APPENDIX B

Teegarden Park BMP Preliminary Design
Post-Construction Stormwater Management / Erosion & Sedimentation Control Plan

November 6, 2009

Teegarden Park
Stormwater BMP Plan

Tredyffrin Township,
Chester County,
Pennsylvania

Prepared For:

Tredyffrin Township
1100 Duportail Road
Berwyn, PA 19312

Project Number: 2007-2196-00
TABLE OF CONTENTS

I. INTRODUCTION [102.4(b)(3)]......................................................... 1
II. PROJECT SITE TOPOGRAPHY [102.4 (b)(5)(i)] ........................................ 2
III. SOIL FEATURES [102.4(b)(5)(ii)] ...................................................... 2
IV. PROJECT CHARACTERISTICS – LAND USE [102.4 (b)(5)(iii)] .................. 3
V. RUNOFF AND STORMWATER [102.4(b)(5)(iv)] ..................................... 3
VI. RECEIVING WATERS [102.4(b)(5)(v)] .................................................. 4
VII. BEST MANAGEMENT PRACTICES [102.4(b)(5)(vi)] ................................ 4
    A. Temporary Control Measures ...................................................... 4
    B. Permanent Control Measures ...................................................... 5
VIII. SEQUENCE OF CONSTRUCTION ACTIVITIES [102.4(b)(5)(vii)] ............... 7
IX. SUPPORTING CALCULATIONS [102.4(b)(5)(viii)] .................................. 7
X. PLAN DRAWINGS [102.4(b)(5)(ix)] .................................................. 7
XI. MAINTENANCE PROGRAM [102.4(b)(5)(x)] ......................................... 7
XII. WASTE RECYCLING AND DISPOSAL [102.4(b)(5)(xi)] .......................... 8

APPENDICES

Appendix I – Figures
    Figure 1 – Soils Map
    Figure 2 – Table C-1 Tredyffrin Township Runoff Curve Numbers
    Figure 3 – Table C-2 Tredyffrin Township Rational Runoff Coefficients

Appendix II – Worksheets
    Preparer’s Qualifications
    Standard Worksheet #2 – Fabric Filter Fence
    Standard Worksheet #3 - Fabric Filter Fence
    Compost Filter Sock Worksheet
    Standard Worksheet #7 – Stabilization Specifications
    Slope Matting Calculations

Appendix III – Stormwater Runoff and Pipe Calculations

Appendix IV – NPDES Calculation and Environmental Testing

Appendix IV – Plan Sheets (Included under separate cover)
I. INTRODUCTION [102.4(b)(3)]

This narrative is part of the combined Post Construction Stormwater Management and Erosion and Sediment Pollution Control Plan for the construction of two new stormwater management facilities incorporating stormwater best management practices (BMPs) at the Teegarden Township Park. The Park is located south of SR202, situated between the roads of Contention Lane, Winston Way and Hickory Lane in Tredyffrin Township, Chester County, Pennsylvania.

The Park is a community park featuring multiple grassed athletic fields and hard court surfaces, playground areas, walking paths and social gathering areas. There is a paved parking area located off of the end of Old State Road. There is a gas pipe line located on the south side of the property as well as overhead electrical lines running through the center of the park. The site is mostly comprised of pervious surfaces. There are trees and shrubs located throughout the park but the majority of the park is maintained grassed lawns surfaces. There is minimal stormwater conveyances located throughout the park. The majority of the site’s discharge is through sheetflow to the surrounding properties or stream to the south.

Currently there are no stormwater management controls at the site to address water quality, rate control, or volume control. This project proposes constructing two BMPs. One designed to infiltrate stormwater runoff from a paved impervious parking lot and the other to attenuate stormwater runoff from a grassed lawn. Both facilities will be constructed to handle, at a minimum, the 2-year storm runoff. (As most of the precipitation that occurs over the course of a year occurs in many events of small increments, designing these BMPs to better manage the smaller events will ensure that a majority of the annual precipitation that falls on the site is treated before it is released to the downstream environment.) The constructed facilities will not create any new concentrated discharge points.

The stormwater BMPs proposed for the site can be one of the following categories.

