

Stormwater Pollution Prevention Plan

For

Heartwood A Lodging Facility

A Proposed

Commercial Development Project

Situate: NYS Route 44/55
Town of Gardiner
Ulster County, New York

Prepared for:

Heartwood

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SECTION 1: General Project Information

1.1 Project Summary:

The Heartwood Lodging facility is a proposed commercial project and is situated off NYS Route 44/55, a 1500 feet west of Albany Post Road in the Town of Gardiner. A proposed ecological lodging facility comprised of 28 eco-cabins and 42 cabins as well as a separate lobby structure and maintenance buildings. All cabins will include full en-suite bathrooms and hotel-quality bedding and furnishings. Accessory to the cabins will be a main lobby structure, food and beverage facility, and event barn for various uses such as yoga and meditation classes, company retreats, workshops and limited weddings for guests of Heartwood only. The site will also feature a vegetable farm, a pool and potential amenities such as bocce courts, tennis courts and spa facilities. The site is a total of 141 acres between two separate properties. The property lines for the two lots will be revised to produce two different lots. The new driveway will be placed 280 feet west of the existing farm driveway. The site was previous used as tree farm. The upland site is currently covered mainly in grass with several wooded areas. The steep slope along the Shawagunk Kill is wooded. The proposed site improvements are shown in a set of site plans attached in Appendix I.

The site currently has approximately 3.22 acres of impervious cover. The site has approximately 2.5 acres of existing dirt farm roads and approximately 0.72 acres of water from the existing pond. There is one existing well that was installed in May 2017.

Site improvements will consist of new driveway, new onsite sewage treatment system, water treatment system and electric utilities extending from NYS Route 44/55. On-site construction will include parking lots, site lighting, stormwater management, sewage pump chambers, backup generator, as well as landscaping.

The proposed buildings will have a total footprint of approximately 71,500 sf. Proposed parking and other impervious surfaces such as road, buildings and, etc will total approximately 9.8 acres, resulting in 7.0% of impervious cover over the entire site.

Stormwater management for the project will include temporary erosion controls during construction as well as permanent post construction controls, such as swales, culverts, rain gardens, bio-retention zones and water quality basins. The stormwater management practices will mitigate the impacts of the proposed development for runoff quantity and quality improvements to remove pollutants from the stormwater before it is discharged to the Shawagunk Kill at the southern edge of the property.

The intent of this report is to prepare the calculations and sizing of the sites drainage system including Water Quality Basins as part of a Storm Water Pollution Prevention Plan (SWPPP) meeting standards of design of Storm water Management Practices (SMP) of the State of New York in accordance with National Pollutant Discharge Elimination System (NPDES).

When all proposed practices are constructed they will reduce all post-development peak flows from the site to less than pre development flows. Therefore there will be no negative impacts on downstream waters or adjacent lands caused by increased flow rates. The reduction is indicated in the following table:

Total Offsite flow to Shawangunk Kill			
Storm	Pre-development (cfs)	Post-development (cfs)	% Change
1 Year	71.9	62.8	- 13%
10 Year	220.5	201.6	- 8.6%
100 Year	569.6	556.8	- 2.2%

1.2 Contact Information/Responsible Parties:

SWPPP Contact/Prepared by:

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Owner/Operator(s):

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Shinrin Yoku LLC
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Brooklyn, NY 11249
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F:
E-mail: phillip@heartwoodny.com

Project Manager(s) or Site Supervisor(s): (To be filled in before construction)

Company or Organization:
Contact Name:
P:
F:
E-mail:

Emergency 24-Hour Contact:

Company or Organization: Heartwood
Philip Rapoport
P: 917-517-4209

Subcontractor(s)*:

Company or Organization:
Contact Name:
Address:
City, State, Zip:
P:
F:

*Insert additional subcontractor contacts below as needed

1.3 Existing Soils, Slopes, Vegetation and Drainage Patterns:

The existing runoff is split into 15 watersheds. All of the watersheds discharge to the south toward the Shawangunk Kill. Watershed 1-1 is mainly covered in grass with wooded area to the south. Watershed 1-2 is covered with grass and woods, the southern portion of the watershed include a steep slope down to the Shawangunk Kill. Watershed 1-3 is mainly wooded and flows west across the property line. Watershed 1-4 is will remain undeveloped. Watershed 1-4 is the only off site watershed. Watershed 1-4 flows beneath NYS route 44/55 into an already existing stream bed in watershed 1-5, the watershed is covered in shrubs and grasses with a small amount of woodland. Watershed 1-5 is mainly covered with tall grass and includes a portion of the neighbor's house to the west. Watershed 1-5 flows under a dirt farm road to watershed 1-6. Watershed 1-6 is mainly covered with grass and a small amount of grass. Watershed 1-6 and 1-7 discharge to watershed 1-8. Watershed 1-7 is covered in grass and woods. Water shed 1-8 is mainly grass and includes the existing onsite pond. The pond discharges into watershed 1-9. Watershed 1-9 is mainly covered with grass on the flat land and then the steep slope is covered in woods. Watershed 1-10 is mainly covered in woods and includes flat and steep slopes. Watersheds 1-11 and 1-12 are covered mainly in woods but do also have a large area of grass. Watershed 1-11 and 1-12 discharge down the steep slope to the Shawangunk Kill. Watershed 1-13, 1-14 and 1-15 are all mainly covered in grass at discharge to the east. Slopes across the site ranges from flat to steep. The site has 5 separate soil classifications accompanying the USDA-NRCS soil survey. The chart below shows the percentage of each hydrological soil group, the soil survey can be found in appendix H.

