WATER BUDGET

Prepared For

Croton Overlook

Town of Yorktown

Westchester County, New York

May 2011

Prepared By

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Introduction:

This report provides comparative analysis of Total Stormwater Volume discharging toward the wetland located at the southeastern corner of the property in predevelopment and postdevelopment conditions. Modifications to the preliminary drainage design are proposed herein to accomplish a "no net change" in the volume of stormwater being discharged to the onsite wetland. The 2-year, 24-hour design storm was chosen, in conjunction with the Town's Wetland Consultant, as the basis for this analysis.

The hydrological analysis prepared by this office for Croton Overlook, dated October 2010, indicates that in the predevelopment condition, drainage area "B" discharges toward the wetland located at the southeastern corner of the property. Therefore, total stormwater runoff volume for area "B" has been employed for the evaluation of the water budget.

The estimated runoff volume (cubic feet) resulting from the 2-year, 24-hour design storm over the predevelopment area "B" was calculated as follows:

V = (461,083 cf x 0.66 inch *) / 12 = **25,359 cf**
* - the hydrograph model demonstrates that the 2-year, 24-hour design storm is expected to result in 0.66 inch of runoff over area "B".

In the postdevelopment condition, drainage area "B" represents the portion of predevelopment area "B" that will remain undeveloped and will continue discharge toward the wetland located at the southeastern corner of the property.

The Estimated runoff volume (cubic feet) resulting from 2-year, 24-hour design storm over the postdevelopment area "B" was calculated as follows:

V = (189,633 cf x 0.8 inch*) / 12 = **12,642 cf**
C - the hydrograph model demonstrates that the 2-year, 24-hour design storm is expected to result in 0.8 inch of runoff over area "B".

The water budget for the project site requires discharging the same volume of runoff toward the wetland in postdevelopment condition as in predevelopment condition for 2-year, 24-hour design storm. To achieve this water budget it was proposed to redirect discharge from the rooftop of fourteen (14) buildings, each containing two attached units (28 units total), located along the easterly side of the proposed roadway toward the wetland. Installation of four (4) Bioretention practices, identified as Standard SMP's with RRv Capacity in the New York State Stormwater Design Manual, have been proposed to provide Water Quality Volume Treatment associated with the construction of these 14 buildings. The areas contributing to each Bioretenion practice are outlined below.

Bioretention Area I

Bioretention Area I will intercept runoff from the rooftop of six buildings (12 units total, lots #33-#44). The Water Quality Volume (WQ_v) for enhanced phosphorus removal is designed to capture the estimated runoff from the 1-year, 24-hour design storm over the postdevelopment watershed. Hydrologic calculations show that the 1-year, 24-hour event results in 2.57 inches of runoff over the total contributing drainage area (hydrograph routings for one-year storm will be provided in the revised hydrologic analysis). To provide pretreatment for the Bioretemtion Area I, installation of CDS stormwater treatment unit have been proposed at the point of discharge into Bioretention. The WQ_v for enhanced phosphorus removal has been calculated as follows:

$$\frac{(2.57 \text{ in}) \times (20{,}800 \text{ sf})}{12 \text{ in/ft}} = 4{,}455 \text{ cf}$$

The proposed Bioretention filter will be located on C soils, therefore only 40% of WQ_v can be applied to the Runoff Reduction Volume. To achieve 100% Runoff Reduction Volume the proposed bioretention practice was oversized by 60% and therefore required a $WQ_v = 11{,}137$ cf.

The required size of bioretention filter area was calculated as follows:

$Af = (WQ_v)\ (d_f) / ((k)\ (h_f + d_f)\ (t_f))$;

Where:
- Af – surface area of filter bed (ft^2)
- d_f – filter bed depth (5 ft)
- k – coefficient of permeability of filter media (0.5 ft/day)
- h_f – average height of water above filter bed (0.25 ft)
- t_f – design filter bed drain time (2 days)

Af = (11,137 cf) (5') / ((0.5'/day) (0.25' + 5') (2)) = 10, 606 sf; (area **10,610 sf** – provided).

Pretreatment was sized to treat 25% of WQ_v. Therefore, 11,137 x 0.25 = 2,784 cf.
The CDS stormwater treatment unit will be sized to treat 25% of WQ_v. (CDS treatment unit design calculations will be provided in the revised hydrologic analysis).

