design year storms. Therefore, an improvement to offsite drainage conditions is expected.

e. Pollutant Loading

The Project Site is situated within the watershed of the New Croton Reservoir which is the under regulatory oversight of the NYC DEP. Prior to adopting the current Rules and Regulations for the Protection from Contamination, Degradation and Pollution of the New York City Water Supply and Its Sources, dated April 4, 2010, a pollutant loading analysis was required. Current regulations no longer require this analysis. However, a coliform analysis is still required. The analysis was performed and the results indicate that the proposed Project will result in a reduction of coliform bacteria (See Appendix D).

The NYSDEC Design Manual states in Section 3.3 that standard stormwater management practices (SMPs) that are designed in accordance with the technical standards are capable of providing 80% TSS removal and 40% TP removal. The proposed Project utilizes a properly designed standard SMP and therefore the referenced pollutant removals would be realized.

f. Pond Outlet Conditions

Discharge from the detention pond is controlled by a multi-stage outlet structure. The structure is detailed on the Site Plans. The outlet structure has three openings: a low flow orifice, for mainly controlling and provided the required extended detention of the water quality storm (1-year storm); a midrange weir; and an overflow riser. All openings discharge to an 18-inch outlet pipe that discharges to Wetland A.

The outlet end of the pipe is stabilized with a prefabricated end section and riprap within the outlet channel.

g. Drainage From Offsite Roadway Improvements

The onsite stormwater management plan diverts approximately 4.2 acres from drainage areas DA-4 and DA-5 that currently drain to the Route 202/35 and old Crompond Road rights-of-way. The runoff is diverted to the onsite storm water management system for attenuation and water quality treatment. This diversion of runoff more than compensates for the increased impervious area resulting from roadway widening of Route 202/35. In consideration of this runoff reduction there will be an overall reduction to localized peak runoff rates within the Route 202/35 corridor, which provides mitigation under post-development conditions, thereby improving offsite drainage conditions.

3. Proposed Mitigation Measures

a. Onsite and Offsite Mitigation

Design of the Project employed several green infrastructure practices that preserve and minimize impact to natural resources as well as reduce impervious cover. The planning techniques are summarized as follows:

Preservation of Undisturbed Areas

As shown in Table III.G.1, approximately 8.60 wooded acres of the existing site is presently undisturbed. The undisturbed area is generally located in the western portion of the site. The proposed development is generally located within the previously developed area in the eastern portion of the site. After development, approximately 4.45 acres of woods will remain undisturbed (see Table III.G.3).

Preservation of Wetlands and Waterways

The Project Site includes two wetlands. Wetland A is 0.91 acres and is located on a north-south axis in the western portion of the site. Wetland B is 0.13 acres and is situated in the northeastern corner of the site. Within Wetland A is an intermittent stream which flows from north to south, exiting at the southwest corner of the site. The proposed development avoids direct impact to both wetlands as well as the intermittent stream.

Preservation of Buffer

The Town of Yorktown's Wetland Ordinance, Chapter 178 of the Municipal Code, establishes a 100-foot buffer around wetlands. Work within this buffer is a regulated activity and requires granting of a wetland permit by the Town Planning Board. The Project proposes disturbance into the buffers of Wetlands A and B. Wetland B is a lesser quality wetland in terms of function than Wetland A. Therefore, the development encroaches further into the buffer of Wetland B in order to minimize encroachment into the buffer of Wetland A. (See the Section F and Appendix C of this DEIS for additional description of the wetland functions.)

Of the 100 foot buffer associated with Wetland A, a minimum of 50 feet will remain undisturbed and the outermost 50 feet will be graded and replanted. A small portion, approximately 0.04 acres, will be converted to impervious surface.

Of the 100 foot buffer associated with Wetland B, the construction of impervious surfaces is proposed to within 9 feet of the wetland and a minimum of 5 feet of the buffer remains undisturbed. Construction has been proposed near Wetland B in order to locate the development as far as practical from Wetland A. As described in Section III.F of this DEIS, Wetland A, by comparison, has significantly greater value than Wetland B. Wetland B was evaluated to have relatively low value and serves little functionality. For this

reason, the Applicant feels that placing the development nearer to Wetland B allows greater preservation of the buffer associated with Wetland A, the wetland with greater value.

Reduction of Clearing and Grading

The Project proposes limiting the onsite soil disturbance to approximately 14.06 acres, thereby maintaining approximately 4.69 acres as undisturbed.

Maintaining Sensitive Areas

The Project proposes locating the majority of the development at the eastern and central portions of the site. Therefore, the most sensitive areas to the west including the intermittent stream Wetland A, and much of the steepest slopes will be preserved.

In addition to preserving natural resources as described above, the design reduces proposed impervious cover by the following means:

Parking Reduction

The standard parking stall dimensions required by Costco is 10-feet by 20-feet and the standard drive aisle is 24-feet. The dimensions have been reduced for this Project resulting in an overall reduction of proposed impervious pavement. The reductions in pavement are accomplished by reducing the 10-feet wide stall dimension to 9-feet for 244, or 40% of the proposed parking spaces. These narrower parking spaces are located further from the entrance. In addition to narrowing the width of selected parking spaces, the 20-feet length was reduced to 18-feet in nearly all locations. In turn, this reduces the 64-foot dimension normally required for a double parking bay to 61-feet. Further reductions to impervious area by reducing the width of drive aisles is not practical as the minimum dimensions provided are necessary to secure traffic safety.