Percentage of Each Hydrological Soil Group (HsG) at Heartwood Site			
A	B	C	D
0%	0%	100%	%

1.4 Changes in Cover Estimates:

The following are estimates of the proposed development.

Total project area:	141.3 acres
Approximate construction site area to be disturbed:	26.0 acres
Percentage impervious area before construction:	2.3%
Runoff coefficient before construction:	CN = 78
Percentage impervious area after construction:	7.0%
Runoff coefficient after construction:	CN = 79
Future Impervious Cover:	9.8 acres
Conservation of natural areas:	54.2 acres

1.5 Receiving Waters:

The runoff from the majority of the proposed development will flow into the Shawangunk Kill

1.6 Sensitive Site Features to Be Protected:

The banks of the Shawangunk Kill are considered a sensitive area. No buildings will be placed within 150' along the Shawangunk Kill or on the steep slopes.

1.7 Potential Sources of Pollution

Potential sources of sediment to stormwater runoff:

- Clearing and grubbing
- Grading and site excavation
- Vehicle tracking
- Topsoil stripping and stockpiling
- Landscaping/stabilization operations

Potential pollutants and sources, other than sediment, to stormwater runoff:

- Re-fueling activities
- Minor equipment maintenance
- Sanitary facilities
- Materials storage of general building materials, solvents, adhesives, paving materials, paints, aggregates, trash, etc.
- General construction activities — paving, concrete pouring building construction
- Concrete Washout Areas

1.8 Historic Preservation:

The site has been reviewed by the New York State Historic Preservation Office and there are no known sensitive site features known.

SECTION 2: Erosion and Sediment Control BMPS

2.1 Minimizing Disturbed Areas, Protecting Natural Features and Soil:

Site disturbance and clearing will be kept within the limits of disturbance as indicated on the site plans. Any sensitive areas such as vegetation areas to be preserved will be clearly flagged prior to disturbance. All contractors will be instructed not to disturb these sensitive areas.

All topsoil from disturbed areas will be striped prior to grading and stockpiled as indicated on the soil erosion control plans. Topsoil will be re-spread on disturbed areas after final grading is complete. A temporary seed will be applied to the topsoil during storage to prevent erosion. Some

2.2 Temporary BMPS:

The following temporary erosion and sediment controls will be used during construction. The locations and detailed designs of each practice is located within the accompanying construction drawings.

- Silt Fence: to capture sediment in lateral sheet flow leaving disturbed areas
- Stabilized Construction Entrances: to capture sediment from vehicles leaving site
- Inlet Sediment Traps: to prevent sediment in concentrated runoff collected from disturbed areas from leaving the site through catch basins
- Temporary Seeding: to stabilize inactive areas or soil stock piles

2.3 Sequence of Construction Activity:

The following sequence of soil erosion and sediment control measures shall be followed during the duration of the project. In addition the guidelines in Section 3 of this report shall be implemented where applicable.

- 1. Schedule a pre-construction meeting:** a pre-construction meeting shall be held to review plans and inspect site with town officials including the Town Engineer, Contractors, and Project Managers at least one week prior to the start of construction, equipment staging and site disturbance.
- 2. Establish Limits of Clearing and Sensitive Areas to be Protected:** Prior to any construction and/or demolition activities commence all vegetation to be persevered shall be protected. In addition the property boundaries and/or limits of clearing shall be clearly marked. A pre-construction meeting shall be held prior to any land disturbance or grading to review plans and inspect site.

