A. INTRODUCTION AND METHODOLOGY

This chapter analyzes potential impacts associated with stormwater runoff. Conversion of land from a forested to a developed condition increases the amount of surface water runoff that occurs during storm events. This raises the potential for impacts related to downstream flooding and erosion. In order to avoid such impacts, regulatory authorities require the implementation of runoff reduction strategies to minimize runoff caused by development and the capture and treatment of stormwater runoff with stormwater management practices. These design strategies and stormwater management practices are intended to reduce post-construction runoff rates and minimize increases in stormwater pollutants.

The regulations that apply to stormwater management and the technical methodology used to model changes in stormwater runoff are discussed below. Stormwater management for the Proposed Project has been conceptually designed, taking into consideration proposed impervious surfaces and development density. In this way, the location and size of stormwater infrastructure have been conservatively estimated for the generic analysis of the overall CDP. The Phase 1 Site has been analyzed with a higher level of detail and is the subject of a preliminary draft Stormwater Pollution Prevention Plan (SWPPP) contained in Appendix G.

REGULATORY FRAMEWORK

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC)

Soil disturbances of greater than 1 acre require coverage under NYSDEC's State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activities Permit No. GP-0-10-001. A Notice of Intent form must be completed and filed with NYSDEC Division of Water in Albany to obtain coverage under the General Permit, and a letter of acknowledgement from NYSDEC is required prior to commencement of construction activities.

The General Permit requires that the stormwater management and erosion control components of proposed development projects be analyzed and designed in accordance with the standards in the following documents:

- New York Standards and Specifications for Erosion and Sediment Controls - last revised August 2005
- New York State Stormwater Management Design Manual (NYSSMDM) - last revised August 2010

To analyze the stormwater runoff in existing and proposed conditions, a computer modeling program is used to model surface hydrology. The program is based on U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) Technical Releases TR20 and TR55. TR20 and TR55 are tools that were developed to calculate the volume and peak

discharge rates of stormwater runoff for rainfall events over a 24-hour period. Runoff volumes and rates are calculated by determining the curve numbers (CN) and calculating the time of concentration (Tc) for each drainage area depending on the given rainfall value.

General Permit for Concentrated Animal Feeding Operations

An additional stormwater-related permit will be required from NYSDEC related to the housing/feeding of horses on-site as part of the harness racing component included in Phase 1 of Proposed Project. This permit is the SPDES General Permit for Concentrated Animal Feeding Operations (CAFOs) - General Permit GP-0-09-001 and is issued pursuant to the Environmental Conservation Law for CAFO operations. Because the proposed horse facility would not discharge or propose to discharge as a point source, but would instead conform to the best management and Comprehensive Nutrient Management Plan requirements of the CAFO General Permit, it would not require coverage under SPDES General Permit GP-04-02 for point source discharges.

DELAWARE RIVER BASIN COMMISSION

The Project Site is located within the drainage basin of the Delaware River, and is therefore subject to the water withdrawal and wastewater discharge regulatory framework administered by the Delaware River Basin Commission (DRBC). The DRBC is an interstate Federal watershed management agency given the authority to adopt and promote uniform and coordinated policies for water conservation, control, use, and management in the Delaware River Basin. The Delaware River Basin Compact provides that no project having a substantial effect on the water resources of the basin shall be undertaken unless it shall have been first submitted to and approved by the Commission (Compact, §3.8). For additional information on the DRBC and its requirements, refer to Chapter 8, "Water Supply," and Chapter 9, "Sanitary Sewer Service."

PLANNED RESORT DEVELOPMENT – THOMPSON ZONING CODE

Regarding stormwater management, the Town of Thompson Zoning Code§ 250-27.2 "Planned Resort Development" is intended to provide for the "efficient use of a site to facilitate adequate and economical construction and maintenance of streets, stormwater management facilities, and water supply and sanitary sewerage systems." In addition, a Comprehensive Development Plan created pursuant to the Town's PRD Zoning "shall …generally show the proposed architectural character and design concepts of all uses and structures, and shall identify proposed stormwater management techniques…" As discussed below, the proposed CDP has been designed to incorporate properly sized conceptual stormwater management facilities to meet these requirements.

B. COMPREHENSIVE DEVELOPMENT PLAN (DGEIS)

EXISTING CONDITIONS

The Project Site is comprised of approximately 1,538 aces in mostly contiguous parcels located at the crossroads of Joyland Road and Thompsonville Road generally bound by Kiamesha Lake Road, NYS Route 17, Concord Road, and County Route 161.

The Project Site's topography is characterized by the lowland valley of Kiamesha Creek that runs from south to north through the center of the Site, and its higher elevation uplands to the east and west. The Project Site is located within a subwatershed of the Neversink River, which is

tributary to the Delaware River. Elevations range from a low point of 1,340 feet above sea level near the center of the Site to a high point of 1,660 feet above sea level on the western side. Drainage on the Project Site generally flows from four high points within the Project Site to the low-lying wetlands, lakes, and Kiamesha Creek.

The Project Site is predominantly forested or occupied by golf course. The Project Site presently contains minimal impervious cover from the existing roadways traversing the Project Site (i.e., Thompsonville Road, Joyland Road, and Chalet Road), unpaved vehicle trails, golf cart paths, portions of the developed golf courses, and the various buildings and residences which remain on the Project Site from previous uses. In addition to the two golf courses that occupy the Project Site, the active Monster Golf Course and the inactive International Golf Course, it also includes the abandoned ski areas/runs, a spring and pump house, and the Chalet Golf Clubhouse.

At the present time, the Project Site contains no purpose-built stormwater management practices. However, the open water ponds and the interconnecting drainage system that occupies the golf courses on the Project Site serve to detain and convey surface flows from portions of the Project Site east and west of Kiamesha Creek to the lowlands at the center of the Project Site. These drainage features include a network of culverts and swales built on the golf courses to channel water away from the fairways. The ponds also provide water features for the golf courses. The golf courses' existing drainage network adequately conveys smaller design flows. However, due to the low elevations of many of the fairways and greens located within the floodplain of Kiamesha Creek, the Monster Golf Course experiences considerable flooding during larger storm events.

