CHEMUNG COUNTY STORMWATER COALITION

851 Chemung Street, Horseheads, New York 14845

February 27, 2012

Mr. Tim Gilbert, Code Enforcement Officer
Town of Big Flats Code Enforcement Department
476 Maple Street, P.O. Box 449
Big Flats, New York 14814

Re: Hickory View Apartments Multi-Family Development
Big Flats, New York
Review of Stormwater Management Plan

Mr. Gilbert:

We have completed a review of the above-referenced project regarding the proposed stormwater management system for that project.

- Response Letter to our January 10, 2012 Stormwater Management Review Letter, Prepared by Larson Design Group, Dated January 20, 2012, Received around February 10, 2012
- Response to Comment #6 under Stormwater Treatment & Infiltration in our January 10, 2012 Stormwater Management Review Letter, "Tabularized Summary of the Vegetated Open Swale Water Surface Elevations and Maximum Drain Times", Prepared by Larson Design Group, Provided via e-mail on February 16, 2012
- Stormwater Pollution Prevention Plan (SWPPP) for Hickory View Apartments Multi-Family Development, unstamped by a NYS Licensed Professional Engineer, Prepared for Arnot Realty Corporation, Prepared by Larson Design Group, LDG Project No. 6632-006, Dated December 16, 2011
- Site Plan Drawings for Hickory View Apartments Multi-Family Development, Stamped by a NYS Licensed Professional Engineer, Prepared for Arnot Realty Corporation, Prepared by Larson Design Group, LDG Project No. 6632-006, Dated January 20, 2012

Our review comments and questions regarding the above-referenced project are as follows. At your request, we would be happy to direct a copy of this letter to Larson Design Group.

Stormwater Collection & Conveyance

1. As noted previously, the drainage of the proposed entrance drive (that has been requested by the applicant to be dedicated to the Town) would depend upon the perpetual performance (and associated maintenance) of proposed infiltration basins. The lack of performance and/or maintenance of these adjacent proposed infiltration basins could result in ponded water reaching the entrance drive.

   As noted previously, in regards to Ponding Area #1A, an infiltration rate of only 0.25 inches/hour was measured by LDG and is expected to have standing water for extended periods of time. As such, given this low infiltration rate, is there a potential that the maximum water surface elevation within Ponding Area #1A may result over time from a number of runoff events, such as an extremely wet period in the spring? Given the existing grading plan, overflow from Ponding Area #1A would reach/cross the entrance drive

Stormwater Treatment & Infiltration

1. There appears to be some mis-interpretation regarding certain stormwater management practices outlined in the New York State Stormwater Management Design Manual. In specific, these practices are Vegetated Swales (Chapter 5 of the Design Manual) and Infiltration Basins (Chapter 6 of the Design Manual). As noted in our January 10, 2012 review letter, it is my belief that the proposed stormwater management facilities for this project are technically infiltration basins, while the designer for the project has indicated that these proposed facilities are "Vegetated Open Swales". The significance with these terms pertains to the respective design criteria that would impact the design and acceptability of the proposed stormwater management system.

In regards to Vegetated Swales, the following table is provided that provides a comparison of certain criteria for vegetated swales and the associated design. Refer to the attached pages from the Design Manual. As shown, there is a deviation of the proposed design from the design criteria for vegetated swales. Furthermore, in regards to the proposed design, can the proposed "Vegetated Swales" be considered swales, as these are proposed to have no slope or outlet?

COMPARISON OF VEGETATED SWALE CRITERIA TO PROPOSED DESIGN	
CRITERIA FOR VEGETATED SWALES	**AS PROPOSED**
Have a slope between 0.5% and 4%	No slope (bottom of facilities are flat)
Be able to convey the peak discharge at a flow depth of 4 inches or less	Depths of ponded water of over 1.5 feet
A vegetated swale designed in accordance with the Chapter 5 criteria will provide a modest (10-20%) runoff reduction for the water quality volume (WQv) for certain development conditions.	Full infiltration of the 100-Year runoff volume

An infiltration basin, on the other hand, captures, temporarily stores stormwater flows in a basin/impoundment, and infiltrates the stormwater into the surrounding soils. Often in our area, the basins consist of excavations into native soil. Infiltration basins have been utilized in the Town of Big Flats (including at Lowe's and at Chase Pitkins for example).