3. **Construct Stabilized Access to Site:** Install the stabilized construction entrance along NYS Route 44/55 in order to provide access for construction traffic on and off the site.
4. **Establish Perimeter Controls and Sediment Barriers:** Silt fences will be installed along downstream portions of the limit of disturbance and around any topsoil stockpiles. Silt fences will be installed as per the detail on site plans in Appendix I. Locations of installation are indicated on the soil erosion and sediment control plans for initial clearing and grading of the site. Install storm water pond as a sedimentary basin.
5. **Land Clearing and Rough Grading:** Begin clearing activities for each phase as per the site plans in Appendix I. The site plans have two Phasing Plans showing how the construction of the proposed development will not disturb more than 5 acres at a time. The ground surface to be used for roads, parking shall be cleared of all trees, stumps, brush, weeds, roots, matted leaves, small structures, debris, and any other unsuitable material, except as otherwise directed by the engineer. The contractor is to get permission from the owner prior to removal of any trees or other vegetation. Material accumulated by clearing as described above shall be disposed of by the contractor in a manner satisfactory to the engineer. After clearing and demolition all topsoil shall be stripped and stockpiled for use in final grading as indicated on plans. Excess topsoil not required for final grading may be removed from the site. Once topsoil has been stripped rough grade site and install permanent drainage structures and conveyance system. (inlet protection, rip rap outlet protection, etc.) Bio-retention zones shall **not** be constructed until all contributing drainage areas are stabilized (i.e. parking and driveways paved and permanent vegetation established) Establish temporary vegetation on any areas which will not be disturbed for a period 14 days or more. Parking and driveway areas may be stabilized with road base material.
6. **Soil Stabilization:** In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures must be initiated by the end of the next business day and completed within (14) days from the date the current
7. **Building Construction:** During the building construction maintain erosion controls.
8. **Landscaping and Final Stabilization:** Place topsoil and install landscaping as indicated on the landscaping plans. Construct bio-retention zones in conjunction with final stabilization.

- 9. Final Inspection and Removal of Temporary BMPS:** Perform final inspection of site to ensure all disturbed areas are stabilized. If all disturbed areas are stabilized temporary erosion control measures shall be removed.

SECTION 3: Good Housekeeping BMPS

3.1 General Construction Equipment and Material Storage Guidelines:

- Construction equipment and maintenance materials will be stored at a centrally located staging area when not in use around the site. Any smaller hand tools or equipment will be stored here in weather proof containers or covered when not in use. The staging area will consist of a temporary gravel pad and all concentrated stormwater runoff will be diverted away from or around the pad.
- Large building materials such as framing material may be stored in the staging area. Such materials will be elevated on wood blocks to minimize contact with runoff.
- The storage areas shall be inspected on a weekly basis and after each storm event. Storage areas will be kept clean and well organized to minimize contamination of stormwater runoff.

3.2 General Construction Waste Management Guidelines:

- All waste building and construction waste materials will be collected and disposed of in trash dumpsters located in a central staging area. Dumpsters will be placed away from stormwater conveyances and drains, and meet all local and state solid-waste management regulations. Only trash and construction debris from the site will be deposited in the dumpsters. All personnel working on the jobsite will be instructed regarding the correct procedure for disposal of trash and construction debris. The individual who manages day-to-day site operations will be responsible for seeing that these practices are followed.
- All dumpsters will be inspected on a weekly basis and after large storm events to ensure no debris are entering stormwater runoff.
- Dumpsters will be emptied as needed and no trash will be stored outside a dumpster if it is full.
- All dumpsters will be removed from the site immediately after all waste generating construction activities are complete.

3.3 Hazardous and Sanitary Waste Management Guidelines:

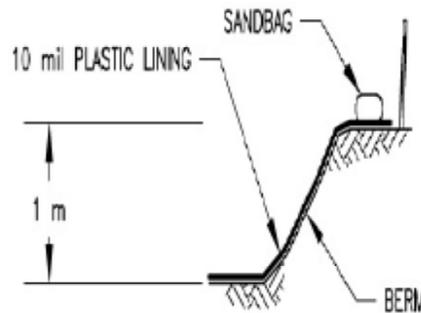
- All hazardous waste materials such as oil filters, petroleum products, paint and equipment maintenance fluids will be stored in structurally sound and sealed designated hazardous material storage area(s). Secondary containment will be provided for hazardous materials in these areas in the form of spill pallets.
- All hazardous materials will be disposed of in accordance with local, state and federal regulations. All personnel will be instructed regarding the correct procedure for disposing off hazardous waste. The individual who manages day-to-day site operations will be responsible for seeing that these practices are followed.
- All storage areas will be kept clean, inspected weekly and after storm events, have ample cleanup supplies in the event of a spill, material safety data sheets and the contact numbers of appropriate emergency spill response personnel shall be posted in the construction office.
- If necessary, sanitary facilities will be provided at the site in the form of portable toilets. Toilets will be located away from concentrated stormwater flows and checked daily for leakage. All sanitary waste generated from the toilets will be disposed of offsite in accordance with local laws and regulations.

