I. Stormwater Management

1. Introduction

This section provides a summary of the stormwater management plan for the ~~proposed~~ ~~p~~Project. The complete Stormwater Management Report is included in the Appendix of this DEIS. The purpose of this section is to evaluate the stormwater management requirements of the proposed site plan. The report quantifies stormwater runoff on the site for existing and post-development conditions. Peak discharge has been estimated in accordance with the document released by the Engineering Division of the U.S. Department of Agriculture Soil Conservation Service titled "Urban Hydrology for Small Watershed," Technical Release No. 55, dated June 1986, Type III Storm Distribution.

The ~~p~~Project's stormwater quality management objective is to improve the quality of stormwater runoff in the areas of redevelopment on the site, as well as to meet or exceed the requirements set forth in the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (Permit No. GP-0-08-001) regarding post-development stormwater quantity and stormwater quality for new construction.

2. Existing Conditions

a. Site Characteristics

The site ranges from gently sloped farm land, in the northwest corner of the site, to the rolling hills of the existing nine hole golf course located west of the Swamp River, to the expansive wetlands in the center of the site, to the dense institutional development and steep wooded slopes to the east. The U.S. Department of Agriculture Soil Conservation Service has classified soil types as shown on Exhibit III.I-1, Existing Soils Map. The site presently does not provide for any water quality treatment or detention of surface water runoff (including from buildings, roads, parking lots, and the nine-hole golf course) prior to discharging into the Swamp River.

b. Existing Conditions – West Parcel

The existing conditions of the West Parcel are shown on Exhibit III.I-2, Existing Drainage Conditions. The area west of the Swamp River site includes a nine-hole golf course with cart paths and club house, various agriculture buildings, former crisis residences, agricultural fields, ponds, woods, and a sewage treatment plant. Wheeler Road crosses the site in the east-west direction.

The subject site contains sloping land that drops from a high point of approximately 540 feet in the northwestern quadrant of the site to an elevation of approximately 420 feet along the banks of the Swamp River. The majority of the runoff from the site discharges into the Swamp River, exiting the site in the northeast corner of the West Parcel. Additional runoff discharges to the north along Pleasant Ridge Road, through a series of four culverts, and a small portion of land discharges overland to the south. The site contains both NYSDEC, USACOE and local wetlands (as defined under Chapter 65 of the local Town Code). The wetlands are found primarily in the Great Swamp and along the Swamp River, with additional wetlands located in the southwest and the northeast portions of the site.

The West Parcel has been divided into 9 watershed sub-basins for evaluation. The drainage characteristics of each of the sub-basins are shown on Table III.I-1, Existing Drainage Conditions, and described in detail in the full Stormwater Management Report included in the Appendix.

Table III.I-1
Existing Drainage Conditions

WATERSHED/SUBBASIN ID	AREA (AC)					(1)	(2)	(3)	(4)	(4)	Design Point #
	IMPERVIOUS	PERVIOUS			TOTAL AREA	I	R_v	CN	Tc	Tt	
	TOTAL	LAWN/ LSCP	WOODED	PER. TOTAL		(%)			(HRS)	(HRS)	
W1	0.30	2.27	0.00	2.27	2.57	11.67	0.20	65	0.15	---	1
W2	0.92	41.09	12.49	53.58	54.50	1.69	0.20	71	0.17	---	2
W3	0.13	21.34	23.65	44.99	45.12	0.29	0.20	70	0.30	---	3
W4	0.00	0.00	3.52	3.52	3.52	0.00	0.20	72	0.25	---	n/a
W5	1.38	11.07	16.63	27.70	29.08	4.75	0.20	77	0.37	---	4
W6	1.06	30.09	13.78	43.87	44.93	2.36	0.20	73	0.32	---	4
W7	2.33	8.88	0.90	9.78	12.11	19.24	0.22	80	0.17	---	4
W8	4.35	120.38	68.04	188.42	192.77	2.26	0.20	72	0.65	---	4
W9	0.07	5.44	13.53	18.97	19.04	0.37	0.20	69	0.35	---	5
E1	3.46	13.70	5.39	19.09	22.55	15.34	0.20	83	0.32	---	6
E2	3.29	9.43	1.20	10.63	13.92	23.64	0.26	84	0.33	---	6
E3	0.76	8.20	17.50	25.70	26.46	2.87	0.20	80	0.31	---	6
E4	9.52	25.19	18.52	43.71	53.23	17.88	0.21	79	0.30	---	7
E5	11.84	20.61	8.77	29.38	41.22	28.72	0.31	82	0.27	---	7
E6	9.49	32.47	68.85	101.32	110.81	8.56	0.20	75	0.37	---	8
E7	2.98	15.39	2.07	17.46	20.44	14.58	0.20	82	0.35	---	8
E8	7.21	30.76	82.30	113.06	120.27	5.99	0.20	76	0.38	---	8
E9	0.80	9.40	86.21	95.61	96.41	0.83	0.20	72	0.47	---	8
E10	0.00	45.16	233.30	278.46	278.46	0.00	0.20	72	0.35	0.03	8
TOTAL AREA	60	451	677	1128	**1187**	5.04					
WGT. CN								74			