- Bioretention – A rain garden with native vegetation is proposed to reduce stormwater runoff volume, filter pollutants, infiltrate stormwater runoff, reduce stormwater temperature impacts, enhance evapotranspiration, enhance aesthetics and provide habitat. The proposed facility is on the east of the park, adjacent to Contention Lane, between the PPL electrical towers.
- Underground Detention/Infiltration – Subsurface stone chambers which detain and infiltrate stormwater runoff. This subsurface structure is proposed for placement under a portion of the existing parking lot off of Old State Road.
- Porous Pavement/Impervious Surface Reduction – Replacement of existing pavement with a porous pavement that will allow stormwater runoff to infiltrate to the proposed underground facility.
- Water Quality Insert – Proprietary devices manufactured to be placed in an inlet to remove suspended solids, oils and other nonpoint source pollutants from stormwater runoff. A proposed inlet on the east side of the parking lot will be constructed with this device.
This project proposes creating no new impervious surface or increasing the amount of post construction stormwater runoff. The total earth disturbance area to construct all of the proposed improvements is anticipated to be 0.89 acres. Other than converting the existing impervious parking lot to a pervious parking surface, this project proposes no change to the land use at the site.

This document and associated drawings were prepared in accordance with procedures outlined in the *Erosion and Sediment Pollution Control Program Manual* (Pennsylvania Department of Environmental Protection, Bureau of Water Quality Protection, Division of Waterways, Wetlands and Erosion Control, March 2000). Preparer Qualification Worksheets are included in the Appendix of this report.

II. PROJECT SITE TOPOGRAPHY [102.4 (b)(5)(i)]

The project site is located at the Teegarden Park in Tredyffrin Township, Chester County. The surrounding area is developed and comprised mostly of residential lots. The land cover for the park and surrounding areas is mainly suburban lawns with some trees and shrubbery. The existing topography consists of slopes generally ranging between 3 and 35 percent.

III. SOIL FEATURES [102.4(b)(5)(ii)]

According to the *USDA Soil Survey of Chester County, Pennsylvania*, the following soil groups are contained within the project site:

**Hatboro Silt Loam (Ha)** 0-3% slopes  
This well drained soil is found on hills and hillsides. Permeability is moderate high. Available water capacity is low. In unlimed areas, reaction is very strongly acidic throughout. Surface runoff is slow to medium. This soil is somewhat limited for nonfarm uses by slow permeability in the subsoil.

**Hollinger Silt Loam (HIC)** 8-15% slopes  
This well drained soil is found on hills. Permeability is slow. Available water capacity is moderate. In unlimed areas, reaction is low acid throughout. Surface runoff is slow. This soil is somewhat limited for nonfarm uses by slow permeability.

**Holly Silt Loam (Ho)**  
This poor drained soil is found on hills and flood plains. Permeability is very slow. Available water capacity is high. Surface runoff is high. Erosion hazard is slight. Acidity ranges from extremely acidic to very strongly acid throughout.

A soil map is presented in Appendix I, Figure 1. Hatboro and Holly are soils listed as having a hydric component according to *USDA*. A wetland delineation was not performed on the site. No wetlands will be impacted by this project.
IV. PROJECT CHARACTERISTICS – LAND USE [102.4 (b)(5)(iii)]

The purpose of this project, which is funded by a Pennsylvania Department of Environmental Protection Growing Greener Grant, is to improve water quality of stormwater runoff from the site. This project proposes no new impervious land cover and, as a result, does not increase the stormwater runoff from the site. It is the intent of this project to construct stormwater BMPs to better manage the 2-year storm runoff and thus provide better management of the total annual precipitation falling on the site.

V. RUNOFF AND STORMWATER [102.4(b)(5)(iv)]

The site is located in the Darby Creek Act 167 Stormwater Management Plan. However, because the site proposes no additional impervious area and does not cause an increase in the runoff potential, the standards and criteria in the Darby Creek ACT 167 or Tredyffrin Township Stormwater Ordinance do not apply to the project. Instead it is the objective of this project to install several BMPs as demonstration projects to improve the way stormwater management is currently being performed at the site. Presently, most of the existing offsite drainage areas are either conveyed around the site, over the site through sheet flow or through the site via existing stormwater conveyances. This project does not propose to modify or alter any of the existing means of conveyance.