Since there is minimal stormwater infrastructure located within the roadway network, the majority of the Project Site runoff travels to the existing wetlands and waterbodies via overland flow, and through tributary streams and brooks. In some areas, man-made swales parallel to the roadways collect and convey the stormwater through culvert crossings. These small (in the range of 8-inch to 24-inch) culverts channel stormwater flows under roadways and driveway crossings. They also serve, in some instances, to maintain the hydrologic connections between wetlands.

The existing stormwater runoff on the Project Site presently discharges to approximately 23 design points. While some of these design points are directed to a structural element such as a culvert, the majority of the points are defined as the locations at which overland flow enters a wetland or waterbody.

THE FUTURE WITHOUT THE PROPOSED ACTIONS AND PROPOSED PROJECT

In the future without the Proposed Project, no substantial changes to the Project Site's stormwater runoff character (volume, water quality, and erosional characteristics) or flow patterns are expected.

Several approved development projects, "No Build projects," within the study area have been identified and are analyzed in this DGEIS (see Chapter 2). While some of these projects may be within the drainage area contributing surface water runoff to the Project Site, these No Build projects must all conform to the NYSDEC SPDES General Permit No. GP-0-10-001 and must develop site-specific stormwater pollution prevention plans to prevent downstream flooding and degradation of water quality. Therefore, it is presumed that no impacts to on Project Site surface waters or wetlands would occur from approved projects to be constructed in the near future in proximity to the Project Site.

PROBABLE IMPACTS OF THE PROPOSED ACTIONS AND PROPOSED PROJECT

Impacts to water quality and quantity can result from changes in land use, creation of impervious surfaces, and changes in grading. As vegetation is removed and the amount of impervious surface increases, the quality of stormwater runoff decreases, impacting receiving waterbodies. In addition, a smaller volume of stormwater infiltrates into the soil, increasing volume and peak flow of stormwater runoff.

The Proposed Project is a multi-phased development that will include year-round residential and commercial uses. The Proposed Project will increase the amount of impervious surface on the Project Site with buildings and roadways and will reduce the amount of forest cover overall. To manage the increase in stormwater runoff that will result from this development, stormwater management practices have been sited and conceptually designed such that all areas of development will receive stormwater treatment in full conformity with the NYSDEC guidelines.

Table 7-1 contains the storm design criteria required by NYSDEC as outlined in the New York State Stormwater Management Design Manual (NYSSMDM). A site-specific stormwater management plan will be designed for each phase of the Proposed Project that complies with these sizing criteria, and with all components of SPDES General Permit No. GP-0-10-001.

Table 7-1
NYSDEC Uniform Sizing Criteria

Water Quality Volume (WQv)	WQv = Treatment of the 1-year storm event (capture and treatment of 90% average annual runoff volume).
Runoff Reduction Volume (RRv)	RRv = Reduction of the total WQv by application of green infrastructure techniques and SMPs to replicate pre-development hydrology.
Channel Protection (Cpv)	Cpv = 24-hour extended detention of post-developed 1-year, 24-hour storm event.
Overbank Flood (Qp)	Control the peak discharge from the 10-year storm to 10-year predevelopment rates.
Extreme Storm (Qf)	Control the peak discharge from the 100-year storm to 100-year predevelopment rates. Safely pass the 100-year storm event.

CONCEPTUAL STORMWATER MANAGEMENT PLAN

A conceptual drainage plan for the Proposed Project is provided principally for planning purposes so that land area is set aside for the necessary stormwater basins and infrastructure that will be required in the future to satisfy NYSDEC's stormwater management requirements. Each development phase of the Proposed Project will be analyzed separately and a SWPPP developed in conformance with the NYSSMDM.

The possible impacts from future phases of the Proposed Project were quantitatively evaluated using the Unified Stormwater Sizing Criteria as defined in the NYSSMDM. A comparison of existing and proposed impervious coverage was used to determine the increase in stormwater runoff generated by the Proposed Project. This resultant increase is the amount which must be captured to reduce runoff to pre-construction conditions.

The area of future development was divided into 18 drainage areas based on natural flow patterns to existing design points at culverts or along waterbodies. The post-development drainage areas were outlined in a manner consistent with the existing drainage patterns. The runoff from each drainage area was determined using TR-55 guidance and HydroCad® computer software.

To perform the required calculations, a "curve number" (CN) was assigned to each drainage area under existing and proposed conditions based on the ground surface cover and percentage imperviousness. The CNs used for the existing condition assumes 100 percent wooded and vegetative cover for all the areas, corresponding to 0 percent impervious coverage. This is a conservative strategy, commonly used in the conceptual design phase, which generates a larger-than-actual runoff volume to be detained, and consequently the design of a conservatively-sized stormwater storage system.

"Curve number" and "time of concentration" were determined for each drainage area and used to calculate peak discharge for the 100-year, 24-hour storm event. Once the peak discharge was determined for pre-and post-construction conditions, the required storage volume was calculated in acre-feet by multiplying the Vs/Vr factor by the proposed drainage area and the post-developed runoff depth (in inches) for the design storm.

The conceptual size (surface area) of the proposed detention basins was determined by assuming a 4-foot average depth of storage volume. This is the basis for the conceptual design of the stormwater management facilities for future phases of the Proposed Project. The locations of the conceptual detention basins (excluding Phase 1, which is considered in greater detail below) are shown in **Figure 7-1.**

Tables 7-2 to 7-5 show the drainage computations used to size the stormwater detention basins.