1. I=Percent Impervious, (Impervious Area/Total Area)*100%
2. Rv = 0.05+0.009(I), Minimum Rv=0.2
3. CN=Curve Number
4. Tc=Time of Concentration, Tt=Travel Time

(1) Design Points

Six design points have been designated for comparison of the pre- and post-development drainage conditions. Design Points W1, W2, W3, and W4 are located along the northern portion of the West Parcel, where concentrated flow exits the site through storm pipes across Pleasant Ridge Road. Design Point Wetland 22 is NYSDEC Wetland DP-22 along the western side of the Swamp River. Sub-basins W5, W6, W7 and W8 drain to this wetland. Design Point W9 is the wetland located at the southwestern portion of the West Parcel.

c. Existing Conditions – East Parcel

The existing conditions of the East Parcel are shown on Exhibit III.I-2. The east side of the Swamp River includes mostly vacant buildings from the former Harlem Valley Psychiatric Center, roadways, a water treatment facility and reservoir. The subject site contains sloping land that drops from a high point of approximately 930 feet in the southeastern portion of the site to an elevation of approximately 420 feet along the banks of the Swamp River. The runoff from the site discharges into the Swamp River after crossing NYS Route 22, in six locations. The East Parcel contains USACOE, NYSDEC and local wetlands. The wetlands are in the land area between the Swamp River and NYS Route 22, the northwest portion of the site, and areas around the reservoir at the east side of the parcel. The Eastern Parcel has been divided into 10 sub-basins for watershed evaluation. The drainage characteristics of each of the sub-basins are shown on Table III.I-1, Existing Drainage Conditions, and described in detail in the full Stormwater Management Report included in the Appendix.

(1) Design Points

Three design points have been designated for comparison of the pre- and post-development drainage conditions. Design Point Wetland 22 is NYSDEC Wetland DP-22 along the eastern side of the Swamp River. Sub-basins E1, E2, and E3 drain to this wetland. Design Point 1 is the southwest edge of the Eastern Parcel, along Route 22. Sub-basins E4 and E5 drain to this area. Design Point Wetland 30 is NYSDEC Wetland DP-30 along the northwest edge of the Eastern Parcel, along Route 22. Sub-basins E5, E6, E7, E8, E9, and E10 drain to this wetland.

3. Potential Impacts of the Proposed Project

a. Proposed Conditions – West Parcel

Post-development site conditions on the West Parcel are shown on Exhibit III.I-3, Proposed Drainage Conditions. On the west side of the Swamp River the amount of impervious area ~~will~~would increase by approximately 32.3 acres, from 10.5 to 42.8 acres. The nine sub-basins identified in the existing conditions have been further divided into 31 sub-basins for the purposes of evaluation and sizing of stormwater treatment measures. The drainage characteristics of the sub-basins are shown on Table III.I-2, Developed Drainage Conditions, and described in detail in the full text of the Stormwater Management Report included in the Appendix.