All of the on-site drainage areas to the various BMPs are less than 1 acre; stormwater runoff from the site was calculated using the Modified Rational Method (Dekalb) with a time of concentration of 5 minutes. The 100-year design flow was used to size the overflow structures and piping for the rain gardens and subsurface infiltration facility. Rational Coefficient Calculations were based on values from the Tredyffrin Township Stormwater Ordinance No. HR-375, Appendix C, Table C-2.

The rain gardens and subsurface infiltration basin were designed to manage 2-year storm runoff. Refer to Table 1 below for rain garden and subsurface infiltration basin details.

<table>
<thead>
<tr>
<th>BMP ID</th>
<th>Rain Garden</th>
<th>Subsurface Infiltration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drainage Area (sf)</td>
<td>42,427</td>
<td>22,433</td>
</tr>
<tr>
<td>Targeted Design Volume (2-yr storm event) (cf)</td>
<td>2,838</td>
<td>1,293</td>
</tr>
<tr>
<td>Basin Bottom Elevation (ft)</td>
<td>Varies</td>
<td>Varies</td>
</tr>
<tr>
<td>Maximum Ponding Depth (ft)</td>
<td>0.5-2 feet</td>
<td>2.5-3.5 feet</td>
</tr>
<tr>
<td>Storage Volume Provided (cf)</td>
<td>4420 Max.</td>
<td>5154 Max.</td>
</tr>
</tbody>
</table>

The rain garden will be constructed to the east of the site, between the two electrical towers adjacent to Contention Way Road. The rain garden will be excavated and berms will be embanked to construct a natural environment for native vegetation and wildlife to live. The surface storage depths will range from 6 inches to one foot. The lower rain garden will discharge into two inlets. Both inlets will connect to the existing road side drainage system. A small yard drain will be located to the west of the berm along the lower rain garden and will be connected to
one of the proposed inlets. The yard drain will serve as outlet for any runoff which might accumulate outside of the rain garden around the electrical tower. The rain gardens’ sizes have been maximized to accommodate the contributing drainage area’s 2-year runoff volume.

A subsurface storage area, located on the eastern side of the parking lot, is proposed and designed to receive runoff from the adjacent lawn and parking lot itself. The size of the proposed subsurface storage chamber is approximately 60’ wide by 120’ long. There are four “bays” within the subsurface infiltration facility. Each bay’s “floor” will measure 15’ wide by 60’ long. The bays will have varying depths and will be filled with AASHTO #3 course aggregate. The aggregate bed will have a 40 percent void volume and will be capable of storing and infiltrating the 2-year storm runoff. The discharge from the facility will exit the system through an outlet structure (inlet). A 12” diameter pipe will convey the water to a level spreader.

The net reduction in stormwater storage for both of the BMPs is shown in Table 2.

<table>
<thead>
<tr>
<th>BMP</th>
<th>Reduction in Stormwater Runoff Volume (cf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rain Garden</td>
<td>4420</td>
</tr>
<tr>
<td>Porous Pavement</td>
<td>5154</td>
</tr>
<tr>
<td>Total Reduction</td>
<td>9574</td>
</tr>
</tbody>
</table>

Detailed storage volume and pipe sizing calculations are provided in the Appendix of the report.

VI. RECEIVING WATERS [102.4(b)(5)(v)]

The project area discharges to the existing conveyance systems around the property and also sheetflows to a tributary creek of Trout Creek. The creek is a tributary to Trout Creek and is designated by Chapter 93 of Title 25 of the Pennsylvania Code as a Warm Water Fishery (WWF) and a Migratory Fishery (MF).

VII. BEST MANAGEMENT PRACTICES [102.4(b)(5)(vi)]

A. Temporary Control Measures

Temporary control measures include rock construction entrance, inlet protection, fabric filter fence, temporary seeding and, potentially, sediment filter bags if required to dewater an excavation. Use of the sediment filter bags is not anticipated and is only cited in the event it is needed by the contractor to dewater a work area. Standard worksheets and details are included in the Appendix of this report. The General Notes and Trenching Notes are included on the plan to clarify proper installation and implementation of the Erosion and Sediment Pollution Control Plan for this project.
B. **Permanent Control Measures**

Permanent control for long term protection shall be accomplished primarily by vegetative cover. All disturbed areas within the confines of the limit of disturbance shall be seeded or landscaped immediately after final grading is performed. Areas to be seeded will receive topsoil, lime, fertilizer and seed conforming to PennDOT Publication 408, Formula B. Areas within the rain gardens will receive plantings, mulch, and a meadow seed mix. No fertilizer is to be used in planting the meadow seed mix. Mulch is to be used as necessary for protection until seeding is established.

