

D. SURFACE WATER RESOURCES

1. Existing Conditions

a. Existing Surface Water Drainage Patterns Within The Site /Discharge Points Of Existing Stormwater Runoff

The site is 71.1 acres and consists of three (3) drainage basins (areas within the land where stormwater flows to a single point) which discharge stormwater runoff to three separate design (discharge) points in the existing (pre-development) conditions. The individual drainage areas represent the portions of the property that ultimately contribute stormwater runoff to each basin's respective design point.

The drainage basins are designated as EDA-1, EDA-2 and EDA-3, and are depicted on Figure IV.D-1 and Drawing EDA-1 entitled "Existing Drainage Area Map" located in Appendix IV "Stormwater Management Plan" of this DEIS. The basin's discharge stormwater runoff to the Design Points (where the stormwater flows to) depicted on Drawing EDA-1, labeled as Design Points 1, 2 and 3.

The entire site is developed in existing conditions, including 61.81 acres of existing impervious surfaces, such as existing buildings and parking lots, which represents 87 percent of the site. The remainder of the site is pervious (where rainwater can soak into the ground more easily), consisting of small wooded areas within eastern portions of the site, parking lot landscaped islands and courtyards.

Existing Drainage Area #1 (EDA #1) is 54.60 acres is the largest of the three areas analyzed in existing conditions and is 89% impervious (buildings, pavement and rock outcroppings). It includes the northern and western portions of the site and a majority of the existing buildings and parking areas, including Macy's, Sears, the recently constructed Stop & Shop and the Main Mall area. Most of the proposed improvements are located within this basin.

This area drains to the north via the existing storm drainage infrastructure throughout the existing parking areas. The existing storm drainage system discharges into the existing 72" corrugated metal pipe located along the site's northern boundary (Figure IV.D-2).

This pipe is owned and maintained by the New York State Thruway Authority and is located within an existing 25 foot wide drainage easement. The pipe enters the site from Central Park Avenue and conveys stormwater runoff from west to east. This pipe exits the property near the midpoint of the northern property line (Design Point #1) where it continues in a easterly direction to an existing drainage tunnel. This tunnel discharges into the Bronx located east of Design Point #1 near the Bronx River / Cross County Parkways interchange.

Existing Drainage Area #2 (EDA-2) is 11.49 acres and is located at the southern portion of site and is 86% impervious. This area includes the existing Cross County Cinema and parking area, existing car wash / gas station (Building #19) and a majority of Stop & Shop parking area. EDA-2 drains to Design Point #2 in Vredenburg Avenue, which is located immediately south of the existing movie theatre. No changes are proposed in this portion of the property.

Existing Drainage Area #3 (EDA-3) is 5.01 acres and is located in the northeast corner of the property. This drainage area includes the existing parking lot adjacent to the former Sizzler restaurant and the recently constructed maintenance building. EDA-3 discharges stormwater runoff to Design Point #3 which is located near the intersection of the existing site driveway and Kimball Avenue.

The following table summarizes peak rates of runoff calculated in the drainage calculations found in Appendix IV for the three (3) drainage areas analyzed in the pre-redevelopment conditions:

Table IV.D-1
Peak Rates of Runoff in Existing Conditions

Storm Frequency (Years)	Peak Rates of Runoff at Design Point in Existing Conditions (c.f.s.)		
	Design Point #1 / EDA-1	Design Point #2 / EDA-2	Design Point #3 / EDA-3
1	103.37	16.08	8.68
10	195.32	38.09	18.12
25	236.62	48.31	22.38
50	277.74	58.52	26.62
100	298.25	63.62	28.73

b. Stormwater Runoff Quantity (The Rate Of Stormwater Runoff And Stormwater Routed Through The Site, And Peak Discharge Rates For The 1, 10, 25, 50 And 100 Year Storms Using An Acceptable Model)

The proposed expansion and renovation of the Cross County Shopping Center includes a completely new drainage system within the project's redevelopment area. The proposed stormwater quantity drainage improvements include the abandonment in place or removal of the existing storm drain pipes, manholes and catch basins. A new stormwater collection system is proposed within the outer ring road which will collect and convey runoff from the existing and proposed buildings, parking structures and on-grade parking areas to the proposed water quantity and quality facilities, and ultimately off-site via the 72" stormwater pipe owned and maintained by the New York State Thruway Authority, or infiltrated into the ground.