3.4 On-Site Equipment Fueling and Maintenance Guidelines:

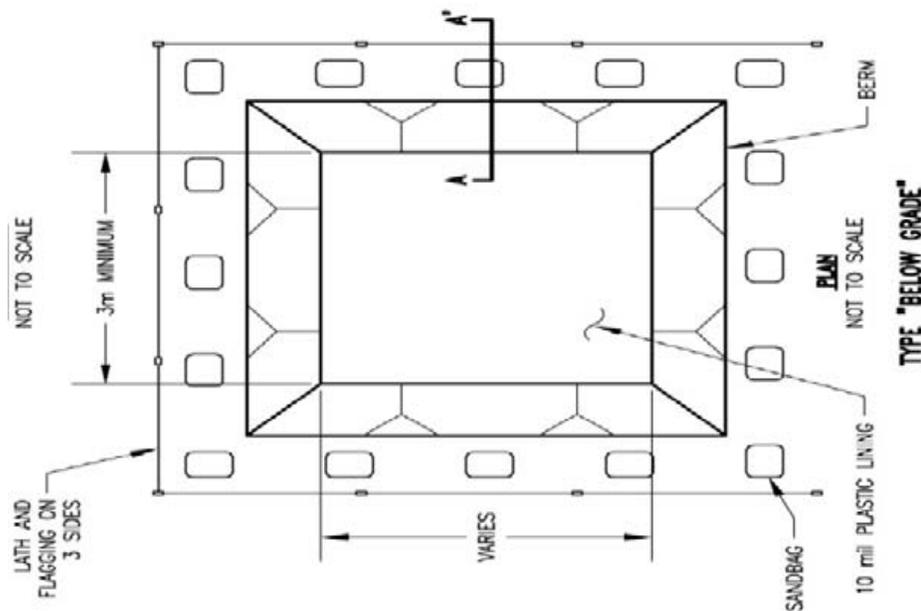
- Several types of vehicles and equipment will be used on-site throughout the project, including graders, excavators, loaders, paving equipment, rollers, trucks and trailers, backhoes, etc. All major equipment/vehicle fueling and maintenance will be performed off-site. A small pickup bed fuel tank will be kept on-site in the combined staging area. When vehicle fueling must occur on-site, the fueling activity will occur in the staging area. Only minor equipment maintenance will occur on-site. All equipment fluids generated from maintenance activities will be disposed of into designated drums stored on spill pallets in accordance with Section 3.3. Absorbent, spill-cleanup materials and spill kits will be available at the combined staging and materials storage area. Drip pans will be placed under all equipment receiving maintenance.
- Equipment/vehicle storage areas and fuel tanks will be inspected weekly and after storm events. Vehicles and equipment will be inspected on each day of use. Leaks will be repaired immediately, or the problem vehicle(s) or equipment will be removed from the project site. Ample supplies of spill-cleanup materials will be kept on-site to immediately clean up any spills.

3.5 Concrete Washouts:

- Designated temporary, below ground concrete washout facilities will be constructed as shown below. Washouts will be centrally located at the discretion of the individuals who manage day to day construction activities. Washouts shall have a minimum length and width of 10 feet but must have sufficient volume to contain all liquid concrete wastes generated from washout operations. The washout areas will be lined with plastic sheeting at least 10 mils thick and free of any holes or tears. Signs will be posted marking the location of the washout areas.



Section A-A



Washout Plan View

- Temporary concrete washout facilities will be located a minimum of (50 feet) from storm drain inlets.

- The washout areas will be inspected daily to ensure that all concrete washing is being discharged into the washout area, no leaks or tears are present, and to identify when concrete wastes need to be removed. The washout areas will be cleaned out once the area is filled to 75 percent of the holding capacity. Once the area's holding capacity has been reached the concrete wastes will be allowed to harden, the concrete will be broken up, removed, and disposed in accordance with local regulations. The plastic sheeting will be replaced if tears occur during removal of concrete wastes from the washout area. Lined roll-off containers is also acceptable for concrete washout.

SECTION 4: Post-Construction BMPS

4.1 Post-Development Drainage Improvements and Mitigation:

To mitigate all of the potential stormwater impacts of the project a drainage study has been performed and a stormwater management plan has been prepared in accordance with the New York State Stormwater Management Design Manual (NYSSMDM), SPDES general permit for stormwater discharges GP-0-15-002. Post-development drainage calculations are included in Appendix H. All nodes have the prefix 2-x with descriptions of each sub catchment provided in the calculations. A detailed work sheet is included in Appendix H showing the location of all post development nodes.

When complete the proposed drainage system will reduce peak runoff rates to less than pre-development levels. The proposed drainage improvements will also reduce pollutant levels in the runoff through several proposed treatment practices. The following sections give a detailed description of the proposed drainage system and on-site mitigations.

4.1.1 Peak Runoff Rate Reduction:

To mitigate the impacts of increased runoff rates after development the project will use bio-retention areas, swales and water quality basin practices to reduce post-development runoff rates to less than pre-development rates. As required by the NYSSMDM the proposed drainage system will provide the required channel protection volume, overbank flood protection, and extreme storm protection.

To meet channel protection requirements, or extended 24 hour detention of the 1-year design storm, the Bioretention Areas (F-5) and Water Quality Basins (Pocket Ponds (P-3 and P-5)) have been designed to capture the 1-year storm and release it gradually.

