Scientists, Engineers & Environmental Planners Designing Innovative Solutions for Water, Wetland and Soil Resource Management

March 11, 2010

Mr. Vinaya Verdhana
Department of Environmental Protection
Division of Land Use Regulation
P.O. Box 439
Trenton, New Jersey 08625-0439

Sent also by email: vinaya.vardhana@dep.state.nj.us

Re: Review of NJDEP File
The Shoppes in the Square
Block 1959, Lots 1 & 2
Hamilton Township, Mercer County, NJ
NJDEP File No. 1103-03-003.1
Princeton Hydro Project No. 527.005

Dear Mr. Verdhana:

Princeton Hydro has reviewed material found in the above referenced NJDEP file, submitted to the New Jersey Department of Environmental Protection (NJDEP), Division of Land Use Regulation under cover letter from Mr. James P. Bannon, Jr., P.E. of Nave Newell, Inc. dated January 12, 2010. The Preliminary and Final Site Development Plans, last revised January 6, 2010 and Stormwater Management Report dated June 29, 2008, last revised January 6 were reviewed to prepare this report. Princeton Hydro was first permitted to review the file on February 18, 2010, by formal OPRA request with Tracking #88982 (Received Date: January 26, 2010).

The following are Princeton Hydro's comments with regard to compliance with NJDEP's Stormwater Rules (NJAC 7:8), regarding non-structural stormwater management, peak rate reduction, water quality and recharge. In our professional opinion, **significant** deficiencies exist in the material recently submitted to NJDEP with regard to stormwater management. Princeton Hydro's specific comments are as follows.

<u>Non-Structural Stormwater Management</u>

1. There are no non-structural/Low Impact Development strategies incorporated into the proposed design. While the Rule is now not new, the following requirements are taken directly from the Stormwater Management Rule, Frequently Asked Questions, 1.3: *What do the new rules require of new development*? [below emphasis added by bolding and underline]
(see: http://www.nj.gov/dep/watershedmgt/stormwaterfaqs2.htm#1_3)

The new rules set forth the stormwater management design and performance standards for proposed development. ***The rules emphasize, as a primary consideration, the use of non-structural stormwater management techniques including minimizing disturbance, minimizing impervious surfaces, minimizing the use of stormwater pipes, preserving natural drainage features, etc.*** *The rules also set forth requirements for groundwater recharge, stormwater runoff quantity control, stormwater runoff quality control and a Special Water Resource Protection Area (SWRPA) or 300 foot buffer adjacent to Category One (C1) waters and their immediate tributaries.*

The design fails the Non-structural Point System analysis even when the engineer improperly takes credit for two strategies not proposed in the design, those being: light weight equipment, not applicable when the project proposes the import of fill, and vegetative conveyance. With an inspection of the plan, one quickly determines a serious lack of non-structural techniques that should be inherent in a design after five (5) years have passed since the initiation of the stormwater rules. NJAC 7:8-5.3 (b) and the New Jersey Stormwater Best Management Practices Manual (BMP Manual, referenced by NJAC 7:8), Chapter 2 outline what the Rules promulgate in terms of non-structural techniques.

The natural wetlands and most of the woods are to be eliminated from the site. The proposal is anything but Low Impact and does not follow the performance standards that NJDEP established to [repeat of the above] ***minimizing disturbance, minimizing impervious surfaces, minimizing the use of stormwater pipes, preserving natural drainage features, etc.***

From *NJAC 7:8-5.3, Nonstructural stormwater management strategies:*

(b) Nonstructural stormwater management strategies incorporated into site design shall: [emphasis added by underline]

1. Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;

The applicant provides no protection for areas that provide water quality benefits. The existing depressions with wetlands are an integral natural water quality feature that should be protected, as natural features provide more benefits than an engineered system.

2. Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces;

The applicant does not minimize impervious surfaces and all impervious areas are connected – the post-development flows are piped. The site is maximized and is wholly deficient in meeting this goal of reducing impervious, recharging and providing vegetated treatment of runoff.

3. Maximize the protection of natural drainage features and vegetation;

The permittee obliterates all natural drainage features and vegetation, including the depressions with wetlands providing existing stormwater management benefits. The existing depressions with regulated wetlands are an integral natural drainage feature with beneficial vegetation that should be protected. The design proposes an engineered stormwater management system that does not equal the benefits provided by the undisturbed land and vegetation.

4. Minimize the decrease in the "time of concentration" from pre-construction to post-construction. "Time of Concentration" is defined as the time it takes for runoff to travel from the hydraulically most distant point of the drainage area to the point of interest within a watershed;

The engineer takes credit for the basin providing lengthening of the Time of Concentration. This is a structural method and can't be given credit under this category. The design did not consider using natural, above-ground drainage as maximizing the build-out of the parcel did not allow room for such features. A reduction in the time of concentration equates to less pollutant removal from runoff, less soil infiltration and distributed recharge of runoff, and higher frequency of maintenance for the proposed structural measures.

5. Minimize land disturbance including clearing and grading;

The designer makes no attempt to limit clearing and grading. The development of the site has been maximized leaving no areas natural for native landscape stormwater management.

6. Minimize soil compaction;

There is very little area that will not necessitate the import of soil and compaction. The development of the site has been maximized, making compliance with this goal virtually inapplicable.

7. Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides;

Much of the site's established vegetation will be eliminated including filling the sensitive wetland areas of the site. There is no evidence in the Landscape Plans that the applicant is striving to adhere to this non-structural goal.

8. Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas; and

There are no proposed vegetated conveyances systems, as all areas of the site will be piped by storm sewer. The engineer stated that vegetated conveyance is "not feasible on this site. Flat topography and small site size are not conducive to grassed swales." Natural, above-ground drainage is not possible due to the build-out of the parcel that did not allow room for such features – this is a self-imposed hardship. Vegetated, open-channel conveyance reduces runoff pollutant migration, and promotes soil infiltration and recharge of runoff.

9. Provide other source controls to prevent or minimize the use or exposure of pollutants at the site in order to prevent or minimize the release of those pollutants into stormwater runoff. These source controls include, but are not limited to:
i. Site design features that help to prevent accumulation of trash and debris in drainage systems;
ii. Site design features that help to prevent discharge of trash and debris from drainage systems;
iii. Site design features that help to prevent and/or contain spills or other harmful accumulations of pollutants at industrial or commercial developments; and
iv. When establishing vegetation after land disturbance, applying fertilizer in accordance with the requirements established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq., and implementing rules.

There are no areas or features proposed to provide nonstructural treatment of the runoff. The existing features that function in this role, the depressions with wetlands, are proposed to be filled and eliminated. The proposed design relies on structural manufactured treatment devices for addressing trash and debris, and pollutant removal. Structural devices require continual maintenance and cleanout, where natural systems are more effective.

Peak Rate Reduction

2. 7:8-5.4(a). The project proposes to fill two wetlands onsite that intercept virtually all of the existing runoff on the property in question and some from adjacent land. The engineer comments: "nearly none of the runoff leaves the site…. This results in the pre-development peak flows being essentially zero." The design engineer then admits that the project will not meet the required peak flow rate reduction due to the lack of runoff in the predevelopment condition.

3. 7:8-5.6(a) 1. The engineer uses a poor method (Modified Rational) to model the pre- and post-development conditions. This model and the way it has been used produces less change in the runoff and is only cited as an acceptable method due to the connected impervious, a violation of the non-structural strategies covered in NJAC 7:8-5.3 above.

4. The 7:8-5.6(a). USDA-NRCS Web Soil Survey 2.0 (attached) shows the site as having HSG B, C and C/D soils. The engineer does not comment on how he interprets the HSG C/D soils.