Since, there is no land use change; there is no required Post Construction Stormwater (PCSM) BMPs for this project. All proposed PCSM BMPs are optional and are intended to enhance the existing stormwater runoff that is presently occurring at the site.

**General Notes**

1. A copy of the approved erosion and sediment control plan must be available at the project site at all times.
2. At least three (3) days before starting any earth disturbance activities, all contractors involved in earth disturbance activities shall notify the Pennsylvania One Call System incorporated at 1-800-242-1776 for buried utility locations.
3. Stockpile heights must not exceed 35 feet. Stockpile slopes must be 2:1 or flatter. Stockpile Material shall be placed in designated stock pile locations as indicated on Plan Drawings.
4. The operator shall assure that the approved erosion and sediment control plan is properly and completely implemented.
5. Immediately upon discovering unforeseen circumstances posing the potential for accelerated erosion and/or sediment pollution, the operator shall implement appropriate best management practices to eliminate the potential for accelerated erosion and/or sediment pollution.
6. All pumping of sediment laden water shall be through a sediment control BMP (Best Management Practice), such as a pumped water filter bag, discharging over non-disturbed well vegetated areas.
7. Only limited disturbance will be permitted to provide access to sedimentation trap and filter fence for grading and acquiring borrow to construct those BMPs.
8. Erosion and sediment BMPs must be constructed, stabilized, and functional before site disturbance begins within the tributary areas of those BMPs.
9. After final site stabilization has been achieved, temporary erosion and sediment BMPs must be removed. Areas disturbed during removal of the BMPs must be stabilized immediately.
10. All earth disturbance activities shall proceed in accordance with the sequence of construction. Each stage shall be completed before any following stage is initiated. Clearing and grubbing shall be limited only to those areas described in each stage.
11. Upon installation of the temporary sediment basin riser(s), an immediate
inspection of the riser(s) shall be conducted by a qualified site representative and Chester County Conservation District shall be notified in writing that riser is sealed.

12. Upon completion or temporary cessation of earth disturbance, or any stage or phase thereof, the project site shall be immediately stabilized.

13. Sediment traps must be protected from unauthorized acts of third parties.

14. Hay or straw mulch must be applied at 3.0 tons per acre.

15. All slopes steeper than 3:1 shall receive erosion control netting or blankets over seed and mulch.

16. Straw mulch shall be applied in long strands, not chopped or finely broken.

17. Until the site is stabilized, all erosion and sediment BMPs must be maintained properly. Maintenance must include inspection of all erosion and sediment control BMPs after each runoff event and at least on a weekly basis. All preventative and remedial maintenance work, including clean out, repair, replacement, regarding, reseeding, remulching, and renetting, must be performed immediately. If erosion and sediment control BMPs fail to perform as expected, replacement BMPs, or modifications of those installed will be required. Contact Chester County Conservation District and the site engineer for guidance.

18. An area shall be considered stabilized when it has a minimum uniform 70% perennial vegetative cover or other permanent non-vegetative cover with a density sufficient to resist accelerated surface erosion and subsurface characteristics sufficient to resist sliding and other movements.

The following notes have been added to the plan to clarify how to construct the bioretention areas:

**Bioretention/Rain Garden General Notes:**

1. Existing sub-grade in Bioretention areas shall not be compacted or subject to excessive construction equipment traffic.

2. Initial excavation can be performed with heavy equipment during rough site grading but shall not be carried to within one feet of the final bottom elevation. Final excavation should not take place until all disturbed areas in the drainage area have been stabilized.

3. Where erosion of sub-grade has caused accumulation of fine materials and/or surface ponding in the graded bottom, this material shall be removed with light equipment and the underlying soils scarified to a minimum depth of 6 inches with a York rake or equivalent by light tractor.

4. Bring sub-grade of bioretention area to line, grade, and elevations indicated. Fill and lightly regrade any areas damaged by erosion, ponding, or traffic compaction. All bioretention areas shall be level grade on the bottom.