This existing 72" pipe located in the northern portion of the property will be relocated around the proposed Macy's expansion and the adjacent 1-story parking deck. The relocated pipe alignment follows the Mall's ring road until its connection into the existing pipe where it exits the property at Design Point #1 (see Figure IV.D-2 "Preliminary Stormwater Management Plan).

The proposed development results in a small increase of impervious areas totaling 0.42 acres, or 0.6 percent of the entire site. The site was segmented into four (4) drainage areas to analyze peak rates of runoff in the post-development condition.

Peak rates of runoff were calculated for existing and proposed drainage areas using the following information and methodologies. These calculations can be found in Appendix IV "Stormwater Management Report" of the DEIS:

- 1) Existing and proposed drainage area maps were developed using topographical surveys prepared by John Meyer Consulting, P.C.
- 2) "Preliminary Subsurface Soil and Foundation Investigation" by Carlin Simpson & Associates, revised 04/19/2005.
- 3) Soils Survey of Westchester County, NY.
- 4) The United States Department of Agriculture Soils Conservation Service Technical Report No. 55, Urban Hydrology for Small Watersheds (TR-55), dated June 1986.
- 5) New York State Stormwater Management Design Manual last revised August 2003.
- 6) All calculations were performed using the Haestad Method Pondpack Version 10 Software Package.
- 7) The time of concentration was calculated using the methods described in Chapter 3 of TR-55, Second Edition, June 1986. Manning's equation was used to determine the travel time of sheet flow with a maximum reach length of 100 feet in existing and proposed conditions. The two year, 24-hour precipitation amount of 3.25 inches was used in the equation for all storm events. The travel time for shallow concentrated flow was computed using Figure 3-1 and Table

3-1 of TR-55. Manning's equation was used to determine the travel time for channel reaches.

- 8) The storm flows for the 1, 10, 25, 50 and 100 year recurrence interval storms were analyzed for the total watershed areas. The Type III Distribution Design Storms with a 24-hour duration were used in the analysis with the following rainfall depths:

<u>Design Storm</u>	<u>Inches of Rainfall</u>
1	2.80 inches
10	5.00 inches
25	6.00 inches
50	7.00 inches
100	7.50 inches

Four (4) drainage basins were analyzed in the proposed conditions which are designated as PDA-1a, PDA-1b, PDA-2 and PDA-3, and are depicted on Figure IV.D-3 entitled "Proposed Drainage Area Map". These basins discharge stormwater runoff to the Design Points depicted on Figure IV.D-3, labeled as Design Points 1, 2 and 3. These are the same design points analyzed in Existing Conditions to provide a basis of comparison of pre and post-development peak rates of runoff.

Proposed Drainage Area #1a (PDA #1a) is 51.48 acres is the largest of the four areas analyzed in proposed conditions. This area is 89% impervious (proposed buildings and parking structures and pavement). It includes the northern and western portions of the site and a majority of the existing buildings and parking areas, including Macy's, Sears, the recently constructed Stop & Shop and the main mall area. Most of the proposed Center's improvements are proposed within this basin.

This area drains without detention, to the relocated 72" culvert to be constructed in the northern portions of the Center's ring road. This drainage area does not include

the proposed single story parking deck to be constructed north of Existing Building #1 (PDA-1b) and discharges stormwater runoff to Design Point #1.

