ATTACHMENT E:

SITE DESIGN RUNOFF REDUCTION CHECKLISTS

Instructions:

Complete the Checklists for each Site Design Runoff Reduction Measure selected for incorporation in your site design. Attach only the completed checklists to this Stormwater Control Plan (SWCP).

Option 1: Soil Quality Improvement & Maintenance

This is the simplest option. Amend project soils to increase permeability and promote creation of a microbial community.

Confirm the following standard specifications are met:

- ❑ Soils for landscaping meet the following bulk identities:
  - Sands, loamy sands: <1.6
  - Sandy loams, loams: <1.4
  - Sandy clay loams, loams, clay loams: <1.4
  - Silts, silt loams: <1.3
  - Silt loams, silty clay loams: <1.1
  - Sandy clays, silty clays, some clay loams (35-45% clay): <1.1
  - Clays (>45% clay): <1.1

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Option 2: Tree Planting & Preservation

Plant and or preserve healthy established tress that include both evergreens and deciduous, as applicable. Install Environmental Sensitive Area (ESA) fencing to protect trees.

On the site plan, show:

- ❑ Location of each preserved tree/ new planted tree
- ❑ Species of each preserved tree/ new planted tree
- ❑ Diameter of each preserved tree
- ❑ ESA fencing locations
- ❑ Irrigation if applicable

Option 3: Porous/Permeable Pavement

Permeable pavements may include pervious concrete, pervious asphalt, porous pavers, crushed aggregate, open pavers with grass or plantings, open pavers with gravel, or solid pavers. Permeable paving maybe substituted for conventional pavement on parking lots or other areas with light traffic.

Show on your site plan:

- ❑ Location, extent, and types of pervious pavements.

Confirm the following standard specifications are met:

- ❑ No erodible areas drain on to permeable pavement.
- ❑ Geotechnical investigation required to identify soil infiltration rate and to design the subgrade to support the anticipated traffic load. If known soil contamination is present, infiltration is not allowed.
- ❑ When infiltrating, 10 feet of separation between bottom of bed and seasonal high water table.
- ❑ Subgrade compaction is minimal.
- ❑ Reservoir base course is of open-graded crushed stone. Base depth is adequate to retain rainfall (3 inches is adequate) and support design loads (more depth may be required).
- ❑ No subdrain is included or, if a subdrain is included, outlet elevation is a minimum of 3 inches above bottom of base course.
- ❑ Subgrade is uniform, and slopes are not so steep that subgrade is prone to erosion. Slopes of pervious pavement surface should not exceed 5% or up to 16% with underdrains. Slopes exceeding 3% typically require berms or check dams placed laterally over the soil subgrade to slow the flow of water and provide some infiltration.
- ❑ Rigid edge is provided to retain granular pavements and unit pavers.
- ❑ Solid unit pavers, if used, are set in sand or gravel with minimum 3/8-inch gaps between the pavers. Joints are filled with an open-graded aggregate free of fines.
- ❑ Permeable concrete or porous asphalt, if used, are installed by industry-certified professionals according to the vendor's recommendations.
- ❑ Selection and location of pavements incorporates *Americans with Disabilities Act* requirements (if applicable), site aesthetics, and uses.

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Option 4: Self-Retaining Area- Rooftop & Impervious Area Disconnection

Downspouts can be directed to vegetated areas adjacent to buildings or extended via pipes to reach vegetated areas further away. Paved areas can be designed with curb cuts, or without curbs, to direct flow into surrounding vegetation.

On the site plan, show:

- ❑ Each impervious area from which runoff will be directed, and its square footage.
- ❑ The vegetated areas that will receive runoff, and the approximate square footage of each.
- ❑ If necessary, explain in notes on the plan how runoff will be routed from impervious surfaces to vegetated areas.

Confirm the following standard specifications are met:

- ❑ Tributary impervious square footage in no instance exceeds twice the square footage of the receiving pervious area.
- ❑ Roof areas collect runoff and route it to the receiving pervious area via gutters and downspouts.
- ❑ Paved areas are sloped so drainage is routed to the receiving pervious area.
- ❑ Runoff is dispersed across the vegetated area and energy dissipator is installed at downspout to avoid erosion and promote infiltration.
- ❑ Vegetated area has amended soils, vegetation, and irrigation if needed to maintain soil stability and permeability.
- ❑ Any drain inlets within the vegetated area allow for a maximum of 3 inches of ponding.
- ❑ Area of rooftop connecting to each downspout is 600 SF or less.
- ❑ The maximum contributing impervious flow path is less than 75 ft *OR* if ≥ 75 ft, then storage device is implemented to achieve required disconnection length.
- ❑ The impervious area to any one discharge location is less than 5,000 SF.
- ❑ Complete and Attach to this SWCP:
- ❑ ***Self-Treating Area Calculations Worksheet*** – found at the end of this Attachment.

Option 5: Self-Retaining Area- Vegetated Swale

This option includes vegetated shallow channels that collect and slowly convey runoff to downstream discharge points.

Show on your site plan:

- ❑ Location and impervious area that will drain into swale.