To meet overbank flood protection and extreme storm protection requirements the proposed drainage improvements will provide extended detention and release post-development runoff for the 10 and 100 year storms at less than pre-development rate. The bio-retention ponds and water quality basin practices will accomplish this through detaining the runoff and releasing it through outlet structures designed to release the stormwater gradually over a period of time.

When the proposed practice is constructed it will reduce the post-development peak flows from the site to less than pre development rate. Therefore there will be no negative impacts on downstream waters or adjacent lands caused by increased peak flow rates. A detailed description of each practice to be used is provided in section 4.3 Post Development BMP's.

4.1.2 Pre and Post-development Runoff Rate Comparison:

The tables below show the change in pre and post-development total runoff rates. Runoff rates are calculated in HydroCAD at each of the ten discharge points indicated on the pre and post development maps.

Total Offsite flow to Shawangunk Kill			
Storm	Pre-development (cfs)	Post-development (cfs)	% Change
1 Year	71.9	62.8	- 13%
10 Year	220.5	201.6	- 8.6%
100 Year	569.6	556.8	- 2.2%

Discharge Points flows		
	Pre-development (cfs)	Post-development (cfs)
Discharge Point #1		
1 Year	4.5	4.5
10 Year	12.7	12.7
100 Year	32.0	32.0
Discharge Point #2		
1 Year	6.0	5.9
10 Year	17.7	17.7
100 Year	46.0	45.4
Discharge Point #3		
1 Year	0.7	0.7
10 Year	2.0	2.0
100 Year	5.3	5.3
Discharge Point #4		
1 Year	25.8	23.2
10 Year	116.4	111.2
100 Year	301.9	297.7
Discharge Point #5		
1 Year	2.1	1.9
10 Year	6.9	6.4
100 Year	19.1	17.6
Discharge Point #6		
1 Year	3.3	1.1
10 Year	9.6	8.1
100 Year	24.9	23.8
Discharge Point #7		
1 Year	3.8	2.4
10 Year	11.7	7.5
100 Year	30.8	26.4

Discharge Point #8		
1 Year	3.4	2.8
10 Year	9.4	7.8
100 Year	23.5	22.7
Discharge Point #9		
1 Year	6.3	4.4
10 Year	17.2	11.2
100 Year	42.9	42.8
Discharge Point #10		
1 Year	6.0	6.0
10 Year	17.0	17.0
100 Year	43.2	43.2

4.1.3 Runoff Calculation Methodology:

Drainage analyses performed for the 1, 10 and 100 year design storms used the Runoff Curve Method as developed by the Soil Conservation Service (SCS), with peak discharge rates, hydrographs, and routing analyses generated using HydroCAD based upon the SCS TR-20 method. Curve numbers and times of concentration were determined using methodology in the SCS Technical Release 55. These calculations are detailed in Appendix H. Curve numbers were selected from soil type and ground cover which were determined from infield inspections and USGS Soil report. The rain fall depths used in the HydroCAD calculations was taken off the Isohyet maps in Section 4 of the 2015 New York State Stormwater Design Manual.

4.2 Runoff Reduction and Water Quality Volumes:

To mitigate the impacts of pollutants in stormwater from the proposed project fifteen bio-retention zones, twelve dry swales, ±28 rain gardens, seven water quality basins and existing pond will be used to treat stormwater from the project and remove pollutants before they are discharged into downstream waters. In accordance with the NYSSMDM the required Runoff Reduction Volume (RRv) and Water Quality Volumes (WQv) have been calculated for all proposed on-site development.

Runoff Reduction for the site is accomplished with the bio retention zones and dry swales. The bio retention zones filters water through a layer of soil before discharging to a stormwater pond or the existing wetland, on site. The RRv is calculated as a percentage of the required WQv. The percentage depends on the sites soils Hydraulic conductivity classification. See Table 3.5 Runoff Reduction Capacity for standard SMPs in the NYSSMDM. The proposed site has soils with hydraulic conductivity classification C. The bio retention zones can contribute 40% of the required WQv toward the RRv. The dry swales can contribute 20% of the required WQv toward the RRv.

The Water Quality Volume is being treated by using the bio retention zones, dry swale, stormwater ponds and existing pond. A detailed description of each practice and

their treatment methods is provided in the following section. Below is a table with the required and provided RRV and WQv.

Runoff Reduction Volume and Water Quality Volume			
Required WQv (cubic feet)	Provided Storage of WQV (cubic feet)	Required Runoff Reduction Volume (cubic feet)	Provided Runoff Reduction Volume (cubic feet)
65,576	±163,000	13,760	14,696

4.3 Channel Protection Volume

Channel protection volume is the 24 hour extended detention of post-developed 1-year, 24-hour storm event; remaining after runoff reduction. Below is a table with the required channel protection volume and the provided channel protection volume for the 1 year, 24 hour storm event for the post developed site. See appendix H for Channel Protection Volume Calculations. The Channel Protection Volume was only calculated for the southern portion of the site. The southern portion of the site is everything to the south-east of the existing drainage ditch leading to the existing pond near the middle of the property. The southern portion includes all new development including the proposed tennis courts that are north-west of the existing pond. The northern portion of the site includes the proposed lot without any proposed improvements and the Conservation Areas.