5. Halt excavation and notify engineer immediately if evidence of sinkhole activity or pinnacles of carbonate bedrock are encountered in the bioretention area.

6. Amended soils shall be placed on the bottom of the bioretention area to the specified depth. Planting soil shall be placed immediately after final excavation of sub-grade
preparation/bed installation. Any accumulation of debris or sediment that takes place after approval of sub-grade shall be removed prior to installation of planting soil.

7. Install planting soil in 18-inch maximum lifts and lightly compact (tamp with backhoe bucket or by hand). Keep equipment movement over planting soil to a minimum - do not over compact. Install planting soil to grades indicated on the drawings.

8. Plant bottom of bioretention areas with Ernst conservation seed mix ERN MX-120 at an application rate of 15 pounds per acre. Seeding shall be applied to the specified areas and soils amendments added per suppliers recommendations.

9. Plant trees and shrubs as noted on plans according to supplier’s recommendations and only from mid-March through the end of June or from mid-September through mid-November.

10. Install 3” shredded hardwood mulch (minimum age 6 months) or compost mulch evenly in areas not planted with vegetation. Do not apply mulch in areas where ground cover is to be grass or where cover will be established by seeding.

11. Protect bioretention areas from accumulation of large amounts of sediment at all times during construction by diverting large tributary areas of off-site flow around the proposed bioretention areas.

12. Water all proposed vegetation at the end of each day for two weeks after planting is completed.

13. Contractor shall provide a one-year 80% care and replacement warranty for all planting beginning after installation and inspection of all plants.

VIII. SEQUENCE OF CONSTRUCTION ACTIVITIES [102.4(b)(5)(vii)]

See Plan Sheets for Construction Sequence.

IX. SUPPORTING CALCULATIONS [102.4(b)(5)(viii)]

Worksheets and calculations are included in the Appendix of this report.

X. PLAN DRAWINGS [102.4(b)(5)(ix)]

Plan drawings are attached.

XI. MAINTENANCE PROGRAM [102.4(b)(5)(x)]

The contractor is required to incorporate all temporary and permanent control measures and facilities indicated in the approved Plan into the project at the earliest practicable time. The contractor is responsible for applying, cleaning, and maintaining all control features during construction. Appropriate erosion and sediment pollution control features shall be applied to sections such as borrow pits and material storage areas unforeseen prior to construction. Permanent erosion control facilities will be maintained by the owner.

The temporary facilities for erosion and sediment pollution control shall be inspected a minimum of once per week and after every rainfall event. Sediment shall be removed when accumulations reach half the above ground height of filter fabric fences and rock filters. As construction
progresses and disturbed areas have been stabilized, temporary erosion control structures are to be cleaned and removed.

When site grading is completed, turf must be established and maintained on all disturbed areas. After installation, the turf shall be inspected weekly until 70% vegetative cover is established. Slope blankets shall be checked for tears and unraveling, and the blanket edges shall be inspected for proper anchoring and overlapping. Necessary repairs and re-seeding shall be performed immediately. The turf grass shall be mowed or trimmed as necessary to maintain 6-inch height. The wildflower/meadow areas will be maintained with minimal cuttings in the first two years. Removal of pervasive weeds is imperative. After the third season, an initial seasonal cut in mid spring is all the maintenance needed. Refer to detail sheet for landscape and bioretention details.

Permanently seeded areas should be inspected for failure. If less than 70% of the disturbed area is covered by established vegetation, re-evaluate the choice of plant materials and the quantities used. Re-establish the stand after the seedbed is prepared. If the season prevents re-sowing, mulch or erosion netting is an effective temporary cover.

XII. WASTE RECYCLING AND DISPOSAL [102.4(b)(5)(xi)]

All suitable accumulated sediment will be incorporated into the fill and reused on-site. Unsuitable material will be removed from the site and disposed of in a lawful manner according to the PA Department of Environmental Protection’s Solid Waste Management Regulations (PA Code Title 25, Chapter 260.1 et seq, 271.1 et seq. and 287.1 et seq). The disposal site must have a separate erosion control plan and must be approved by the engineer and the Chester County Conservation District.
APPENDICES
Appendix I – Figures

Figure 1: Soils Map

Figure 2: Table C-1 Tredyffrin Township Runoff Curve Numbers

Figure 3: Table C-2 Tredyffrin Township Runoff Curve Numbers