Bioretention Area II

Bioretention Area II will intercept runoff from the rooftop of three buildings (6 units total, lots #45-#50). The proposed CDS stormwater treatment unit will provide pretreatment for the Bioretention Area II. The WQ_v for enhanced phosphorus removal has been calculated as follows:

$$\frac{(2.57 \text{ in}) \times (10{,}000 \text{ sf})}{12 \text{ in/ft}} = 2{,}142 \text{ cf}$$

The proposed Bioretention filter will be located on C soils, therefore only 40% of WQ_v can be applied to the Runoff Reduction Volume. To achieve 100% Runoff Reduction Volume the proposed bioretention practice was oversized by 60% and therefore required a $WQ_v = 5{,}355$ cf.

The required size of the bioretention filter area was calculated as follows:

Af = (5,355 cf) (5') / ((0.5'/day) (0.25' + 5') (2)) = 5,100 sf; (area **5,289 sf** – provided).

Pretreatment was sized to treat 25% of WQ_v. Therefore, 5,355 x 0.25 = 1,339 cf. (CDS treatment unit design calculations will be provided in the revised hydrologic analysis).

Bioretention Area III

Bioretention Area III will intercept runoff from the rooftop of three units (lots #51-#53). The proposed CDS stormwater treatment unit will provide pretreatment for the Bioretention Area III. The WQ_v for enhanced phosphorus removal has been calculated as follows:

$$\frac{(2.57 \text{ in}) \times (5{,}400 \text{ sf})}{12 \text{ in/ft}} = 1{,}157 \text{ cf}$$

The proposed Bioretention filter will be located on C soils, therefore only 40% of WQ_v can be applied to the Runoff Reduction Volume. To achieve 100% Runoff Reduction Volume the proposed bioretention practice was oversized by 60% and therefore required a WQ_v = 2,891 cf.

The required size of the bioretention filter area was calculated as follows:

Af = (2,891 cf) (5') / ((0.5'/day) (0.25' + 5') (2)) = 2,753 sf; (area **2,888 sf** – provided).

Pretreatment was sized to treat 25% of WQ_v. Therefore, 2,891 x 0.25 = 722 cf. (CDS treatment unit design calculations will be provided in the revised hydrologic analysis).

Bioretention Area IV

Bioretention Area IV will intercept runoff from the rooftop of seven units (lots #54-#60). The proposed CDS stormwater treatment unit will provide pretreatment for the Bioretention Area IV. The WQ_v for enhanced phosphorus removal has been calculated as follows:

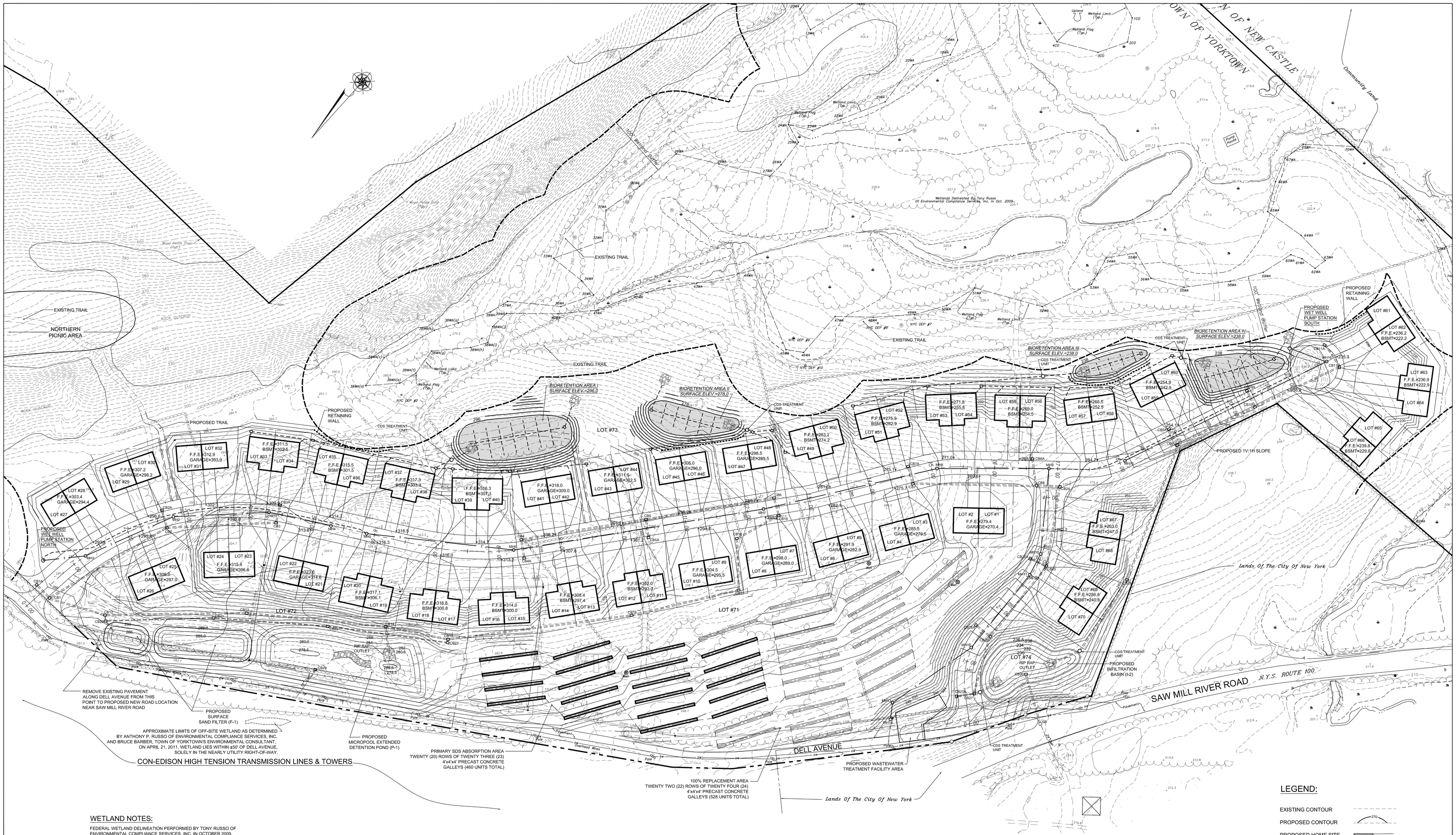
$$\frac{(2.57 \text{ in}) \times (11{,}800 \text{ sf})}{12 \text{ in/ft}} = 2{,}527 \text{ cf}$$