Channel Protection Volume (CPv)	
Required Channel Protection Volume (cubic feet)	Provided Channel Protection Volume (cubic feet)
147,500	194,500

4.4 Post-Development BMP's:

4.4.1 Bio-Retention (Green Infrastructure Practice):

- **Feasibility:** Fifteen bio-retention areas (F-5) will be used to treat runoff from the proposed parking areas and proposed building roof areas. Bio-retention areas were selected because they are a Green infrastructure practice with relatively small contributing drainage areas and the ability to integrate well into the proposed landscaping of the site.
- **Conveyance:** Runoff will be conveyed to Bio-retention areas as overland sheet flow and shallow concentrated flow. A ponding depth of 6 inches will occur before runoff overflows into the overflow structures.

- **Pretreatment:** Pretreatment for the Bio-retention zones will be provided in the form of gravel diaphragms, grass filter strips and a mulch layer on the planting beds.
- **Treatment:** Runoff entering the bio-retention zones will be treated through infiltrating the runoff into the planting soil bed. All of the bioretention areas are proposed to have underdrains installed below the planting soil bed. Calculations for determining the required water quality volume is included in Appendix H. A maximum ponding depth of six inches has been provided as well as a mulch layer on top of the planting soil bed. Criteria for the planting soil are outlined in the site plan set.

Appendix H1.2 has all of the bio-retention zone calculations. The calculations indicate the required water quality volume, required planting bed area based on the required water quality volume of the bio-retention zone. The calculation also indicates the provided water quality volume and provided filter bed area.
- **Landscaping:** A detailed landscaping plan is to be provided in the plan set.
- **Maintenance:** The bioretention area will be monitored on an annual basis and checked for sediment accumulation. In addition any areas needing to be re-mulched, dead or diseased plants will be replaced at this time. Any sediment removed from the site shall be tested for contaminants and disposed of offsite in accordance with local laws and regulations.

4.4.2 Water Quality Basin (Stormwater Ponds)

- **General Description:** Seven Water quality basins are proposed to provide water quality treatment for the proposed construction of impervious areas. The type of stormwater ponds were selected for the use due to the size of the post-development watersheds. Water quality basins #1,#3,#5 and #7 are proposed to be stormwater ponds (Type P-5), as listed in the NYSSMDM. Water quality basins #2,#4,and #6 are proposed to be stormwater ponds (Type P-3), as listed in the NYSSMDM. Channel protection volume will be achieved by low flow orifice, as an outlet, installed in the aquatic bench which will release the 1 year storm over a 24 hour period and restore post-development peak flow rates to less than pre-development rates. To meet overbank flood protection and extreme storm protection requirements the pond will provide extended detention and release post-development runoff for the 10 and 100 year storms at less than pre-development rates. The ponds will accomplish this through detaining the runoff and releasing it through an outlet structure designed to release the stormwater gradually over a period of time.

- **Practice Feasibility:** As mentioned before the water quality basin was selected for use due to the size of the post-development watersheds which will discharge into it. The stormwater pond will be lined with a clay liner if the existing soil is not capable of holding water. Each pocket pond will have an aquatic bench. The following table provides a summary of the watershed area for the proposed ponds.

Pond Drainage Areas		
Water Quality Basin (Type)	Suggested Contributing Drainage Area (Per NYSSMDM)	Actual Drainage Area
WQB #1 (P-5)	5 Ac. (Max.)	2.8 Ac.
WQB #2 (P-3)	25 Ac. (Max.)	6.2 Ac.
WQB #3 (P-5)	5 Ac. (Max.)	2.9 Ac.
WQB #4 (P-3)	25 Ac. (Max.)	6.9 Ac.
WQB #5 (P-5)	5 Ac. (Max.)	4.5 Ac.
WQB #6 (P-3)	25 Ac. (Max.)	5.6 Ac.
WQB #7 (P-5)	5 Ac. (Max.)	1.6 Ac.

All proposed stormwater ponds will be located outside of jurisdictional waters and onsite wetlands.

- **Conveyance:** The pond has been designed to have a bench on either side. The internal flow path between the forebay and the ponds drainage structure is 1.5 times the width of the pond or greater.
- **Inlet Protection:** Inlet protection for the pond will be provided in the form of a forebay for the point where concentrated flow enters the pond. The inlets into the forebay will be stabilized with rip-rap.
- **Outfall Protection:** The outfall point from the proposed pond will be stabilized with rip-rap energy dissipaters and all culvert outfalls will have flared end sections or headwalls.
- **Pretreatment:** Pretreatment of concentrated flow into the pond will be provided in the form of a forebay. The forebay will be a minimum of four feet deep and be separated from the mircopool by an earthen weir. The forebay is to be a minimum of 10% of the required water quality volume.
- **Minimum Water Quality Volume:** Runoff entering the pond will be treated through settling and biological uptake of pollutants. The table below indicates the required and provided water quality volume for the water quality basins. The provided water quality volume is the volume below the low flow orifice and volume between the low flow orifice and overflow riser for extended detention. The NYSSMDM only allows for 50% of WQV to come from extended detention.