Table III.I-2
Developed Drainage Conditions

WATERSHED/SUBBASIN ID	AREA (AC)					(1)	(2)	(3)	(4)	(4)	Design Point #
	IMPERVIOUS	PERVIOUS			TOTAL AREA	I	R_v	CN	Tc	Tt	
	TOTAL	LAWN/ LSCP	WOODED	PER. TOTAL		(%)			(HRS)	(HRS)	
W1exist	0.30	2.27	0.00	2.27	2.57	11.67	0.20	65	0.15		1
W2exist	0.92	36.94	6.80	43.74	44.66	2.06	0.20	71	0.17		2
W2A	0.91	2.59	0.00	2.59	3.50	26.08	0.28	80	0.15		2
W2B	1.03	1.68	0.00	1.68	2.71	38.00	0.39	83	0.14		2
W2D	1.29	2.11	0.00	2.11	3.40	38.00	0.39	83	0.15		2
W3exist	0.13	13.62	21.06	34.68	34.81	0.37	0.20	72	0.30		3
W3A	0.35	0.35	0.00	0.35	0.70	49.71	0.50	89	0.14		3
W3C	0.16	8.25	0.00	8.25	8.78	1.82	0.20	59	0.15		3
W4exist	0.00	0.00	3.52	3.52	3.52	0.00	0.20	72	0.25		n/a
W5exist	1.38	11.07	16.63	27.70	29.08	4.75	0.20	77	0.37		4
W6exist	3.39	23.66	4.05	27.71	31.10	10.90	0.20	74	0.32		4
W6A	1.46	2.39	0.00	2.39	3.85	38.00	0.39	82	0.15		4
W6B	5.94	3.25	0.00	3.25	9.19	64.59	0.63	90	0.16		4
W7exist	1.66	4.61	0.00	4.61	6.27	26.48	0.29	83	0.17		4
W7A	4.97	2.99	0.00	2.99	7.96	62.46	0.61	89	0.15		4
W8exist	0.80	132.38	17.30	149.68	150.48	0.53	0.20	72	0.65		4
W8A	1.16	0.66	0.00	0.66	1.82	63.81	0.62	89	0.14		4
W8B	2.44	1.32	0.00	1.32	3.76	65.00	0.64	90	0.15		4
W8D	1.29	1.34	0.00	1.34	2.63	49.19	0.49	86	0.15		4
W8F	1.57	2.56	0.00	2.56	4.13	38.00	0.39	83	0.15		4
W8G	1.50	2.45	0.00	2.45	3.95	38.00	0.39	79	0.15		4
W8H	0.95	1.55	0.00	1.55	2.50	38.00	0.39	75	0.15		4
W8I	1.01	1.66	0.00	1.66	2.67	38.00	0.39	75	0.15		4
W8J	0.43	0.69	0.00	0.69	1.12	38.00	0.39	75	0.14		4
W8K	2.33	3.80	0.00	3.80	6.19	37.63	0.39	75	0.15		4

WATERSHED/SUBBASIN ID	AREA (AC)					(1)	(2)	(3)	(4)	(4)	Design Point #
	IMPERVIOUS	PERVIOUS			TOTAL AREA	I	R_v	CN	Tc	Tt	
	TOTAL	LAWN/ LSCP	WOODED	PER. TOTAL		(%)			(HRS)	(HRS)	
W8L	0.46	0.74	0.00	0.74	1.20	38.00	0.39	75	0.14		4
W8M	1.65	2.69	0.00	2.69	4.34	38.00	0.39	83	0.15		4
W8N	0.80	1.31	0.00	1.31	2.11	38.00	0.39	83	0.14		4
W8O	1.27	2.07	0.00	2.07	3.34	38.00	0.39	83	0.15		4
W9exist	0.07	4.30	12.52	16.82	16.89	0.41	0.20	68	0.35		5
W9A	1.19	1.95	0.00	1.95	3.14	38.00	0.39	83	0.15		5
E1exist	0.83	13.80	5.23	19.03	19.86	4.18	0.20	80	0.32		6
E1A	2.83	0.31	0.00	0.31	3.14	90.00	0.86	96	0.15		6
E2exist	0.27	8.25	0.75	9.00	9.27	2.91	0.20	80	0.33		6
E2A	3.78	0.42	0.00	0.42	4.20	90.00	0.86	96	0.15		6
E3exist	0.73	4.41	21.32	25.73	26.46	2.76	0.20	80	0.31		6
E4exist	1.82	12.21	21.21	33.42	35.24	5.16	0.20	74	0.30		7
E4A	7.34	6.78	0.00	6.78	14.12	52.00	0.52	87	0.17		7
E5exist	1.54	4.61	0.00	4.61	6.15	25.00	0.28	85	0.27		7
E5A	9.85	16.06	0.00	16.06	25.91	38.00	0.39	85	0.16		7
E5B	10.99	1.94	0.00	1.94	12.93	85.00	0.82	95	0.17		7
E6exist	3.63	31.57	46.52	78.09	81.72	4.44	0.20	74	0.37		8
E6B	4.16	5.38	1.40	6.78	10.94	38.00	0.39	83	0.17		8
E7exist	0.37	6.75	2.25	9.00	9.37	3.95	0.20	80	0.35		8
E7A	7.89	7.28	0.00	7.28	15.17	52.00	0.52	89	0.16		8
E8exist	1.10	39.49	57.72	97.21	98.31	1.12	0.20	75	0.38		8
E8A	3.97	6.47	0.00	6.47	10.44	38.00	0.39	83	0.16		8
E8B	1.75	2.86	0.00	2.86	4.61	38.00	0.39	83	0.16		8
E8C	7.14	11.65	0.00	11.65	18.79	38.00	0.39	83	0.19		8
E9exist	0.00	22.70	53.92	76.62	76.62	0.00	0.20	73	0.47		8
E9A	1.57	2.57	0.00	2.57	4.14	38.00	0.39	81	0.15		8
E9B	4.67	14.00	0.00	14.00	18.66	25.00	0.28	80	0.18		8

