



# **STORMWATER MANAGEMENT FACILITY** **POST CONSTRUCTION VERIFICATION** **CHECKLIST**

## **Standard Submittal Requirements**

- A completed BMP Construction Review Checklist
- Post Construction verification (As-Built) survey plan in accordance with the items of this Checklist
- Supporting calculations in accordance with the items of this Checklist
- General narrative stating the design plans used to verify as-built compliance (i.e., “Plan Title, Revision A”, Approved 3/23/2023) and what deviations, if any, were found. Be advised that facilities not constructed per the approved plans (i.e., lowest point at top of bank below design) will require either remediation or approved plan revision prior to as-built review.
- Geotechnical engineer’s report, if applicable (Liner installation, Embankment construction, Fill depths, Confirmatory testing)

## **Post Construction Verification Document (PCVD) As-Built Plan Requirements**

### All Plans:

- Plans must be submitted on (1) copy: 24” x 36” sheet(s) and PDF.
- Provide an accurate location map of the BMP on the plan (BMP’s in proximity to nearest road intersection)
- Provide a north arrow on the plan.
- Plan view to consist of PCVD data & contours labeled in red, design contours labeled grey for reference. (All pre-development site grades to be removed for clarity).
- Facility Summary Block to include the following information:
  - Design stage/storage (black),
  - Post Construction stage/storage (red),
  - Total Acres Treated by BMP,
  - Impervious Acres Treated by BMP,
  - Facility Latitude/Longitude in decimal degree format (xx.xxx, -xx.xxx).
- Responsible party for facility maintenance. (Contact information: Name, Title, address, email & phone number)
- Provide all applicable BMP O&M notes including the scheduled inspection intervals.

### The title block must include:

- Project name indicating “Post Construction Verification Document” in the plan title
- Name, address, telephone and fax numbers of the individual preparing the plan
- Scale of plan (maximum plan scale accepted will be 1”=50’)
- Date of the survey
- Hundred, County, and State
- Street address of the project site
- Signature and seal of Delaware Registered Professional Engineer or Professional Land



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Delineate and properly label the following (as applicable):

- Roads adjoining the stormwater management facility
- Property lines adjacent to the stormwater management facility
- Easements (i.e. drainage, utility, access, etc.) adjacent to the stormwater management facility
- Vegetated perimeter around the wetland area

Provide the following as it relates to the BMP's surface area and available storage (**Wet, Dry & Infiltration Facilities**):

- Surveyed contours of the constructed stormwater management pond shown in red, including but not limited to forebays, micropools and elevations below permanent pool at 1- or 2-foot intervals based on the datum of the approved plan. *(One-foot contours will generally be expected. For sites with elevation differences (+20' across the site) 2-foot contours will be accepted.)*
- Pond bottom elevations on a fifty-foot grid with high and low points noted.
- A minimum of two actual cross sections showing elevations, inside slopes, benching, top width and backslope, as applicable (to scale) in red overlaid on the design cross section in black. Cross sections should be taken through inlet and outlet structures/spillway as applicable.
- Lowest top of bank elevation at fill for embankment/combination pond or lowest top of bank elevation for excavated pond \*\*\*The constructed top of bank elevation may be no lower than the design elevation for top of bank.
- Provide design storm elevations within facilities.
- Provide elevation of permanent pool (during survey and as designed), if applicable.
- Provide design and constructed forebay volume.
- Provide a calculations table with the volume of the constructed pond incremental storage and cumulative storage volumes in red (volumes measured in cubic feet for each one-foot elevation contour) along with the design incremental storage and cumulative storage volumes in black and variances in percentage. \*\*\*The constructed volume of the constructed wetland storage shall be no less than 90% of the design volume.

Provide the following as it relates to the **Bioretention and Wetland Facilities** surface area and available storage:

- Surveyed contours of the constructed wetland facility, including any forebays, at 1-foot intervals.
- A minimum of two cross sections showing elevations, inside slopes, top width and backslope, as applicable (to scale) in red overlaid on the design cross section in black. Cross sections should be taken through inlet and outlet structures/spillway as applicable.
- Lowest top of bank elevation \*\*\*The constructed top of bank elevation may be no lower than the design elevation for top of bank.



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- Water elevations within facilities, if applicable. *(Note if none present during survey)*
- Provide a calculations table of wetland surface area(s).
- Provide a calculations table of the volume of the wetland zones with incremental and cumulative storage volumes (volumes measured in cubic feet for each one-foot elevation contour) along with the design incremental and cumulative storage volumes. *\*\*\*The constructed volume of the constructed wetland storage shall be no less than 90% of the design volume.*

Provide the following as it relates to the **Underground Storage Facilities** surface area and available storage:

- Grate and invert elevations of all structures. *\*\*\*Grate and invert elevations of all structures, including weirs, shall be within 0.15 foot of the design.*
- Invert and diameter of all pipes or chambers within underground storage system that is accessible following construction. *\*\*\*Diameter of all pipes or dimensions of chambers within the underground facility shall be as shown on the plan.*
- Dimensions of any weirs within underground structures. *\*\*\*Dimension of any weirs shall be within 10% of the design.*

Provide the following as it relates to the **Infiltration Facilities**:

- Provide Confirmatory Infiltration Testing per BMP Standards and Specifications, Appendix A-Soil Investigation Procedures *\*\*\*The measured rate in native soils at design bottom shall be no less than 150% of the design rate.*
- Provide Hand Auger testing to verify separation of facility's bottom from groundwater per BMP Standards and Specifications, Appendix A-Soil Investigation Procedures *\*\*\*Depth to limiting layer shall be no less than 2' from facility bottom.*

Provide the following as it relates to the **Permeable Pavement** surface area and available storage:

- Surveyed contours of the constructed wetland facility, including any forebays, at 1-foot intervals. *\*\*\*Contributing Drainage Area shall be no greater than the designed contributing area.*
- A minimum of two cross sections showing elevations and slopes (to scale) in red overlaid on the design cross section in black. Cross sections should be taken through outlet structures as applicable.
- Provide calculations of the permeable pavement surface area. *\*\*\*The constructed area of the permeable pavement surface shall be no less than the design surface area.*
- Provide a calculations table with the volume capacity of the constructed permeable pavement incremental storage and cumulative storage volumes in red (volumes measured in cubic feet for each one-foot elevation contour) along with the design incremental storage and cumulative storage volumes in black and variances in percentage. *\*\*\*The constructed volume of the constructed wetland storage shall be no less than 90% of the design volume.*



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Provide the following as it relates to the **Vegetated Channel's slope and cross section**. *\*\*\*The constructed slope, bottom width, depth and length of the vegetated channel shall be within 90% of the design geometrics for these parameters:*

- Spot elevations of top of bank, bottom of bank and centerline of the vegetated channel every 25 feet throughout the length of the channel.
- Additional spot elevations that demonstrate downstream drainage beyond the end of the vegetated channel.
- Cross sections of the vegetated channel at midpoint.
- Photo documentation of the vegetated channel depicting the channel bottom width and verification of achievement of the required 90% vegetated cover.

Provide the following as it relates to the **Vegetated Filter Strip's or Open Space**:

- Dimensions of Vegetated Filter Strips (length and width) *\*\*\*Length and width shall be no less than 90% of the design geometrics.*
- Area of Vegetated Open Space. *\*\*\*Length and width shall be no less than 90% of the design geometrics.*
- Cross-slope. *\*\*\*Slope shall be no greater than 2% steeper than design slope.*
- Elevations of any structural component, such as gravel diaphragms or engineered level spreaders. *\*\*\*Elevations of any structural components shall be within 0.15 feet of design elevation.*
- Photo documentation of the grassed filter strip or grassed open space providing verification of achievement of the required 90% vegetated cover.

Provide the following as it relates to the structural elevations and dimensions of the **Sand Filter**:

- Chamber dimensions of sedimentation (wet) chamber and filtration (sand) chamber. If modular units are used, chamber dimensions must be provided for all units. *\*\*\*The constructed surface area of the filter bed shall be no less than 90% of the design surface area.*
- Grate elevations at all four corners of the sand filter. If modular units are used, provide corner elevations of each modular unit. *\*\*\*The constructed surface area of the filter bed shall be no less than 90% of the design surface area.*
- Internal weir elevations between the two chambers. *\*\*\*The constructed elevation of any structure shall be within 0.115-feet of the design.*
- Water surface elevation in the sedimentation chamber.
- Sand surface elevation in the filtration chamber. *\*\*\*Depth of filter media shall be no less than 12 inches.*
- Overflow catch basin dimensions, grate elevation and invert elevation.

Provide the following as it relates to the **Afforested** surface area:

- Post construction surveyed contours of the planted area. *\*\*\*The proposed Afforestation area shall be upland.*
- A minimum of two cross sections through Afforestation area showing elevations (to scale) in red.
- Dimensions of the Afforestation area. *\*\*\*The planted Afforestation area shall be a minimum of 10,000 sf with a minimum width of 50 feet.*



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Provide the following as it relates to the planting density (mortality) within the **Afforested area**:

- Estimated number of combined live, planted or volunteer trees per 500,000 sf (6" diameter or greater.)
- Time span since initial planting.

*aaa* When the allowable tolerances are exceeded for afforestation area, supplemental actions must be taken to meet the design requirements. Submit the following:

- Perform reinforcement planting the first Spring if survival rate falls below 65%
- Calculations demonstrating that the design requirements have been met in the constructed condition.

Provide the following information related to the **inlet and outlet structures**. *\*\*\*The constructed elevation of any structure shall be within 0.15 foot of the design:*

- Diameter and material of all inlet and outlet pipes
- Invert elevations of all inlet and outlet pipes
- Dimensions (length, width, depth, d50) for all areas of rock outlet protection
- Dimensions and material of overflow structures
- Profile through principal spillway showing inverts and dimensions of all pipes, weirs, risers and other appurtenances, as applicable (to scale)
- Cross-section of emergency spillway (to scale)
- Profile through emergency spillway (to scale)

*\*\*\**When the allowable tolerances are exceeded for pond surface area or volume or structure elevations, supplemental calculations must be submitted to the approval agency to determine if the facility, as constructed, meets the design requirements. Submit the following:

- Calculations of outflow from the facility for all design storms. Routing computations must be based on the construction volumes and elevations of the facility.
- Calculations demonstrating that the design requirements have been met in the constructed condition.