Treatment Volumes				
Water Quality Basin (Type)	Required WQv (cubic feet)	Provided WQv (cubic feet)	% WQv In Permanent Pool (Required)	% WQv In Extended Detention (Required)
WQB #1 (P-5)	2,865	13,500	6,750 (50% Min.)	6,750 (50% Max.)
WQB #2 (P-3)	4,900	8,400	4,200 (50% Min.)	4,200 (50% Max.)
WQB #3 (P-5)	2,225	11,200	5,600 (50% Min.)	5,600 (50% Max.)
WQB #4 (P-3)	4,665	20,000	10,000 (50% Min.)	10,000 (50% Max.)
WQB #5 (P-5)	6,550	22,700	11,350 (50% Min.)	11,350 (50% Max.)
WQB #6 (P-3)	6,400	44,900	22,450 (50% Min.)	22,450 (50% Max.)
WQB #7 (P-5)	1,700	9,000	4,500 (50% Min.)	4,500 (50% Max.)
Total WQV:	29,305	129,700	64,850	64,850

- **Minimum Pond Geometry:** The water quality basins have been designed with a minimum length to width ratio of 1.5:1. The water quality basins minimum surface area to drainage area ratio is 1:100.
- **Pond Benches:** All permanent pools 4 feet or greater in depth will have a safety bench. The safety benches have been designed to extend 10-15 feet outward from the perimeter of the Water Quality Basin.
- **Landscaping Plan:** When complete the pond will be seeded with a mix of wetland species to promote a diverse habitat.
- **Pond Maintenance:** Long term maintenance schedules for the ponds have been provided in Appendix G. Included in the schedules are annual and monthly inspections to be performed for each of the ponds.

4.4.3 Rain Gardens

- **Feasibility:** Rain gardens will be used to treat rooftop runoff from the eco cabins. These practices were selected because of the relatively small contributing drainage areas and their ability to integrate well near the cabins with minimal impact on the site.
- **Conveyance:** Runoff will be conveyed to rain gardens through roof leader outlets. Overflow weirs will pass runoff out of the rain garden in the event their capacity is exceeded.
- **Pretreatment:** Pretreatment will be provided in the form of gravel rip rap at the inflow points from the roof leaders. No gravel diaphragms or grass filter strips are needed, because only roof runoff is to be discharged to the rain gardens.

- **Treatment:** Runoff entering the rain garden will be treated through infiltrating the runoff into the planting soil bed. Calculations for determining the required water quality volume is included in Appendix H. A maximum ponding depth of three inches has been provided as well as a mulch layer on top of the planting soil bed. Criteria for the planting soil are outlined in the plan set. However the Rain gardens were not modeled within the Hydrologic model. The bio-retention areas, dry swales and ponds proposed will provide the required run off reduction and water quality volume.

4.4.4 Dry Swales

- **Feasibility:** Dry swales (0-1) will be used mainly to treat road runoff from the proposed roads. The swales will be located alongside mainly alongside the roads that they are treating and were selected for this portion of the project due to the relatively level slopes and small contributing drainage areas.
- **Conveyance:** The dry swale has been designed to handle storms up to the 10-year while providing a minimum of 6" of free board. The swales will have a maximum side slope of 2:1 and typically be 12-18 inches in depth. Runoff will be conveyed to the swale as sheet flow or as shallow concentrated flow.
- **Pretreatment:** The majority of runoff will enter the swale as lateral sheet flow and be pretreated by grass filter strips. Other pretreatment will be provided in the use of rip-rap check dams.
- **Treatment:** To meet water quality requirements the dry swales will capture and infiltrate the required water quality volume through the swale floor. Overflow weirs will ensure the water quality volume is stored in the swale and infiltrated through the floor. Treated runoff will absorb into the dry swale soil and then be conveyed via underdrains to discharge downstream or to a water quality basin. Calculations for determining the required water quality volume is included in Appendix H. Calculated water quality volume is the available storage in the swale below the crest of the overflow.

SECTION 5: Inspections

5.1 Site Inspection Frequency:

The owner or operator shall have a qualified inspector conduct site inspections in conformance with the following requirements.