In regards to infiltration systems, various design criteria are outlined in the New York State Stormwater Design Manual, including the following. Refer to the attached page from the Design Manual.

- Infiltration basins cannot be placed in locations that cause water problems to downgradient properties. Infiltration trenches and basins shall be setback 25 feet downgradient from structures and septic systems. (Page 6-35)
- Pretreatment of runoff must be provided prior to entrance into an infiltration facility. (Page 6-36)
- In regards to the sizing of infiltration basins, only the floor of the practice shall be considered to infiltrate. (Page 6-37)
- The maximum dewatering time for an infiltration facility is 48 hours. (Page 6-42)

When these criteria were noted in our review letter, the applicant's engineer indicated that these criteria are not applicable, as the stormwater management practice used in their design is Vegetated Swales.

Of particular interest is the maximum dewatering time. As per the "Tabularized Summary of the Vegetated Open Swale Water Surface Elevations and Maximum Drain Times", provided on February 16, 2012 by the applicant's engineer, several of the proposed infiltration basins are estimated to have maximum dewatering times of over 48 hours. The maximum dewatering times for some of the basins are estimated to be over 90 hours. This is especially significant, given the close proximity of the basins to the residential buildings, and appears to be inconsistent with the applicant's stated intent not to have standing water on the property. A plot of water depth over time for each basin would be helpful.

Also, in regards to dewatering times in excess of 48 hours, a greater opportunity would exist for consecutive storm events to effectively extend the estimated dewatering times further. In situations where stormwater plans involve maintaining developed stormwater entirely on-site and percolation rates are low, this consideration would result in the need to increase the size of infiltration basins accordingly.

Contingency Stormwater Management Plan

1. Given the marginal nature of the on-site soils for stormwater infiltration, our previous recommendation for a Contingency Stormwater Management Plan is still pertinent.

2. As noted previously, the existing infiltration basins for the adjacent Simmons-Rockwell site are also situated upon Collamer (CoA) silt loam, are prone to standing water, and were increased in volume beyond the 100-year event to account for the low percolation rate.

   Previously, it was suggested by the applicant that the soils on the Simmons-Rockwell site are fill, which have resulted in the lack of percolation observed that those infiltration basins. Upon discussion with the contractor, who completed the site work for the Simmons-Rockwell project, it was noted that the soils at the Simmons-Rockwell basins were not fill.

Time of Concentration

1. As per the National Resource Conservation Service (NRCS), the maximum length for sheet flow conditions should be limited to no more than 100 feet. This NRCS recommendation is based on research conducted since the TR-55 manual was published. In a typical urban environment, sheet flow conditions are usually less than 50 feet.

Grading Plan

1. It is recommended that the grading plan for the drives and parking areas be refined. Proposed spot elevations would be helpful for this purpose.

2. The grading plan for the proposed entrance drive onto Hickory Grove Road should be refined to clearly show how runoff would be conveyed away from Hickory Grove Road.

Runoff from Hickory Grove Road

1. As noted previously, an appropriate agreement (of a legal and binding nature) will be needed to allow runoff from Hickory Grove Road to continue to flow onto the project property.

Operation & Maintenance Plan

1. As noted previously, an operation and maintenance agreement for the stormwater system will be needed for this project which is of a legal and binding nature.

If you have any questions or comments, please do not hesitate to contact me. Furthermore, I would be happy to meet to discuss this project in greater detail.

Sincerely,

Jimmie Joe Carl

Jimmie Joe Carl, P.E.
Chemung County Stormwater

Cc: Theresa Dean, Town of Big Flats Supervisor
Lance Muir, Town of Big Flats Planning Board
Larry Wagner, Town of Big Flats Public Works Commissioner
Jessica Verrigni, Chemung County Stormwater

VEGETATED SWALE

5.3.3 Vegetated Swale

A vegetated swale is a maintained, turf-lined swale specifically designed to convey stormwater at a low velocity, promoting natural treatment and infiltration. A properly designed, constructed, and maintained channel (or, in some cases natural drainage path) can be used in both residential and non-residential areas as a runoff reduction practice. A vegetated swale can be an alternative to underground storm sewers or lined open channels. Where drainage area, topography, soils, slope and safety issues permit, vegetated swales can be used in the street right-of-way and on developed sites to convey and treat stormwater from roadways and other impervious surfaces.