The proposed Bioretention filter will be located on C soils, therefore only 40% of WQ_v can be applied to the Runoff Reduction Volume. To achieve 100% Runoff Reduction Volume the proposed bioretention practice was oversized by 60% and therefore required a WQ_v = 6,318 cf.

The required size of the bioretention filter area was calculated as follows:

Af = (6,318 cf) (5') / ((0.5'/day) (0.25' + 5') (2)) = 6,017 sf; (area **6,088 sf** – provided).

Pretreatment was sized to treat 25% of WQ_v. Therefore, 6,318 x 0.25 = 1,580 cf. (CDS treatment unit design calculations will be provided in the revised hydrologic analysis).



WETLAND NOTES:

FEDERAL WETLAND DELINEATION PERFORMED BY TONY RUSSO OF ENVIRONMENTAL COMPLIANCE SERVICES, INC. IN OCTOBER 2009.

THE BOUNDARIES OF THE WETLAND A (FLAGS 37WA THROUGH 90WA) AND WETLAND B WERE CONFIRMED IN THE FIELD BY BRUCE BARBER, TOWN OF YORKTOWN'S WETLAND CONSULTANT, ON AUGUST 11, 2010. *(REFER TO SHEET C1 FOR LOCATION OF WETLAND B).*

THE REMAINING BOUNDARY LIMITS OF WETLAND A (FLAGS 8WA THROUGH 38WA(j)) WERE CONFIRMED IN THE FIELD BY BRUCE BARBER, TOWN OF YORKTOWN'S WETLAND CONSULTANT, ON APRIL 21, 2011.

THE WETLAND BOUNDARIES ARE TAKEN FROM THE PLAN ENTITLED "TOPOGRAPHICAL SURVEY OF THE PROPERTY PREPARED FOR 107 DEVRIES AVENUE CORP." PREPARED BY DONALD D. COLEMAN, JR., L.L.S., LAST REVISED ON MAY 9, 2011.

NO WORK SHALL BE PERFORMED WITHIN WETLAND OR WETLAND BUFFER.

LEGEND:

- EXISTING CONTOUR
- PROPOSED CONTOUR
- PROPOSED HOME SITE & DRIVEWAY
- PROPOSED RETAINING WALL
- FEDERAL WETLAND BOUNDARY
- EXISTING STONE WALL
- EXISTING TREE LINE
- EXISTING WELL
- EXISTING CATCH BASIN AND CULVERT
- EXISTING UTILITY POLE
- EXISTING CHAIN LINK FENCE

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CROTON OVERLOOK

SAW MILL RIVER ROAD & DELL AVENUE
TOWN OF YORKTOWN, WESTCHESTER COUNTY, NEW YORK
GRADING PLAN (WATER BUDGET)

Revisions:

JOB NUMBER: 09-1111-15
DATE: MAY 12, 2011
SCALE: 1"= 50'

SHEET # S1
1 OF 1