- When soil disturbances are ongoing inspections shall be conducted by a qualified professional at least every seven (7) calendar days.
- When soil disturbance activities have been temporarily suspended (winter shutdown etc.) and temporary stabilization measures have been applied to all disturbed areas, the qualified inspector shall conduct a site inspection at least once every thirty (30) calendar days. The owner or operator must notify the NYS DEC Regional Office in writing prior to reducing the inspection frequency.
- For sites where the soil disturbance activities have been shut down with partial project completion, the qualified inspector can stop conducting inspections if all areas disturbed as of the project shutdown date have achieved final stabilization and all post-construction stormwater management practices required for the completion of the project portion are in place and constructed in accordance with the SWPPP. The owner or operator shall notify the NYS DEC Regional Office in writing prior to the shutdown. If soil disturbance is not resumed within 2 years from the shutdown date the owner operator shall have the qualified inspector perform a final inspection to certify all disturbed areas have achieved final stabilization, and all temporary, structural erosion and sediment control measures have been removed; and all post-construction stormwater management practices have been constructed in conformance with the SWPPP by signing the “Final Stabilization” and “Post-Construction Stormwater Management Practice” certification statements on the Notice of Termination. The completed Notice of Termination shall be submitted to NYS DEC.

5.2 Site Inspection Reports:

The qualified inspector shall prepare an inspection report subsequent to each and every inspection. All Inspection reports must be signed by the qualified inspector. At a minimum, the inspection report shall include and/or address the following:

1. Date and time of inspection;

2. Name and title of person(s) performing inspection;
3. A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of the inspection;
4. A description of the condition of the runoff at all points of discharge from the construction site. This shall include identification of any discharges of sediment from the construction site. Include discharges from conveyance systems (i.e. pipes, culverts, ditches, etc.) and overland flow;
5. Identification of all erosion and sediment control practices that need repair or maintenance;
6. Identification of all erosion and sediment control practices that were not installed properly or are not functioning as designed and need to be reinstalled or replaced;
7. Description and sketch of areas that are disturbed at the time of the inspection and areas that have been stabilized (temporary and/or final) since the last inspection;
8. Current phase of construction of all post-construction stormwater management practices and identification of all construction that is not in conformance with the SWPPP and technical standards; and
9. Corrective action(s) that must be taken to install, repair, replace or maintain erosion and sediment control practices; and to correct deficiencies identified with the construction of the post-construction stormwater management practice(s).

(See Appendix B for Inspection Forms)

5.3 Corrective Actions:

Within one business day of the completion of an inspection, the qualified inspector shall notify the owner or operator and appropriate contractor (or subcontractor) of any corrective actions that need to be taken. The contractor (or subcontractor) shall begin implementing the corrective actions within one business day of this notification and shall complete the corrective actions in a reasonable time frame.

(See Appendix C for Corrective Action Log)

SECTION 6: Reporting and Retention of Records

6.1 Record Keeping:

The following documents shall be retained for a period of five (5) years from the date the site achieves final stabilization:

1. Notice of Intent
2. Notice of Intent Acknowledgment Letter
3. SWPPP
4. Reports and inspections generated during implementation of the plan
5. Notice of Termination

SECTION 7: Stabilization

7.1 Final Stabilization:

Permanent seeding will be applied immediately after the final design grades are achieved on portions of the site but no later than 14 days after construction activities have permanently ceased. Construction debris, trash and temporary BMPs (including silt fences, material storage areas, sanitary toilets, and inlet protection etc.) will also be removed and any areas disturbed during removal will be seeded immediately.

Seedbed Preparation:

1. In areas where disturbance results in subsoil being the final grade surface, topsoil will be spread over the finished area at minimum depth of 2 to 6 inches.
2. The seedbed will be free of large clods, rocks, woody debris and other objectionable materials.
3. Fertilizer and lime will be applied to the seedbed according to the manufacturer's recommendations or soil tests.
4. The top layer of soil will be loosened to a depth of 3–5 inches by raking, tilling, disking or other suitable means.

See accompanying plans for seed and application rates.

SECTION 8: Certifications

▪ Operators Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. Further, I hereby certify that the SWPPP meets all Federal, State, and local erosion and sediment control requirements. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law. "

Name (please print): _____

Title _____ Date: _____

Address: _____

Phone: _____ Email: _____

Signature: _____

▪ Qualified Professional's Credentials & Certification

" I hereby certify that I meet the criteria set forth in the General Permit to conduct site inspections for this project and that the appropriate erosion and sediment controls described in the SWPPP and as described in the following Pre-construction Site Assessment Checklist have been adequately installed or implemented, ensuring the overall preparedness of this site for the commencement of construction."

Name (please print): _____

Title _____ Date: _____

Address: _____

Phone: _____ Email: _____

Signature: _____

▪ Contractors Certification

" I certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP for the construction site identified in such SWPPP as a condition of authorization to discharge stormwater. I also understand that the operator must comply with the terms and conditions of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards"

Name (please print): _____

Title _____ Date: _____

Address: _____

Phone: _____ Email: _____

**Appendices available electronically upon request
(406 pages)**