5. 7:8-5.6(a) 3. Over 60-percent of the site contains woodlot on HSG B soils; despite this, the design calculations assume that all of the existing woodlot soils are of a single, less permeable HSG C soil (due to the Modified Rational method not having a Coefficient for woods on HSG A and B soils). The fill soil is then assumed to be HSG B soil with the modeling showing much less change from the existing to developed conditions. There is a lack of proof on what hydrologic soil group is used for the post-development filling/compaction in the area of the existing wetlands and the remainder of the imported compacted fill. The compacted fill, no matter what soil type, will generate more runoff than the undisturbed woodlot with dense leaf litter.

6. 7:8-5.6(a) 5. The analysis of the basin relies on a free discharge. The engineer does not consider the hydraulic capacity of the storm sewer from the basin to Mark Twain Drive and downstream, up to the 100-year flow. This ponding within the system is tailwater and must be evaluated in the modeling, especially since the engineer says that the site has "Flat topography."

7. 7:8-5.4(a). The engineer does not adequately describe the sequence of the project to ensure stormwater management is maintained during the filling of the wetlands and construction of the proposed basin. A thoughtful construction sequence is vitally important as the existing wetlands currently perform very important stormwater management for the surrounding area.

Recharge

8. 7:8-5.7(a) 1. The Annual Groundwater Recharge Analysis is flawed. As in comment 3. above, the engineer did not use the latest soil map. This may be why the recharge pits are so small with respect to the impervious roof area. Evidence of the infiltration basin and dry well drain time must be reported to verify that storage volume exists for the next storm event.

9. 7:8-5.4 (a) 2. The seasonal high groundwater table was established using an unapproved method. In addition, there is no reference to the water table at the two wetland areas proposed to be filled.

10. According to the BMP Manual, Chapter 9.3, the infiltration basin and dry well designs must consider the depth to seasonal high water table in the design to prove the system's functioning and to verify that there is 2-feet of groundwater separation to the bottom of the proposed system. The design engineer relies on readings taken of observation wells, not soil mottling as one would expect to witness in soil testing with the presence of wetlands onsite. Testing in the exact location of the proposed recharge facility is required by the BMP Manual.

Note on Observation Wells: Groundwater contamination was previously discovered on this site (the reason for the observation wells). The ground water contamination was limited to methyl tertiary-butyl ether (MTBE). Several rounds of monitor well groundwater sampling occurred and the MTBE in the entire set of onsite wells ultimately was below the applicable NJDEP ground water standards. In August 2006 the site was granted a No Further Action (NFA) letter from the NJDEP.

The monitoring wells that the engineer uses for his groundwater evaluation are still present on the site. A condition of the NJDEP NFA letter is to properly close and seal any wells that will no longer be utilized for monitoring. Apparently, this has not occurred to date. The proper closure and sealing of these wells must occur by a certified contractor following all the necessary procedures of N.J.A.C. 7:26. Such procedures include obtaining the proper well closure permits from NJDEP, submitting a well closure plan to the NJDEP for approval, and finally the proper removal and sealing of the wells.

11. Inconsistent with the BMP Manual, no test pit and infiltration testing was performed at the location of the underground basin and dry wells. Soil testing performed does not meet the BMP manual Appendix E testing requirements. Additionally, the engineer utilized incorrect soil permeability assumptions.

12. In contrast to the BMP Manual, Chapter 9.3, the water entering the drywells is not pretreated, likely resulting in premature clogging of the facility. Additionally, the engineer states "Over time, the sand at the bottom of the underground [infiltration] basin will trap sediment and fine particles, which will reduce the infiltration from the basin" - compromising long-term groundwater recharge. It is interesting that the engineer notes future failure in his report – and should questioned on taking credit for recharge for this facility.