WATERSHED/SUBBASIN ID	AREA (AC)					(1)	(2)	(3)	(4)	(4)	Design Point #
	IMPERVIOUS	PERVIOUS			TOTAL AREA	I	R_v	CN	Tc	Tt	
	TOTAL	LAWN/ LSCP	WOODED	PER. TOTAL		(%)			(HRS)	(HRS)	
E10exist	0.00	42.36	228.99	271.35	271.35	0.00	0.20	72	0.35	0.03	8
E10A	0.68	2.03	0.00	2.03	2.70	25.00	0.28	80	0.28		8
E10B	0.93	2.78	0.00	2.78	3.70	25.00	0.28	80	0.28		8
TOTAL AREA	121	544	521	1065	**1186**	10.17					
WGT. CN								76			

1. I=Percent Impervious, (Impervious Area/Total Area)*100%
2. Rv = 0.05+0.009(I), Minimum Rv=0.2
3. CN=Curve Number
4. Tc=Time of Concentration, Tt=Travel Time

b. Proposed Conditions – East Parcel

Post-development site conditions on the East Parcel are shown on Exhibit III.I-3. On the east side of the Swamp River the amount of impervious area ~~will~~would increase by approximately 28.5 acres, from 49.3 to 77.8 acres. The 10 sub-basins identified in the existing conditions have been further divided into 24 sub-basins for the purposes of evaluation and sizing of stormwater treatment measures. The drainage characteristics of the sub-basins are shown on Table III.I-2, Developed Drainage Conditions, and described in detail in the full Stormwater Management Report in included in the Appendix.

c. Stormwater Quantity

Under proposed conditions, the total volume of runoff is expected to increase due to an increase in on-site impervious area. However, the increase in the peak rates of runoff ~~will~~would be mitigated by the use of stormwater basins, such that the peak runoff rates ~~will~~would either remain the same or decrease from existing conditions. The stormwater runoff from developed areas ~~will~~would be directed to the stormwater basins via underground piping and surface swales. The outlet controls of the detention systems ~~will~~would control the rate of release of the detained water such that the peak rate of runoff at each of the design points is less than or equal to existing flows. The peak rate of runoff has been calculated for pipe sizing. A comparison of the pre- and post-development peak runoff rates is shown on Table III.I-3, Design Flow Summary.

Table III.I-3
Design Flow Summary

DESIGN POINT NO.		**1-YEAR** (CFS)	**2-YEAR** (CFS)	**10-YEAR** (CFS)	**25-YEAR** (CFS)	**100-YEAR** (CFS)
Wingdale, New York (IN) [1]		2.7	3.2	4.8	5.8	8.0
West Side of Swamp River						
1	Existing	1	1	4	5	10
	Developed	1	1	4	5	10
	Delta	0	0	0	0	0
2	Existing	26	42	100	141	235
	Developed	23	36	88	126	214
	Delta	-3	-6	-13	-15	-21
3	Existing	16	27	66	94	161
	Developed	16	24	59	90	157
	Delta	-1	-3	-8	-4	-4
4	Existing	97	149	339	470	776
	Developed	84	120	315	457	757
	Delta	-13	-29	-23	-13	-19
5	Existing	6	10	25	36	63
	Developed	5	8	25	36	61
	Delta	-1	-2	0	0	-1

DESIGN POINT NO.		1-YEAR (CFS)	2-YEAR (CFS)	10-YEAR (CFS)	25-YEAR (CFS)	100-YEAR (CFS)
East Side of Swamp River						
6	Existing	56	76	143	187	285
	Developed	45	63	120	166	273
	Delta	-11	-14	-23	-21	-11
7	Existing	78	108	211	278	429
	Developed	47	65	181	256	423
	Delta	-31	-43	-31	-22	-6
8	Existing	201	300	683	967	1647
	Developed	183	268	666	956	1646
	Delta	-18	-32	-16	-11	-1

Source: Northeast Regional Climate Center. New York State 24 Hour Precipitation Figures, Data Ending 2003