In addition to reducing impervious surfaces through reduction of parking stall dimensions, the total number of parking spaces required by zoning was reduced for this Project. The Town Zoning Code requires a parking index of 5 spaces per 1,000 square feet of building area, resulting in 756 spaces required for the proposed building footprint. Costco historic data as well as the Institute of Traffic Engineers (ITE) and Chapter 5.2.6 of the DEC Design Manual support a parking index of less than 4 parking spaces per 1,000 square feet. This Project proposes 610 parking spaces, which equates to a parking index of 4.04 spaces per 1,000 square feet and results in a further reduction of impervious area. (See Section III.L of this DEIS for further detailed discussion.)

The above mentioned planning and impervious cover reduction practices result in reduced impact to the natural resources associated with the project site and in and of itself constitutes onsite mitigation design measures.

In addition, the Stormwater Pollution Prevention Plan (SWPPP) employs a stormwater collection system that conveys runoff from the developed portions of the Project Site to the micropool extended detention pond where water quality treatment is provided prior to discharge.

The pond is located at the northern end of the site, which is the most appropriate location with regard to site layout, building and parking locations. At this location, Wetland A extends to the east approaching the proximity of the pond. Therefore, the pond embankment and outlet extend into the 100-foot buffer.

With the implementation of the onsite mitigation, offsite stormwater improvements are not necessary. Since the peak discharge rates from the site have been reduced for all design year storms, downstream receptors should benefit. As an additional mitigation measure, reconstruction of the existing headwall at Design Point #1 is proposed. The proposed reconstruction will improve the entrance condition at the existing culvert resulting in a likely reduction of the frequency and intensity in which runoff may bypass the existing culvert and be conveyed downhill along Old Crompond Road.

Pervious Mitigation Practices

Development of the site will result in an increase of 8.01 acres of impervious surfaces. With the implementation of the above referenced planning measures, the amount of proposed impervious surfaces needed to support the Project was minimized to the extent practicable. In addition, 52 percent of the existing wooded areas have been preserved and approximately 7.84 acres of the project site will remain vegetated. Pervious landscaped islands have been placed at the ends of most parking bays as well as along the parking perimeter.

Improved pervious surfaces, such as pervious pavements, were considered but not proposed as their effectiveness is greatly diminished in northern climates where snow removal, sanding and deicing are common.

b. New York City Department of Environmental Protection (NYCDEP) Regulations

The Project Site is in a Designated Main Street Area (DMA) designated by the Town of Yorktown and approved by the NYCDEP. Section 18-39(b)(3)(x) of the NYCDEP Rules and Regulations for the Protection from Contamination, Degradation and Pollution of the New York City Water Supply and Its Sources (Rules and Regulations) requires that a Stormwater Pollution Prevention Plan (SWPPP) be provided for construction of an impervious surface within a DMA. Section 18-39(b)(3) requires that the SWPPP be prepared and implemented in accordance with the requirements of the New

York State Department of Environmental Conservation General Permit No. GP-0-10-001.

Since the Project Site is within a DMA, there are several requirements of the Rules and Regulations that are exempted for this project. The following exemptions are noted: Section 18-39(a)(3) states that the limitation of impervious area within 100 feet of a watercourse shall not apply; and Section 18-39(c)(6) states that two different types of stormwater management practices in series shall not be required (paragraph (ii)) for activity within a DMA.

With regard to the onsite wetlands, the NYCDEP regulates only wetlands that are mapped by the NYSDEC and are at least 12.4 acres in size. The onsite wetlands do not meet these criteria and therefore are not under the NYCDEP's jurisdiction.

c. New York State Department of Environmental Conservation (NYSDEC) SPDES General Permit

The NYSDEC requires coverage under the SPDES General Permit for Stormwater Discharges from Construction Activity, Permit No. GP-0-10-001, for all construction activity that involves soil disturbance of at least one acre or 5,000 square feet if located in the New York City Watershed located east of the Hudson River. Obtaining coverage under this permit requires preparation of a SWPPP and a Notice of Intent (NOI), which must be reviewed and accepted by the Town of Yorktown as the regulated, traditional land use control MS4 entity as defined in Permit No. GP-0-10-001.

d. Stormwater Pollution Prevention Plan (SWPPP)

The stormwater management design has been performed in accordance with the technical standards provided in the August 2010 version of the *New York State Stormwater Management Design Manual* (DEC Design Manual). The SWPPP has also been prepared in accordance with Chapter 248, Stormwater Management and Erosion and Sediment Control, of the Town of Yorktown's Municipal Code. Since the Town of Yorktown is the regulated, traditional land use control MS4 entity as defined in Permit No. GP-0-10-001, the Town will be responsible for review and approval of the SWPPP. Since the project is situated within the New York City watershed located east of the Hudson River, the project has also been designed to meet the requirements of the New York City Department of Environmental Protection (NYCDEP) Rules and Regulations for the Protection from Contamination, Degradation and Pollution of the New York City Water Supply and its Sources (Rules and Regulations). The SWPPP is included in Appendix D of this DEIS.