When compared to underground pipes or hardened channels, vegetated swales increase the time-of-concentration (T_c), reduce the peak discharge and provide infiltration opportunities. A vegetated swale designed in accordance with the criteria in this section will provide modest (10-20%) runoff reduction for the water quality volume (WQv) for certain development conditions.

The vegetation height in a vegetated swale should be maintained at approximately 4 inches to 6 inches.

Note:
Other types of swales are used for simple conveyance, diversion, conventional water quality treatment (wet and dry swales, Chapter 6) and pretreatment. Unique design and application criteria (different from vegetated swale*) must be applied for each specific type of use.*

Benefits

- Reduces the cost of road and stormwater conveyance construction
- Provides some runoff storage and infiltration, as well as treatment of stormwater
- If a vegetated swale is properly designed, a 10-20% reduction of WQv may be applied for sizing conventional treatment practices within the contributing DA
- The post-development peak discharges used to calculate "quantity" controls will likely be lower, due to a slightly longer T_c for the site
- Reduced maintenance costs

VEGETATED SWALE

Feasibility/Limitation

- Local codes may not allow swales instead of curb and gutter or closed drainage pipes – *Meet with local officials to discuss waivers for alternative designs*
- There is a perception that swales require more maintenance than curb and gutter or closed drainage pipes – *With the proper design and proper education of owners, swales require less maintenance and are less prone to failure*
- Lack of curbing may increase potential for failure of the pavement at the grass interface – *The potential for failure can be alleviated by hardening the interface by installing grass pavers, geosynthetics, or placing a compacted granular material strip along the pavement edge*
- Swales in residential neighborhoods are perceived to reduce property values and the "curb appeal" for re-sale, when compared to conventional curb and gutter street systems. – *Properly designed and maintained* vegetated swale *can be incorporated into landscaped lawn areas, with no impact to property value or neighborhood character*

Sizing Criteria

A vegetated swale can be used where the contributing DA is less than 5 acres, and when the WQv peak flow (Q_{WQV}) is less than 3cfs.

The WQv for a vegetated swale is computed in accordance with the uniform sizing criteria methods outlined in Chapter 4. Design flows are calculated using small storm hydrology (APPENDIX B), and conventional hydrology methods (Chapter 8) in conjunction with Manning's equation for open channel flow.

For a properly designed vegetated swale, the following runoff reductions in the computed WQv may be applied to the water quality volume of the drainage area for which the swale is designed:

Hydrologic Group A and B soils – 20%

Hydrologic Group C and D soils – 10%

Modified* Hydrologic Group C and D soil – 15%-12%

**Modifications must be in accordance with Soil Restoration in Chapter 5 of this Manual.*

VEGETATED SWALE

Required Elements

The vegetated swale design must:

- Receive peak water quality volume flow rates from the contributing drainage area that are no greater than 3 cfs
- Provide sufficient length (minimum 100 ft) to retain the computed treatment volume for 10 minutes in a swale that receives runoff as a point discharge at the inlet, or an average of 5 minutes of retention time for a swale receiving sheet drainage or multiple point discharges along its length
- Convey the peak discharge for water volume flow (3 cfs or less):
  a. at a velocity of $\leq$ 1.0 fps, and
  b. at a flow depth of 4 inches or less
- Check Dam may be required to achieve the above criteria
- Have a trapezoidal or parabolic shape, with a bottom width minimum of 2' and no greater than 6'
- Have side slopes no steeper than 3 horizontal:1 vertical
- Have a slope between 0.5% and 4% (between 1.5- 2.5 percent recommended)
- Convey the 10-year storm with 6 inches of freeboard at a velocity $\leq$ 5 fps
- Use variable n values corresponding to flow depths (from .15 down to .03) (APPENDIX L)

Design Example

Design a vegetated swale to provide water quality runoff reduction treatment for a 4-acre section of a 30-acre residential development with eight ½-acre lots (25% impervious surfaces) on Hydrologic Soil Group B soils. This developed area will drain to a 625-foot long flow path on a natural gradient of 3.5%.