(1) Proposed Stormwater Management

One objective of a stormwater management plan is to limit the proposed peak rate of stormwater runoff to levels equal to or less than the existing peak rates of flows. This ~~will~~would be accomplished by temporarily detaining a portion of the stormwater runoff in the stormwater basins. Orifices are set on the outlet control structure to retain 20 percent of the 90 percent storm volume (water quality volume), detain the 1-year storm for 24 hours, and control the release rate of storms up to the 100-year storm. An emergency overflow weir is located at the top of each stormwater basin to safely convey the runoff if it exceeds the capacity of the outlet control structure. Table III.I-4, Detention Basin Summary, presents storage volumes and high water elevations associated with various size storm events. The stormwater management facilities have been designed in accordance with NYSDEC guidelines, with the basins designs based on the 1, 2, 10, 25 and 100 year storm events. ~~These basins will be modified as required to accommodate the 2 and 25 year storm events as well, once the plan has advanced further in the design and review process. Basin modifications are not expected to have any significant impact on the design of the basins.~~

Table III.I-4
Detention Basin Summary

BASIN ID	BOTTOM ELEV.	TOP ELEV.	1-YEAR HWE(1)	2-YEAR HWE(1)	10-YEAR HWE(1)	25-YEAR HWE(1)	100-Year HWE	100-Year SV(2)
W2A	450.0	456.0	452.0	452.0	452.5	452.9	453.7	0.71
W2B	446.0	452.3	449.5	449.9	450.6	451.0	451.3	0.43
W2D	442.0	452.3	448.0	448.7	449.7	450.4	451.3	0.55
W3A	434.0	438.0	435.6	435.8	436.3	436.5	436.9	0.15
W3C	432.0	438.2	434.9	435.9	436.7	436.9	437.2	0.32
W6A	416.0	426.0	420.9	421.6	422.7	423.4	424.3	0.62
W6B	410.0	420.9	418.0	418.2	419.1	419.4	419.9	3.14
W7A	412.0	418.9	416.6	416.8	417.2	417.5	417.9	2.37
W8A	412.0	420.0	416.2	416.7	417.7	418.1	418.7	0.48

BASIN ID	BOTTOM ELEV.	TOP ELEV.	1-YEAR HWE[1]	2-YEAR HWE[1]	10-YEAR HWE[1]	25-YEAR HWE[1]	100-Year HWE	100-Year SV[2]
W8B	416.0	426.1	422.0	422.4	423.4	424.0	425.1	0.93
W8D	420.0	428.0	424.3	424.7	425.4	425.8	426.7	0.56
W8F	424.0	434.0	427.1	427.4	428.2	428.8	429.9	0.92
W8G	444.0	452.5	448.8	449.4	450.4	451.1	451.5	0.47
W8H	454.0	462.1	458.5	458.9	459.6	460.1	461.1	0.26
W8I	446.0	452.4	449.6	450.1	450.9	451.1	451.4	0.24
W8J	446.0	452.0	448.5	448.7	449.3	449.5	450.0	0.21
W8K	430.0	440.0	434.2	434.6	435.9	436.8	438.5	1.02
W8L	458.0	466.0	460.9	461.2	462.0	462.2	462.7	0.15
W8M	460.0	470.0	463.5	463.7	464.7	465.3	466.5	1.01
W8N	450.0	460.0	453.9	454.3	455.0	455.4	456.2	0.35
W8O	458.0	466.5	463.5	464.1	465.0	465.2	465.5	0.42
W9A	448.0	458.1	454.0	454.4	455.4	457.1	457.1	0.52
E1A	410.0	418.4	415.8	416.1	417.0	417.1	417.4	1.22
E2A	412.0	418.6	416.4	416.8	417.2	417.4	417.6	1.14
E4A	418.0	428.1	424.7	425.1	426.2	426.6	427.1	3.15
E5A	412.0	422.6	419.7	420.0	420.6	421.1	421.6	4.54
E6B	724.0	732.5	730.3	730.5	731.0	731.2	731.5	0.88
E7A	420.0	430.0	425.3	425.9	427.1	428.0	428.8	4.27
E8A	424.0	434.3	430.5	430.9	432.1	432.7	433.3	1.42
E8B	420.0	430.0	423.9	424.2	425.2	425.8	427.0	1.01
E8C	430.0	440.5	437.4	437.8	438.6	439.0	439.5	3.07
E9A	432.0	440.0	437.6	438.0	438.3	438.5	438.6	0.32
E9B	440.0	450.0	445.0	445.4	446.7	447.5	448.9	3.01
E10A	780.0	788.0	783.4	783.7	784.4	784.8	785.7	0.50
E10B	780.0	788.0	784.0	784.3	785.2	785.7	786.3	0.57

[1]High Water Elevation (Feet)
[2]Storage Volume (Acre Feet)

(2) Flood Zones

The low areas of the site near the Swamp River and adjacent wetlands are subject to flooding as they lie within the 100-Year Floodplain of the Swamp River. Exhibit III.I-4, Flood Map – Existing Conditions shows the approximate extent of flooding in the 100 year storm frequency (The Flood Insurance Rate Map (FIRM) for the Town of Dover has been revised by FEMA five times by Letter of Map Revision (LOMR) since the last publication of the FIRM dated August 15, 1984. The most recent LOMR occurred on October 15, 2007. None of these map revisions impact the flood insurance boundary shown on the FIRM covering the Project Site. Thus, the flood boundaries shown on Exhibits II.I-4 and II.I-5 represent the most current FEMA flood boundary).