Confirm the following standard specifications are met:

- ❑ Vegetated side slopes at 2H:1V max slope. Mowed turf swales at 3H:1V max.
- ❑ Grass height 4"-6". Do not install trees if liner is present.
- ❑ Swale divider required for bottom widths > 10'. Min. required bottom width is 2' excluding width of low flow channel. Max. bottom width with divider is 16'.
- ❑ Depth of flow for water quality treatment must not exceed 2/3 of the grass height and not greater than 3" (infrequently mowed) or 2" (frequently mowed).
- ❑ Perforation pipe should have perforations set at 120 degrees and perforation slots should be pointed down.
- ❑ If no underdrain, low flow drain shall extend entire length of swale and shall have a depth of 6" minimum and width no more than 5% swale bottom width. If used, anchored plate flow spreader shall have v-notches (maximum top width 5% of swale width) or holes to allow preferential exit of low flows.
- ❑ Install check dams or grade control structures for slopes >6% at 50" max spacing to achieve a max effective longitudinal slope of 6%. Flow spreaders must be provided at inlet and at base of each check dam.
- ❑ Install energy dissipator at the inlet.
- ❑ Swale length shall be 100' or length required to provide 10 minutes residence time, whichever is greater.
- ❑ Tributary impervious square footage in no instance exceeds twice the square footage of the receiving pervious area.
- ❑ Install appropriate outlet structure to accommodate low flow channel and/or underdrain, if present.
- ❑ Amend soils with 2" compost tilled into 6" of native soil unless native soil organic content is >10%.
- ❑ Maximum flow velocity for the runoff from the design storm event is less than or equal to 1.0 ft per second.
- ❑ 10-ft setback from foundations, 100-ft from septic fields and water supply wells, and 50-ft from steep slopes.
- ❑ BMP footprint is approximately 10-20% of the drainage area, drainage area less than 2 acres.

Complete and Attach to this SWCP:

- ❑ ***Self-Treating Area Calculations Worksheet*** – found at the end of this Attachment.

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Option 6: Green Roof

Installing a vegetative layer on a roof can reduce the impervious coverage of the project.

Show on your site plan:

- ❑ Location and area of green roof that is impervious.
- ❑ Confirm the following standard specifications are met:
- ❑ Roof slope less than 15% OR has grid to hold the substrate in place until it forms a thick vegetation mat.
- ❑ PE has assessed the necessary load reserved and designed a roof structure to meet state and local needs.
- ❑ Include irrigation plan, if necessary to sustain the green roof during extended dry periods.
- ❑ Incorporate watertight liner to prevent rainwater from intruding the underlying structure.

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Option 7: Rain Barrels and Cisterns

Use of cisterns or rain barrels to comply with this requirement is subject to municipality approval. Planning and Building Permits may be required from other agencies.

Show on your site plan:

- ❑ Impervious areas tributary to each cistern or rain barrel.
- ❑ Location of each cistern or rain barrel.

Confirm the following standard specifications are met:

- ❑ Rain barrels are sited at grade on a sound and level surface at or near gutter downspouts.
- ❑ Gutters tributary to rain barrels are screened with a leaf guard or maximum ½-inch to ¼-inch-minimum corrosion-resistant metallic hardware fabric.
- ❑ Water collected will be used for irrigation only.
- ❑ Openings are screened with a corrosion-resistant metallic fine mesh (1/16-inch or smaller) to prevent mosquito harborage.
- ❑ Large openings are secured to prevent entry by children.
- ❑ Rain barrels and gutters are to be cleaned annually.
- ❑ The local *mosquito and vector control* district is informed of the installation. The district will be provided additional information and/or rights of entry if they request.

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Option 8: Stream Setbacks and Buffers

A stream buffer is a vegetated area that exists or is established to protect a stream system, lake reservoir or coastal estuarine area.

Show on your site plan:

- ❑ Location of water body in proximity to project.
- ❑ Area of impervious area that will drain into a stream buffer.

Confirm the following standard specifications are met:

- ❑ Runoff from project enters flood prone width as sheet flow or within 500 ft of a stream channel as sheet flow (whichever is larger).
- ❑ Contributing overland slope is 5% or less *OR* if greater than 5% then a level spreader is used.
- ❑ The buffer area is protected from vehicle or other traffic barriers to reduce compaction.
  Stream buffer will be maintained in an ungraded and uncompacted condition and vegetation will be maintained in a natural condition.

Self-Retaining Area Calculations Worksheet

Self-retaining areas are pervious areas that retain rainfall on itself and runoff from an adjacent impervious area, up to a maximum 2:1 ratio (impervious: pervious). The entire self-retaining area must be designed to retain an inch of rainfall without flowing off-site. Drains, if any, should be set to allow a maximum of 3" of ponding.

Sizing calculations for self-retaining areas use a runoff coefficient to determine the amount of contributing runoff from different surfaces. Use the table below to determine the runoff coefficient for the impervious area contributing runoff to the self-retaining area. Then complete the calculations table below to determine the sizing criteria for each drainage management area using self-retaining areas to treat stormwater.

Estimated Runoff Coefficient for Surfaces During Small Storms	
Type of Surface Contributing Run-Off	**Runoff Coefficient [A]**
Roofs	.90
Concrete or Asphalt	
Stone, Brick, or Concrete Pavers with mortared or sand joints and bedding	
Grass	.10
Permeable Pavement	
Crushed Aggregate	

Worksheet next page

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Self-Retaining Area Calculations Worksheet

Project Title/ Number/ & Design Unit	DMA ID (as referred to on drawings)	Total Drainage Management Area (SF)	Post Project Imperv. Surface Type	Runoff Coefficient [A]	Impervious Surface Area (SF) [B]	Contributing Runoff (SF) [C] = [A] x [B]	Receiving Pervious Self-Retaining Area (SF) [D]	Ratio [C]: [D]	Meets requirement of max. 2:1, impervious to pervious?
									☐ Yes ☐ No
									☐ Yes ☐ No
									☐ Yes ☐ No
									☐ Yes ☐ No
									☐ Yes ☐ No
									☐ Yes ☐ No