Table 7-2
Existing Conditions

Drainage Area #	Existing Drainage Area (ac)	Flowrate (cfs)	Runoff Volume (af)	Runoff Depth (in)
1	52	93.26	15.57	3.60
2	28	60.58	8.36	3.63
3	31	46.23	9.29	3.57
4	37	96.05	11.14	3.64
5	43	91.21	12.86	3.62
6A	9	13.96	2.62	3.58
6B	28	45.07	8.47	3.58
7A	8	17.89	2.29	3.63
7B	18	42.16	5.39	3.63
8	23	42.40	6.86	3.61
9	22	52.35	6.79	3.63
10	57	128.25	17.16	3.63
11A	24	48.70	7.30	3.62
11B	63	127.16	19.06	3.62
12	48	92.01	14.47	3.61
13	52	100.44	15.78	3.61
14	104	183.33	31.20	3.60
15	24	51.95	7.15	3.63

Notes: acre (ac), acre feet (af), cubic feet per second (cfs), inches (in)

Table 7-3
Proposed Conditions

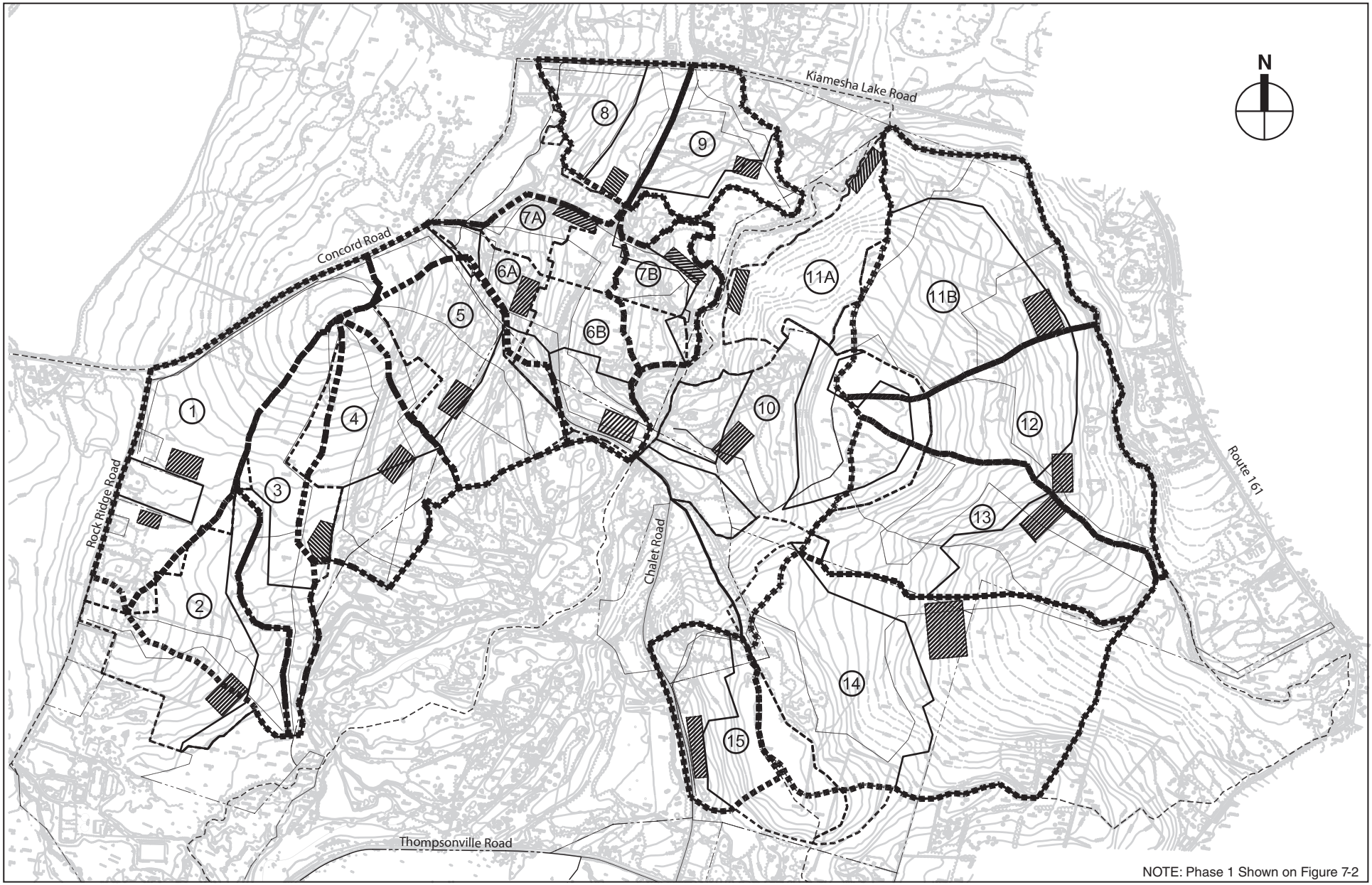
Drainage Area #	Proposed Drainage Area (ac)	Flowrate (cfs)	Runoff Volume (af)	Runoff Depth (in.)
1	56	195.71	19.98	4.28
2	41	186.86	14.34	4.19
3	32	140.61	11.09	4.19
4	41	182.44	14.03	4.09
5	43	185.33	14.62	4.08
6A	9	41.29	3.15	4.30
6B	28	147.03	11.45	4.84
7A	8	41.47	2.98	4.74
7B	18	97.72	7.02	4.74
8	23	97.77	7.98	4.19
9	22	121.74	9.26	4.96
10	62	200.22	20.45	3.96
11A	24	118.72	8.05	3.99
11B	63	317.34	21.56	4.09
12	44	206.78	14.54	3.98
13	52	252.15	17.42	3.98
14	106	499.10	39.77	4.51
15	37	177.02	14.81	4.84

Notes: acre (ac), acre feet (af), cubic feet per second (cfs), inches (in)

Table 7-4
Existing and Proposed Flowrate and Volume Comparison

DA	Existing Flowrate (cfs)	Proposed Flowrate (cfs)	Existing Runoff Volume (af)	Proposed Runoff Volume (af)	Difference Runoff Volume (af)
1	93.26	195.71	15.57	19.98	4.41
2	60.58	186.86	8.36	14.34	5.97
3	46.23	140.61	9.29	11.09	1.80
4	96.05	182.44	11.14	14.03	2.89
5	91.21	185.33	12.86	14.62	1.76
6A	13.96	41.29	2.62	3.15	0.53
6B	45.07	147.03	8.47	11.45	2.98
7A	17.89	41.47	2.29	2.98	0.70
7B	42.16	97.72	5.39	7.02	1.64
8	42.40	97.77	6.86	7.98	1.11
9	52.35	121.74	6.79	9.26	2.47
10	128.25	200.22	17.16	20.45	3.29
11A	48.70	118.72	7.30	8.05	0.75
11B	127.16	317.34	19.06	21.56	2.51
12	92.01	206.78	14.47	14.54	0.08
13	100.44	252.15	15.78	17.42	1.64
14	183.33	499.10	31.20	39.77	8.57
15	51.95	177.02	7.15	14.81	7.66