FEMA has not defined the 100-Year flood elevation. However, based on reports of observed evidence from a former hospital employee and local resident, flooding is expected to occur at or below approximate elevation 419 feet. Flooding is expected to be limited to the defined wetland areas as well as a small portion of low-lying land located adjacent to the Swamp River.

On-site, with minor exception, the Project has been designed to construct all of the proposed structures outside the approximate limits of the 100-Year Flood Zone, as shown on the FEMA flood map (see Exhibit III.I-5). In the few exceptions where structures are located just within a potential 100-year Flood Zone, the existing grade elevation is at or above elevation 419 (the assumed 100-Year Flood Elevation based on observed evidence.) Further, no impacts from the possible minor development within the assumed 100-Year Flood Zone would be expected given the project's plans for the construction of abutting wetland buffer enhancement areas capable of accommodating any minor changes to existing flood patterns.

The Project's Stormwater Management Plan has been designed to provide a zero increase in the peak rate of stormwater runoff from pre-development conditions. As a result there would be no increase in the volume of stormwater runoff from the site during the time of peak discharge and no off-site flooding impacts to either upstream or downstream properties are expected.

The finished first floor elevations of all proposed structures would be designed at least 3 feet above the elevation of 419 feet, with the lowest finish floor elevation of any proposed structure on the current plan set at an approximate elevation of 422 feet. The proposed finish floor elevation of the lowest residential unit under the Proposed Action is set at or above approximate elevation 424 which for comparison is the approximate elevation of the existing Metro-North Train Station platform. Existing parking areas located around the Storehouse and Powerhouse buildings are at or below this elevation and would be allowed to continue to flood during extreme storm events so as not to reduce any of the existing flood storage capacity in areas adjacent to the Swamp River. Further, the design of the new Wheeler Road bridge would, at minimum, maintain the existing cross sectional channel area to avoid any changes to flood flow within the Swamp River. ~~Development within the 100 year flood zone will generally be avoided; however, some portion of the parking lot to the rear of the Store House and Power House may experience some flooding during extreme storm events. New homes and commercial buildings will be placed at elevations to avoid flooding in these areas. The proposed development is shown with the 100 year flood zone is shown of Exhibit III.I-5, Flood Map – Proposed Conditions.~~ All utilities and critical mechanical systems ~~will~~would be designed so as to minimize disruptions in service during flood events.

d. Stormwater Quality

(1) Post-Development Conditions Without Treatment

The change in land use and increase in impervious area ~~will~~would result in an increase in pollutant loading. Without treatment, the pollutant loads would increase for Total Suspended Solids, Total Phosphorus, Total Nitrogen, Metals, and Bacteria.

(2) Post-Development Conditions With Treatment

The use of wet extended detention ponds, rain gardens, water quality swales, and hydrodynamic separators is expected to reduce the pollutant loading from the treated runoff. The treatment methods ~~will~~would be designed in compliance with the NYDSDEC Stormwater Management Design Manual. The estimated pollutant loading rates for the existing, post-development without treatment, and post development with treatment conditions are summarized in Table III.I-5.

Table III.I-5
Annual Pollutant Loading

	TSS	TP	TN	Metals	Bacteria
	Lbs/Yr	Lbs/Yr	Lbs/Yr	Lbs/Yr	1,000 Col/Yr
Existing	627,720	2,222	12,104	55	70,095
Developed w/o Treatment	912,579	3,208	15,816	114	64,619
Developed w/Treatment	588,203	2,519	13,666	70	57,325
Pollutants Removed	324,376	689	2,150	44	7,295

Salt and/or other deicing materials (i.e., calcium chloride, magnesium chloride or other material blends) may be applied in cold, inclement weather during the winter months. Deicing materials are applied to lower the melting point of ice and reduce icing on roadways and other paved surfaces. The use of sand may also be applied to improve traction on icy road surfaces. Potential environmental concerns related to the use of such deicing materials include the possible damage to roadside vegetation and increased salinity in groundwater. To minimize these potential concerns, the Applicant proposes to install curbing and/or roadside swales in select locations to capture stormwater runoff and direct the effluent to water quality basins. These basins would be planted with salt tolerant vegetation designed to help treat the water quality of stormwater entering the basins. In addition, as per the NYS Stormwater Management Design Manual (April, 2008), these basins are expected to improve the water quality of the captured runoff by achieving the removal of at least 80 percent of total suspended solids (TSS), 40 percent of total phosphorous (P), greater than 30 percent of total nitrogen (N), and greater than 60 percent of all metals.