The following data has already been computed for the 4 acres:

WQv = 3,500 feet^3 (90% rule, Chapter 4)
Q_{WQV} = 2.5 cfs (small storm hydrology, APPENDIX B)
Q_{10} = 8.0 cfs (TR-55, Chapter 8)

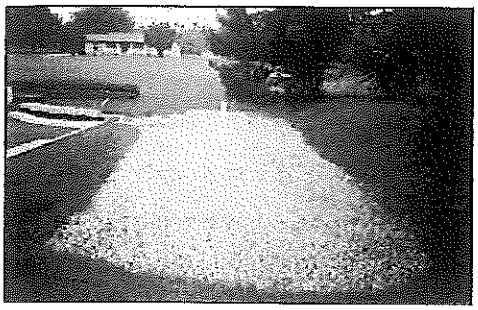
Try the following swale design:

A 2-foot deep trapezoidal channel with a bottom width of 4', with 1:3 side slopes, and a design slope of 3%.

Determine the Q_{WQV} flow depth and velocity (using Manning's equation iterations, computer programs or selected design charts):

$Q = 1.49 / n \cdot A \cdot ((A/P)^{2/3}) \cdot S^{1/2}$
Area (for trapezoid) = (bottom width + top width)/2 x depth

Infiltration Practices (INCLUDING INFILTRATION BASINS)



Description: Excavated trench or basin used to capture and allow infiltration of stormwater runoff into the surrounding soils from the bottom and sides of the basin or trench.

Design Options:
Infiltration Trench (I-1), Shallow Infiltration Basin (I-2), Dry Well (I-3)

KEY CONSIDERATIONS

FEASIBILITY

- Minimum soil infiltration rate of 0.5 inches per hour
- Soils less than 20% clay, and 40% silt/clay, and no fill soils.
- Natural slope less than 15%
- Cannot accept hotspot runoff, except under the conditions outlined in Section 6.3.1.
- Separation from groundwater table of at least three feet (four feet in sole source aquifers).
- 25' separation from structures for I-1 and I-2; 10' for I-3.

CONVEYANCE

- Flows exiting the practice must be non-erosive (3.5 to 5.0 fps)
- Maximum dewatering time of 48 hours.
- Design off-line if stormwater is conveyed to the practice by a storm drain pipe.

PRETREATMENT

- Pretreatment of 25% of the WQv at all sites.
- 50% pretreatment if fc >2.0 inches/hour.
- 100% pretreatment in areas with fc >5.0 inches/hour.
- Exit velocities from pretreatment must be non-erosive for the 2-year storm.

TREATMENT

- Water quality volume designed to exfiltrate through the floor of the practice.
- Construction sequence to maximize practice life.
- Trench depth shall be less than four feet (I-2 and I-3).
- Follow the methodologies in Chapter 6 to size practices.

LANDSCAPING

- Upstream area shall be completely stabilized before flow is directed to the practice.

MAINTENANCE REQUIREMENTS

- Never serves as a sediment control device
- Observation well shall be installed in every trench, (6" PVC pipe, with a lockable cap)
- Provide direct maintenance access.

STORMWATER MANAGEMENT SUITABILITY

- [X] **Water Quality**
- [ ] **Channel Protection**
- [ ] **Overbank Flood Protection**
- [ ] **Extreme Flood Protection**

Accepts Hotspot Runoff: *No*

IMPLEMENTATION CONSIDERATIONS

- [H] **Capital Cost**
- [H] **Maintenance Burden**

Residential Subdivision Use: Yes

High Density/Ultra-Urban: *Yes*

Drainage Area: *10 acres max.*

Soils: *Pervious soils required (0.5 in/hr or greater)*

Other Considerations:

- *Must not be placed under pavement or concrete*

Key: **L**=Low **M**=Moderate **H**=High