Notes: acre feet (af), cubic feet per second (cfs)



Drainage Areas and Conceptual Stormwater Management Plan - CDP

Table 7-5
Storage Volume Estimation

DA	Proposed Volume (af)	Existing Volume (af)	V_r (af)	q_o (cfs)	q_i (cfs)	Vs/Vr	Q_d (in)	A (ac)	Vs (af)	Surface Area (4 ft deep pond)
1	19.98	15.57	19.98	93.26	195.70	0.29	4.28	55.97	5.71	62,167.17
2	14.34	8.36	14.34	60.58	186.86	0.36	4.28	41.10	5.33	58,007.24
3	11.09	9.29	11.09	46.23	140.61	0.36	4.28	31.80	4.09	44,532.79
4	14.03	11.14	14.03	96.05	182.44	0.27	4.28	41.30	3.92	42,731.67
5	14.62	12.86	14.62	91.21	185.33	0.28	4.28	43.00	4.29	46,699.85
6A	3.15	2.62	3.15	13.96	41.29	0.35	4.30	30.40	3.87	42,103.19
6B	11.45	8.47	11.45	45.07	147.03	0.37	4.84	30.40	4.59	50,018.41
7A	2.98	2.29	2.98	17.89	41.47	0.31	4.74	29.30	3.54	38,537.03
7B	7.02	5.39	7.02	42.16	97.72	0.31	4.74	29.30	3.54	38,534.66
8	7.98	6.86	7.98	42.40	97.77	0.30	4.19	21.70	2.31	25,142.54
9	9.26	6.79	9.26	52.35	121.74	0.31	4.28	22.50	2.46	26,777.47
10	20.45	17.16	20.45	128.25	200.22	0.23	4.28	61.90	5.03	54,722.45
11A	8.05	7.30	8.05	48.70	118.72	0.32	3.99	63.30	6.65	72,398.62
11B	21.56	19.06	21.56	127.16	317.34	0.32	4.28	63.30	7.24	78,821.05
12	14.54	14.47	14.54	92.01	206.78	0.30	4.28	43.90	4.69	51,081.47
13	17.42	18.12	17.42	115.34	252.15	0.29	4.28	52.50	5.51	59,967.44
14	39.77	31.20	39.77	183.33	499.10	0.34	4.28	105.8	12.76	138,962.97
15	14.81	7.15	14.81	51.95	177.02	0.38	4.28	36.8	5.03	54,781.43

Notes: acre (ac), acre feet (af), cubic feet per second (cfs), inches (in)

CONCEPTUAL STORMWATER TREATMENT TECHNIQUES

The Proposed Project will employ various stormwater treatment techniques to address the anticipated increase in pollutant loads from the development of the Project Site. Stormwater will be detained and treated in one or a combination of the following pond designs:

Stormwater Ponds

- Micro-pool Extended Detention Pond
- Pocket Pond
- Wet Pond
- Wet Extended Detention Pond
- Multiple Pond System

Created Wetlands

- Shallow Wetland
- Extended Detention Shallow Wetland
- Pond/Wetland System
- Pocket Ponds

Filtering Systems

- Surface Sand Filter
- Underground Sand Filter
- Perimeter Sand Filter
- Organic Filter
- Bioretention

In accordance with NYSDEC runoff reduction volume requirements, green infrastructure will be incorporated into the stormwater management design where feasible to further reduce runoff and provide water quality treatment. Green infrastructure practices are now a required element of stormwater management design intended to enable the post-developed condition to closely replicate pre-development conditions.

Some of the green infrastructure practices which may be employed include:

- Rain garden/bioretention basin
- Porous pavement/pervious pavers
- Rain barrels/cistern
- Vegetated swales
- Tree planting/tree box
- Disconnection of rooftop runoff
- Green roof
- Stormwater planter
- Conservation of natural areas

KIAMESHA CREEK FLOODING ABATEMENT

The Proposed Project proposes to redesign the existing Monster Golf Course in the center of the Project Site to retain a wide central green space on either side of Kiamesha Creek. Development of new buildings, roadways, and related impervious surfaces is not proposed in close proximity to Kiamesha Creek so that the stream resource can be protected and enhanced. In the past, the low-lying topography of the course resulted in frequent flooding, which has likely been exacerbated by upstream development along the Kiamesha Creek corridor. Proposed Project components intended to remedy this situation include:

- Implementation of stormwater management practices to capture, detain, and recharge the groundwater close to the source of the runoff so that the Creek is not overburdened with Proposed Project-generated runoff.
- The redesigned golf course would improve course irrigation and drainage systems to reduce weather-related course closings.

CUMULATIVE STORMWATER IMPACTS

As noted previously, several approved development projects, “No Build projects,” within the study area have been identified and are analyzed in this DGEIS. While some of these projects may be within the drainage area contributing surface water runoff to the Project Site, these No Build projects must all conform to the NYSDEC SPDES General Permit No. GP-0-10-001 and

must develop site-specific stormwater pollution prevention plans to prevent downstream flooding and degradation of water quality. As such, cumulative impacts resulting from development of these projects in combination with the Proposed Project are not expected.

MITIGATION

Based on the information and analysis presented above, the Proposed Project will not result in any significant adverse impacts from stormwater runoff. Sufficient space and locations have been incorporated in the future development phases of the Proposed Project to allow for all of the necessary stormwater infrastructure that will be required.

For each phase of the Proposed Project, changes in stormwater runoff characteristics will be evaluated and a SWPPP would be developed in accordance with NYSDEC design guidelines and SPDES General Permit No. GP-0-10-001 to mitigate potential impacts identified. The resulting SWPPP will require review and approval by the NYSDEC in advance of the development of each future phase of the Proposed Project. Therefore, potential impacts from stormwater runoff, including flooding and erosion impacts, will be avoided. No further mitigation will be required.

Based on the preliminary geotechnical report the predominant soil type throughout the project site is silty sand, or a sandy silt mixture. Only three of the 50 samples collected were inorganic silts and very fine sands, or soil that has more than 50% passing the 200 sieve. However, as a precautionary method, soil stabilization procedures will include the spray application of soil stabilizers in addition to the standard erosion and sediment control measures. This method of soil stabilization will reduce soil erosion. Most stormwater runoff will be conveyed to temporary sediment basins where flocculant would be added to the temporary sediment basin as necessary. All necessary DEC permits would be obtained prior to the use of any chemicals within the ponds.