Similar to the use of deicing materials, the excessive use and application of fertilizers and pesticides can have a potential impact on groundwater quality. The Applicant proposes the use of native plant materials and a xeriscaped landscape design that is well suited to the local climactic characteristics to minimize the need for the use of

such chemicals. In addition, golf course maintenance and management techniques relating to the on-site use of both fertilizer and pesticide products would be employed, including the daily scouting of the golf course to discover diseased and or pest infected areas, the spot treatment of diseased or infected areas in lieu of blanket treatment applications, careful application of such materials in strict accordance with manufacturer specifications, the protected on-site storage of such products, and the restriction on the use of such lawn care treatments within 24 to 48 hours of a forecasted significant rain event.

e. Stormwater Quality Management Measures

The strategy of the Stormwater Management Plan is to tailor the treatment measures for the various proposed land uses. A variety of measures ~~will~~would be used to maximize infiltration of runoff into the ground when possible. ~~i~~In areas of clustered development,~~;~~ centralized open stormwater basins ~~will~~would be used. In low density development sites, lots ~~will~~would include onsite stormwater infiltration systems and the public roads ~~will~~would be provided open channels, whenever possible, to convey and treat the stormwater runoff. A portion of the redevelopment areas on the west side of the Swamp River ~~will~~would use the alternative practices defined in *Chapter 9, Redevelopment Projects, of the NYS Stormwater Management Design Manual.*

The Stormwater Management Plan is based on the analysis of the existing and proposed stormwater conditions discussed in the previous section of this report and the design criteria of the stormwater management practices noted below. As the proposed development ~~will~~ would involve the creation of an approximately 6~~0~~1-acre increase in on-site impervious surfaces associated with pavements and roofs, higher pollutant loadings would be expected to occur on the developed site. A total water quality volume, as calculated and shown on Table No. 10 included in the full Stormwater Management Report in the Appendix, of 416,000 cubic feet ~~will~~would be provided. An outline of the varying stormwater quality management Best Management Practice's (BMP's), both structural and non-structural, to be implemented both during construction and/or after ~~p~~Project completion are presented below.

Some of the Best Management Practices would include the design of new stormwater basins for the purpose of managing stormwater runoff and improving water quality, the construction of roadside swales designed to capture and treat stormwater runoff, and the construction of new wetland areas (wetland creation areas) to offset project impacts and provide additional water quality treatment. Wetland area and wetland buffer enhancements would also be provided to provide additional water quality treatment. Refer to Exhibit III.I-6 for the approximate locations of these practices.

The use of the proposed stormwater basins would be expected to improve the water quality of the captured runoff by achieving the removal of at least 80 percent of total suspended solids (TSS), 40 percent of total phosphorous (P), greater than 30 percent of total nitrogen (N), and greater than 60 percent of all metals (see the Stormwater Management Plan in the Appendix).

(1) Wet Extended Detention Pond

A wet extended detention pond ~~will~~would provide treatment of the required water quality volume through extended detention and incorporates a pool of water at the outlet of the pond to reduce sediment re-suspension. The treatment system includes a stone-lined sediment forebay, stone rip-rap berm, permanent pool, outlet control drain structure, and emergency overflow weir. The wetpool extended detention pond ~~will~~would treat the 90 percent rainfall event through filtration and detain all storm events up to the 100 year frequency. The outlet structure is designed such that downstream flow ~~will~~would be less than or equal to existing conditions.

(2) Rain Gardens

A rain garden is a stormwater management practice to manage and treat small volumes of stormwater runoff using a conditioned planting soil bed and planting materials to filter runoff stored within a shallow depression. The method is a variation on bioretention and combines physical filtering and adsorption with bio-geochemical processes to remove pollutants[1].

(3) Hydrodynamic Separators

Hydrodynamic Separators are proprietary systems that move water in a circular centrifugal manner to accelerate the separation and deposition of primarily sediment from the water. These systems ~~will~~would be employed in the areas of the redeveloped parts of the site where conventional systems cannot be used.

(4) Open Channels

Three types of open channels ~~will~~ would be utilized on this ~~p~~Project ~~s~~Site.

(a) Dry Swale – An open drainage channel, within a grass or stone lined surface, designed with a permeable layer of soil and perforated underdrain to detain and promote the filtration of stormwater runoff into the soil media.