Water Quality

13. 7:8-5.8(a). There was no evidence in the NJDEP file that an Operation and Maintenance Manual has been submitted. The manual must be site specific to instruct the operator how to specifically take care of the stormwater management systems. Since the applicant is taking credit for TSS removal in the underground infiltration system and based on Comment 12. above, it is very important that access for cleaning, methods, equipment and frequency of clean out are specified.

In summary, the design does not meet non-structural stormwater management strategies, peak rate reduction, groundwater recharge and water quality standards. The applicant through the engineer, in addressing the email from NJDEP dated July 1, 2009, despite entering into a settlement agreement that is included in the municipal Resolution of Memorialization, uses Hamilton Township and neighbors as a reason for not meeting the

Stormwater Rules (NJAC 7:8). This agreement was pivotal for the local approval and does not imply the relaxation of any standard including peak rate reduction.

The applicant has submitted a GP-6 application to gain approval to fill in the wetlands that are providing natural stormwater management with no runoff from the property. This is all the more reason that NJDEP should adhere to its Stormwater Management Rules to match the 7:8-2.2 Goals of stormwater management planning. These are:

1. *Reduce flood damage, including damage to life and property;*
2. *Minimize, to the extent practical, any increase in stormwater runoff from any new development;*
3. *Reduce soil erosion from any development or construction project;*
4. *Assure the adequacy of existing and proposed culverts and bridges, and other instream structures;*
5. *Maintain groundwater recharge;*
6. *Prevent, to the greatest extent feasible, an increase in nonpoint pollution;*
7. *Maintain the integrity of stream channels for their biological functions, as well as for drainage;*
8. *Minimize pollutants in stormwater runoff from new and existing development in order to restore, enhance and maintain the chemical, physical, and biological integrity of the waters of the State, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial and other uses of water; and*
9. *Protect public safety through the proper design and operation of stormwater management basins.*

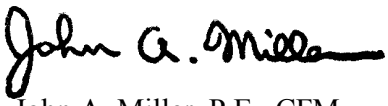
So far neither the State nor municipality has mentioned mitigation for relief of the requirements. A Mitigation Plan section is contained in Hamilton Township's Stormwater Management Plan – and element of the municipal Master Plan. As described in 7:8-4.2(c) 11.:

> *In order to grant a variance or exemption from the design and performance standards in N.J.A.C. 7:8-5, include a mitigation plan that identifies what measures are necessary to offset the deficit created by granting the variance or exemption. The mitigation plan shall ensure that mitigation is completed within the drainage area and for the performance standard for which the variance or exemption was granted.*

The project's numerous design faults and admitted deficiencies, especially with regard to peak rate reduction, makes this an excellent example of a project needing mitigation. With Hamilton Township recognizing the need to manage stormwater in its Stormwater Management Plan, and having a mitigation section in this element of the Master Plan, the NJDEP should act in its statutorily role in performing a stormwater management review in the context of directing the municipality to implement mitigation.

Princeton Hydro reserves the right to make additional comments on this application. Thank you for considering the above concerns in your review of the most recent materials and future material submitted by the applicant.

Sincerely,



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File

Hydrologic Soil Group—Mercer County, New Jersey
(Square Properties)

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Soil Ratings
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Political Features
- Cities

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:1,260 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Mercer County, New Jersey
Survey Area Data: Version 8, Aug 18, 2008

Date(s) aerial images were photographed: 8/5/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Mercer County, New Jersey				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
MbpB	Matapeake loam, 2 to 5 percent slopes	B	2.1	46.9%
MbpC2	Matapeake loam, 5 to 10 percent slopes, eroded	B	0.8	17.7%
MBYB	Mattapex and Bertie loams, 0 to 5 percent slopes	C	0.3	7.8%
OthA	Othello silt loam, 0 to 2 percent slopes	C/D	1.1	23.7%
UdstB	Udorthents, stratified substratum, 0 to 8 percent slopes	D	0.2	3.9%
Totals for Area of Interest			**4.5**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.