C. SITE-SPECIFIC DEVELOPMENT OF PHASE I (DEIS)

EXISTING CONDITIONS

The following section provides a summary of the stormwater conditions and stormwater management plan developed for the Phase 1 Site. Additional information on the hydrologic analysis for the Phase 1 Site is contained in the Draft SWPPP found in Appendix G.

The Phase 1 Site is approximately 125 acres in size and is located in the southern portion of the Project Site. It is bordered by Thompsonville Road on the north and Joyland Road on the east. At present, there are no structures or built features on the Phase 1 Site. The Site consists of forested land and manicured lawns within the existing Monster Golf Course.

Substantive stormwater infrastructure does not exist within the Phase 1 Site. Drainage on the Phase 1 Site generally flows from the high area located along the western side of Joyland Road to the low-lying wetlands and lakes to the west. Stormwater runoff travels via overland flow across the Phase 1 Site toward the Tannery Brook which ultimately discharges into Kiamesha Creek. The elevations on the Phase 1 Site range from a high of approximately 1,455 feet along the eastern property line to a low of approximately 1,342 feet in the southwestern corner of the Site at the pond adjacent to Thompsonville Road.

Since there is minimal stormwater infrastructure located within the roadway network, the majority of the existing Phase 1 Site runoff travels via overland flow, natural channels, and through tributary streams and brooks. In some areas, such as along the southern side of Thompsonville Road, man-made swales parallel to the roadway collect and convey the stormwater through culvert crossings. These small (in the range of 8-inch to 24-inch) culverts channel stormwater flows under roadways and driveway crossings. They also serve, in some instances, to maintain the hydrologic connections between wetlands.

DESIGN POINTS

The existing stormwater runoff from the Phase 1 Site presently discharges to five "design points" - points of discharge at the periphery of the Phase 1 Site used to analyze changes in runoff from development. While some of these design points are pinpointed to a structural element such as a culvert, the majority of the points are defined as the locations at which overland flow enters a wetland or waterbody. **Figure 7-2** shows the location of the pre-development design points and contributing drainage areas.

THE FUTURE WITHOUT THE DEVELOPMENT OF PHASE 1

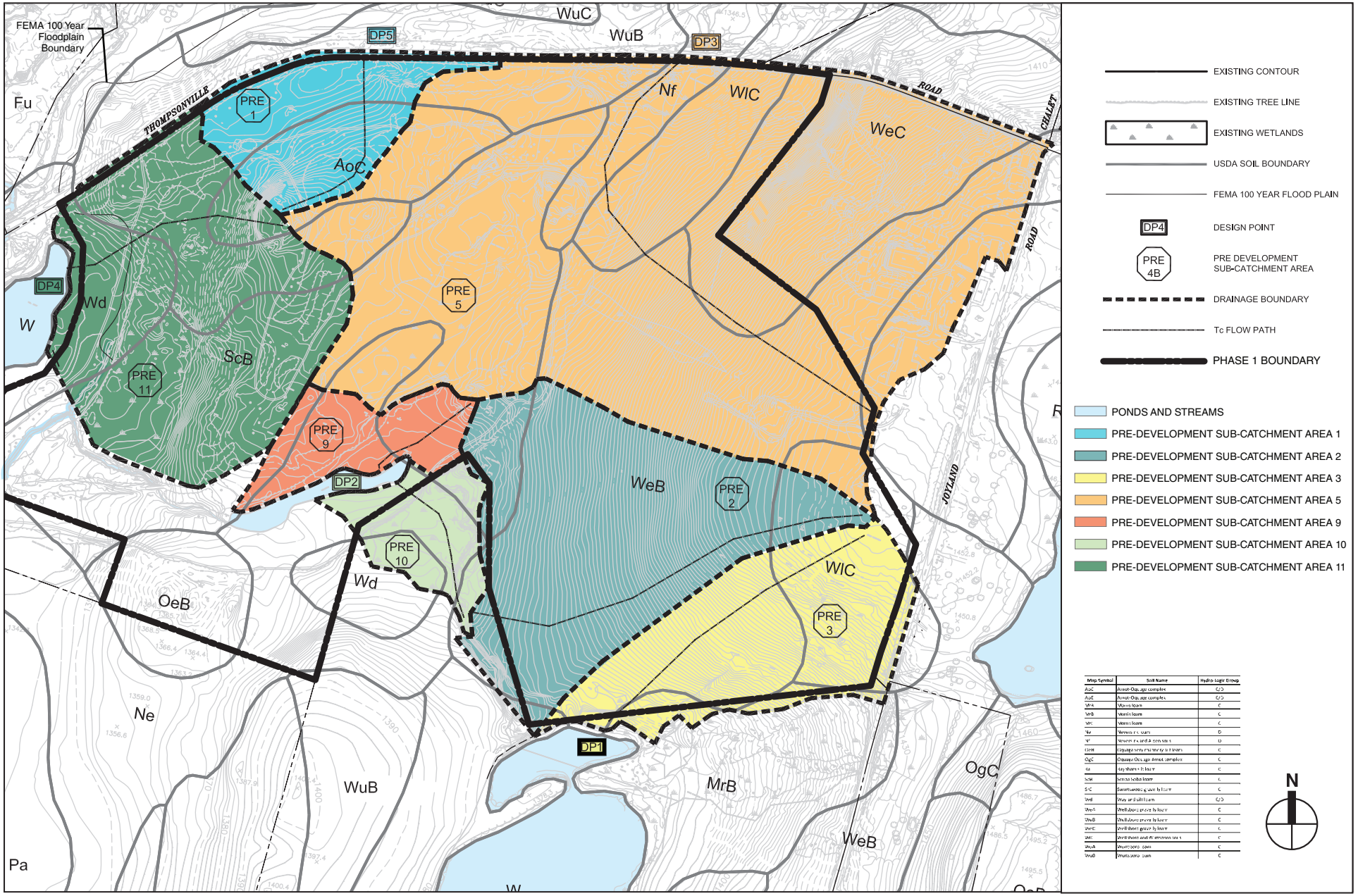
In the future without Phase 1, the 125-acre area would remain as an undeveloped forested area with several small wetlands and several surface drainage channels. The portion of the Monster Golf Course that is included in the Phase 1 Site would be maintained as it currently exists. There would be no investment to improve the flooding conditions that occur on the golf course and improvements to stormwater management facilities would not be implemented.