(b) Wet Swale – A flat sloped, planted and open drainage channel designed to retain stormwater for water quality treatment. These are usually placed in areas where soils are poorly drained and my have normally high ground water conditions.

(c) Grass Swale – A vegetated channel designed to filter stormwater runoff and meet velocity targets for the water quality design storm and the two year storm events. A grass channel is parabolic shaped with a minimum 2-foot wide center section and side walls at 2:1 slope or flatter.

(5) Infiltration Trench/Dry Well

Stormwater infiltration practices capture and temporarily store the water quality volume before allowing it to infiltrate into the soil over a two-day period. Design variants include the infiltration trench, infiltration basin, and dry well.

[1] New York State Stormwater Management Design Manual,. P. 9-9.

The infiltration facility ~~will~~ would be preceded by a pre-treatment measure (sedimentation basin, sump pit, grass channel or plunge pool. The measures are well suited for smaller development areas and ~~will~~ would be utilized for lots that can not be drained to share a central stormwater management practices.

(6) Catch Basin Sumps

All new catch basins ~~will~~would be provided with sumps to capture and collect sediment and debris prior to it entering the municipal stormwater conveyance system. Each catch basin sump ~~will~~would be cleaned out periodically to remove the dirt and debris as part of routine maintenance.

(7) Stormwater Pollution Prevention Control Plan

In compliance with requirements established for the NYSDEC SPDES General Permit For Stormwater Discharges from Construction Activity (Permit No. GP-0-08-001) a Stormwater Pollution Prevention Plan ~~will~~would be prepared and implemented. As a result, an Erosion Control Plan shall be prepared as part of the contract documents and ~~will~~would require that the erosion and sedimentation controls set forth thereon be implemented before the start of construction and further ~~will~~would be monitored and maintained during construction. Stabilization of the site shall also comply with the conditions or requirements set forth therein and further established by the Town of Dover.

Several temporary structural practices to be utilized to mitigate any potential impacts include, but shall not be limited to, surrounding material stockpiles with silt fencing and hay bale dams, excavated and embankment areas ~~will~~would be graded to permit drainage and the runoff ~~will~~would be intercepted in ditches with silt barriers or collected in settling basins to permit sedimentation, and stabilized construction entrances ~~will~~would be constructed and maintained during construction to minimize the off-site migration of sediment. In addition, the SWPPP would provide recommendations on the use of deicing products so as not to apply excessive amounts.

4. Mitigation Measures

Project implementation ~~will~~ would increase the quantity of impervious surfaces on the site. However, the ~~p~~Project would include a comprehensive stormwater management system designed to satisfactorily address both stormwater volumes and quality. As described above, the proposed approach employs a variety of mechanisms, including ~~l~~Low ~~i~~Impact Design (LID)~~development~~ techniques~~., such as wet extended detention ponds, rain gardens, water quality swales, and hydrodynamic separators.~~ Elements of LID that have been incorporated in the current plan include: the clustering of units in distinct hamlet areas; preserving a greater percentage of site-wide open space area and the reduction of land clearing area; the use of roadside swales, detention ponds, rain gardens and hydrodynamic separators where appropriate to capture and collect stormwater runoff, thereby preserving wildlife corridors and minimizing the need for a closed pipe drainage system; creation of a naturally vegetated buffer system along the existing wetland areas; the incorporation of the existing wetland ecosystem into the

stormwater drainage design; the use of sidewalks on one-side of the street where practical to reduce impervious surfaces; and the use of reduced road widths in the outer lying portions of the development site to reduce impervious area and Project stormwater runoff volumes.

In compliance with requirements established for the NYSDEC SPDES General Permit For Stormwater Discharges from Construction Activity (Permit No. GP-0-08-001) a Stormwater Pollution Prevention Plan ~~will~~would be prepared and implemented. As a result, an Erosion Control Plan shall be prepared as part of the contract documents and ~~will~~would require that the erosion and sedimentation controls set forth thereon be implemented before the start of construction. Further, the plan ~~will~~would establish the guidelines for monitoring and maintaining the control measures both during and after construction. Stabilization of the site shall also comply with the conditions or requirements set forth therein and as established by the Town of Dover.

Several temporary structural practices to be utilized to mitigate any potential impacts include, but shall not be limited to, surrounding material stockpiles with silt fencing and hay bale dams, excavated and embankment areas ~~will~~would be graded to permit drainage and the runoff ~~will~~would be intercepted in ditches with silt barriers or collected in settling basins to permit sedimentation, and stabilized construction entrances ~~will~~would be constructed and maintained during construction to minimize the off-site migration of sediment.