There are no approved projects in proximity to the Phase 1 Site that would generate runoff affecting the Phase 1 Site in the future without the Proposed Project. Therefore, stormwater management and runoff conditions on the Phase 1 Site will remain unchanged in the future without the development of Phase 1.

PROBABLE IMPACTS OF THE DEVELOPMENT OF PHASE 1

The planning and layout of Phase 1 were influenced by the varied Phase 1 Site topography. The project components were laid out to conform to existing topography as much as possible. For example, the parking garage is proposed to be located underneath the podium level of the main building to best utilize the change in grade from east to west and the harness horse racetrack is proposed for the most level area within the Phase 1 Site.

Construction of Phase 1 will increase the impervious coverage of the Phase 1 Site and thereby produce greater stormwater volumes and introduce additional pollutants into the runoff. These changes in the quantity and quality of the stormwater runoff from the Phase 1 Site have the potential to result in downstream flooding, increased erosion and sediment deposition as well as impacts to surface waterbodies from increased pollutant loads carried in the runoff. To mitigate the effects of the development of Phase 1, the stormwater management system has been designed in accordance with NYSDEC guidelines to comply with runoff reduction requirements, and provide pollutant removal by using Stormwater Management Practices (SMPs) acceptable for water quality and runoff reduction. The development of the stormwater management system for the Phase 1 Site involves the use of green infrastructure practices where feasible.



Phase 1 Stormwater Pre-Development

Figure 7-2

GREEN INFRASTRUCTURE AND RUNOFF REDUCTION VOLUME

In addition to providing for water quantity and quality treatment for major storm events, the NYSSMDM requires proposed developments to achieve a runoff reduction volume. This volume is achieved through such measures as infiltration, groundwater recharge, reuse, or evaporation/evapotranspiration of 100 percent of the post-development water quality volumes. Such measures are meant to replicate pre-development hydrology to the greatest extent. This requirement can be accomplished by application of on-site green infrastructure techniques, standard stormwater management practices with runoff reduction capacity, and good operation and maintenance. The following green infrastructure techniques are proposed for Phase 1 and their locations are shown on **Figure 7-3**.

Green Infrastructure Technique 7: Rain Gardens/Bioretention Basins

Rain gardens/bioretention basins have been designated for Phase 1 in areas downstream of paved parking areas, between driveways, and adjacent to buildings where there is sufficient space to provide the necessary treatment area. Each area is designed to capture and treat this surface runoff before discharging into an adjacent proposed stormwater conveyance system. These areas are designed to achieve pollutant treatment, groundwater recharge, and micro-scale habitat.

Infrastructure Technique 11: Porous Pavement

Certain parking areas on the Phase 1 Site have been designed with porous pavement in order to decrease stormwater runoff and promote infiltration. These practices are expected to help to reduce stormwater runoff and improve water quality and quantity downstream.

In order to achieve the requirements for the Runoff Reduction Volume (RRv), the Phase 1 Site must use green infrastructure techniques and practices to meet the required water quality volume (WQv) as determined in the NYSSMDM. However due to limiting Phase 1 Site conditions, the full WQv may not be achieved using the green infrastructure practices alone. The major limiting conditions are the proposed slopes, building mass, and poor infiltrative capacity of the soils.

In such cases, the NYSSMDM states that if a project is not able to achieve runoff reduction to the pre-construction condition, it must, at a minimum, reduce a percentage of the runoff from impervious areas to be constructed on-site. The percent reduction is based on the Hydrologic Soil Group(s) (HSG) of the site. The Phase 1 Site is located in HSG C and D soils, and therefore the percent reduction factor is 0.30 and 0.20, respectively.

By providing rain gardens/bioretention basins and porous pavement, Phase 1 is expected to meet the requirements of the RRv based on the Specific Reduction.

STORMWATER DESIGN ANALYSIS

In order to quantify the pre- and post-development drainage conditions, the Phase 1 Site development area was examined using HydroCAD®, a computer-aided design tool used to evaluate and analyze stormwater runoff. **Tables 7-6 to 7-9** show the pre-construction versus post-construction runoff characteristics of the design points at which stormwater is conveyed from the Phase 1 Site. After incorporating the Green Infrastructure and Runoff Reduction components discussed above, several additional stormwater management practices were designed and incorporated into Phase 1 so that it fully complies with the SPDES General Permit. These include:

- Pond 1 – Extended Detention Shallow Wetland (Design "W-2" per the NYSSMDM)

- Pond 4 – Pocket Pond (Design "P5" per the NYSSMDM)
- Pond 3 – Micro-pool Extended Detention Pond (Design "P1" per the NYSSMDM)
- Pond 5 – Pocket Pond (Design "P-5" per the NYSSMDM)
- Pond 6 – Proposed Pond/Wetland System (Design "W-3" per the NYSSMDM)

Post-construction drainage areas and the location of the stormwater management practices are shown in **Figure 7-4**. As shown in the tables below, in the post-development condition, stormwater runoff rates are reduced at all design points for all storm events.

Additional information on the hydrologic analysis, including the calculations and methodology used to size the stormwater practices and to determine post-construction stormwater runoff rates/volumes is contained in the complete SWPPP found in Appendix G.

Table 7-6
Comparison of Pre- and Post-Development Conditions – Design Point 2

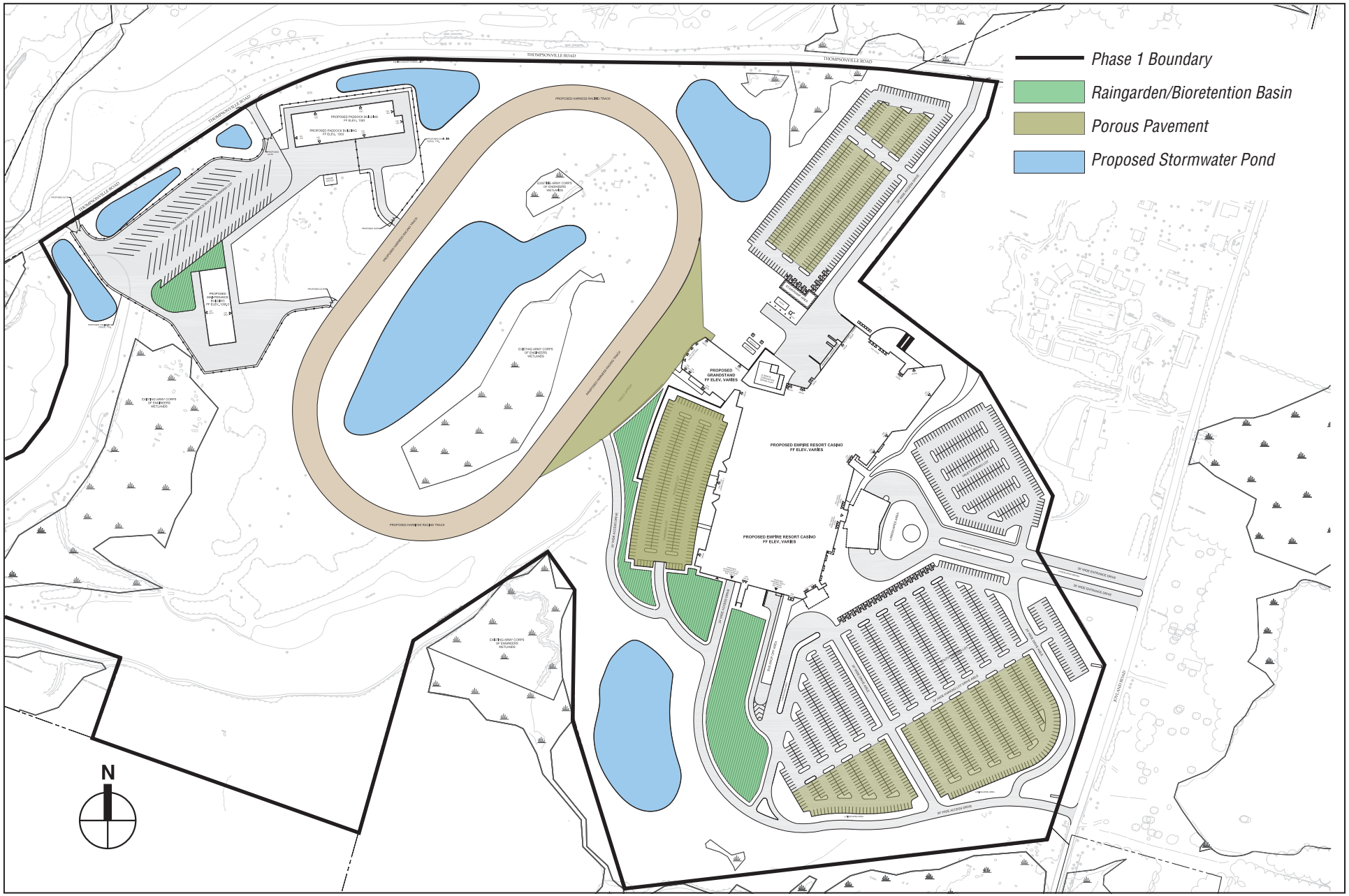
		Pre-Development DP-2	Post-Development DP-2
1 – Year Storm	Flow (cfs)	6.44	3.56
	Volume (CF)	61,725	158,297
10 – Year Storm	Flow (cfs)	38.39	28.73
	Volume (CF)	314,634	584,227
100 – Year Storm	Flow (cfs)	60.75	51.09
	Volume (CF)	493,056	859,265
Notes: Flow from existing DP1 is directed to DP 2 in Post-Development Condition. CF (Cubic Feet), cfs (cubic feet per second)			

Table 7-7
Comparison of Pre- and Post-Development Conditions – Design Point 3

		Pre-Development DP-3	Post-Development DP-3
1 – Year Storm	Flow (cfs)	21.13	14.02
	Volume (CF)	153,810	358,586
10 – Year Storm	Flow (cfs)	113.57	68.96
	Volume (CF)	736,381	1,088,303
100 – Year Storm	Flow (cfs)	175.38	107.49
	Volume (CF)	1,138,876	1,560,581

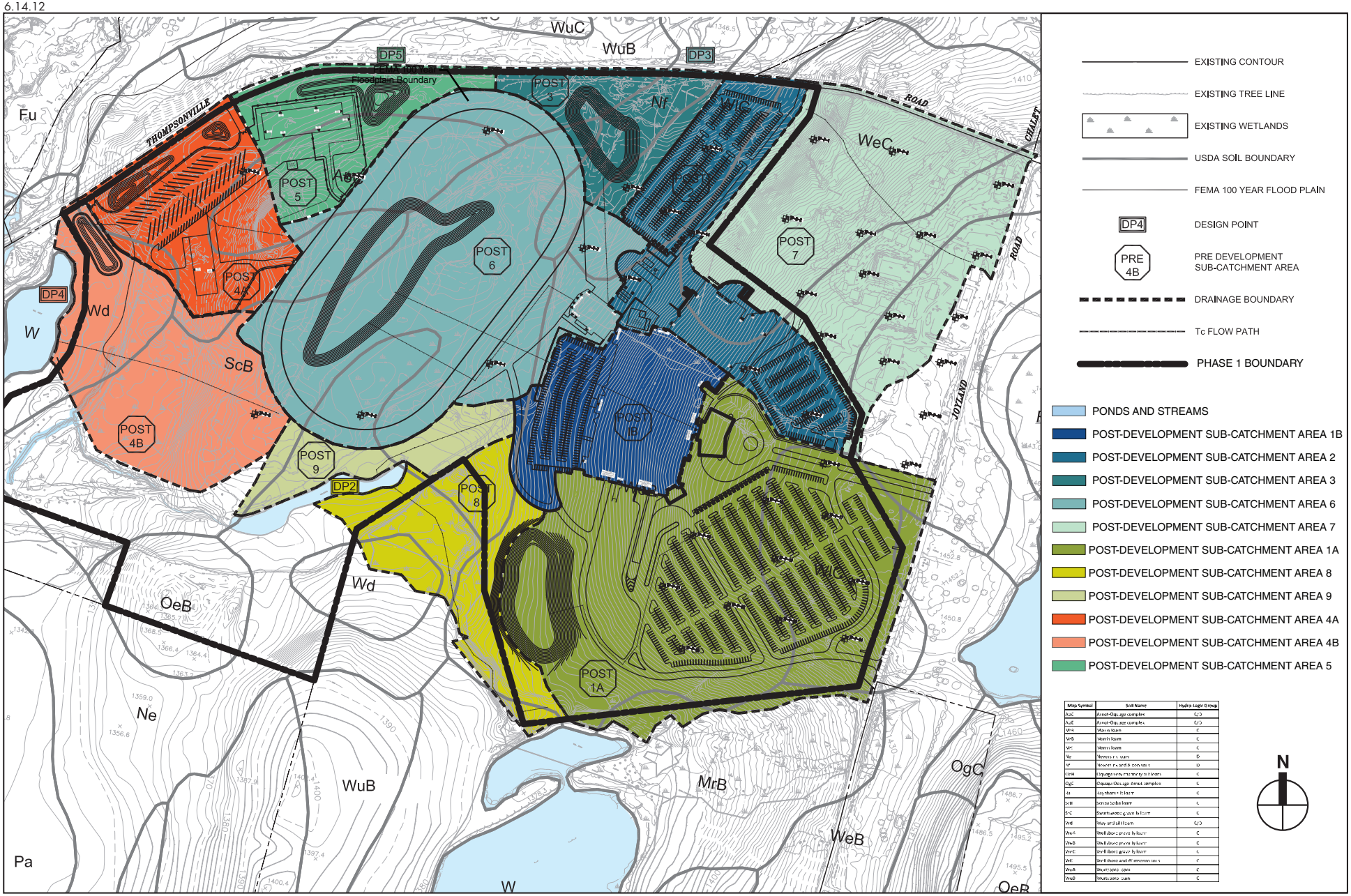
Table 7-8
Comparison of Pre- and Post-Development Conditions – Design Point 4

		Pre-Development DP-4	Post-Development DP-4
1 – Year Storm	Flow (cfs)	10.46	9.41
	Volume (CF)	54,668	70,524
10 – Year Storm	Flow (cfs)	53.58	52.94
	Volume (CF)	252,866	268,112
100 – Year Storm	Flow (cfs)	82.18	75.29
	Volume (CF)	388,425	397,659



Phase 1 Green Infrastructure

6.14.12



Phase 1 Stormwater Post-Development

Figure 7-4

Table 7-9
Comparison of Pre- and Post-Development Conditions – Design Point 5

		Pre-Development DP-5	Post-Development DP-5
1 – Year Storm	Flow (cfs)	4.08	0.16
	Volume (CF)	22,041	23,174
10 – Year Storm	Flow (cfs)	19.85	2.58
	Volume (CF)	98,489	88,950
100 – Year Storm	Flow (cfs)	30.16	3.72
	Volume (CF)	150,282	131,594

EROSION AND SEDIMENT CONTROL

Potential impacts associated with construction activities for Phase 1 include sediment deposition, erosion, and turbidity within receiving waterbodies. To address these potential impacts, Erosion and Sediment Control Plans will be developed in accordance with the New York Standards and Specifications for Erosion and Sediment Controls and SPDES General Permit GP-0-10-001.

It is anticipated that the following practices will be implemented to minimize the potential impacts associated with the disturbance:

- Protect vegetation
- Stabilize construction entrance/exit
- Silt fence
- Stone check dams
- Storm drain inlet protection
- Material stockpile protection
- Gravel surface construction area
- Stone outlet sediment trap
- Dust control
- Temporary stabilization (such as rolled erosion control blankets, seeding, and mulching or soil stabilizers)
- Sump pit
- Dewatering
- Perimeter dike/swale
- Temporary sediment basin
- Materials handling precautions

Inspection and Maintenance

Inspection and maintenance of the proposed stormwater management features will be conducted to ensure that the erosion and sediment control practices that are part of the SWPPP continue to be effective in preventing sediment and other pollutants from entering the stormwater system. As a part of the SWPPP inspection and maintenance activities during construction, an Erosion and Sediment Control Inspection Report will be updated and kept on-site.

Inspections will be conducted by a qualified inspector once every seven days, according to the schedule required by the SPDES GP 0-10-001. The inspection schedule will be increased to twice per week when land disturbance is greater than 5 acres. During each inspection, the qualified inspector will record the areas of disturbance, deficiencies in erosion and sediment control practices, required maintenance, and areas of temporary or permanent stabilization. The

need for modifications to the Erosion and Sediment Control Plan will be identified and implemented immediately.

All maintenance will be completed in accordance with the New York State Standards and Specifications for Erosion and Sediment Control.

MITIGATION

Peak flows have been reduced through the implementation of green infrastructure and standard stormwater management practices. Post-development peak flows are less than the pre-development conditions. Therefore, it has been demonstrated that the proposed stormwater drainage and treatment system described above mitigates the impacts associated with the development of Phase 1.

The preparation of the SWPPP and Erosion and Sediment Control Plan (described above) in accordance with SPDES GP 0-10-001 will also satisfy the requirements of the Delaware River Basin Commission. The Commission will have the opportunity to review the SWPPP concurrent with review by the NYSDEC. Once found satisfactory by both agencies, this will finalize review and approval of the stormwater management-related components of Phase 1.

Separately, as part of the horse housing/feeding operation conducted for the harness horse racetrack component of Phase 1, the General Permit for Concentrated Animal Feeding Operations (CAFOs) - General Permit GP-0-09-001, will be submitted for review and approval by the NYSDEC. The harness horse racetrack component of Phase 1 will be permitted once NYSDEC accepts the best management and Comprehensive Nutrient Management Plan. These elements of the harness horse racetrack operation will be completed during the site plan approval process for Phase 1. Monticello Raceway Management, Inc.'s existing CAFO permit will be modified to include the operations at the Phase 1 Site.

Implementation of the State-approved SWPPP for Phase 1 will avoid potential adverse impacts caused by surface water runoff. Therefore, no further mitigation will be required. ✷