Proposed Drainage Area #1b (PDA #1b) is 3.11 acres and is 100% impervious as it includes the surface of the proposed one-story parking deck north of Existing Building #1 and east of the proposed Macy's expansion. This drainage area is routed through the proposed stormwater subsurface management system located north of the proposed Macy's addition, which will provide flood control and infiltration of stormwater runoff from PDA-1b. This system consists of 920 linear feet of five (5) foot diameter perforated corrugated metal pipe with an outlet control structure to restrict flows leaving the system. The proposed outlet control structure includes an interior wall with a 13" orifice to be constructed at the same elevation at the bottom of the proposed system. This structure will cause stormwater runoff to back-up within the proposed pipes and exit the facility at a reduced and controlled rate. The proposed pipes will be perforated, allowing for infiltration of runoff into the ground thereby enhancing water quality by allowing it to filter through the existing subsoils. Peak rates and total volume of runoff from the proposed system, when combined with the undetained PDA-1a, will be less than those that currently exist at Design Point #1.

Proposed Drainage Area #2 (PDA #2) is 11.48 acres and will remain undisturbed during the construction of the proposed improvements. This area is 0.01 acres smaller than EDA-2 as analyzed in existing conditions due to the modifications required for the proposed drainage collection system. Therefore, peak rates of runoff and runoff volume from this area will virtually remain unchanged in proposed conditions.

Proposed Drainage Area #3 (PDA #3) is 5.03 acres in size and is located at the northeast corner of the site. The impervious coverage in this area increases slightly by 0.13 acres (5700 sq. ft.) due to the proposed widening of the existing site driveway at Kimball Avenue. Additional stormwater flows from this increase are

mitigated by 150 linear feet of 48" diameter perforated corrugated metal storage pipe, which is similar to the system for PDA #1b.

The following table summarizes peak rates of runoff from the three (3) drainage areas analyzed in the pre-development conditions:

Table IV.D-2
Peak Rates of Runoff in Proposed Conditions

Storm Frequency (Years)	Peak Rates of Runoff at Design Point in Proposed Conditions (c.f.s.)		
	Design Point #1	Design Point #2	Design Point #3
1	103.28	16.06	7.96
10	194.28	38.06	16.33
25	235.45	48.27	20.09
50	275.83	58.47	23.83
100	296.05	63.56	25.70

c. **Stormwater Runoff Quality And Compliance With NYSDEC Phase II Regulations / Stormwater runoff quality and compliance with NYSDEC Phase II regulations including reference to Guidelines for Redevelopment Projects issued in April 2004**

The New York State Department of Environmental Conservation (NYSDEC) issued its “Interim Strategy for Redevelopment Projects” dated April 30, 2004 (hereinafter referred to as the “Redevelopment Strategy”) because many of the proposed improvements included in the New York State Stormwater Management Manual last revised 2003 (the Manual) are not easily incorporated into redevelopment projects. Therefore, the redevelopment strategy requires all redevelopment projects such as the Cross County Center be reviewed by the NYSDEC as required by Section I.D.3.b of the SPDES General Permit GP-02-01 for Stormwater Discharges from Construction Activity. These requirements were not in place when Cross County Center was constructed in the 1950's, and therefore

the redevelopment will improve the stormwater measures of the site, bringing them into conformance with the State's latest stormwater quality and control measures.

The Redevelopment Strategy includes specific criteria for the implementation of these most current surface water quantity and quality improvements for the projects. These guidelines are applied to the proposed improvements as follows:

- 1) Water Quantity: Due to the small increase in impervious area, the proposed stormwater management facilities comply with the 10-year (Overbank Flood Control) and 100-year (Extreme Flood Control) water quantity controls in the Manual pipe. Pursuant to Section 4.3 of the Manual, Channel Protection is not required because flows in all storm events are decreased and the existing pipe system discharges into the Bronx River, which is designated by the NYSDEC as a 4th order stream.
- 2) Water Quality: The Stormwater Practices that are proposed that will treat 100% of the water quality volume from the entire contributing area of the proposed redevelopment (Figure IV.D-4).

Infiltration will be provided as with perforated subsurface systems which allow for filtering of the site's stormwater runoff. Vortech devices (these are underground structures that provide treatment of sediment, oil and grease in stormwater runoff) are proposed to provide 80% removal of total suspended solids from all stormwater runoff generated by the site. These devices are designed based on flow rates to accommodate the required NYSDEC Water Quality Volumes for their contributing drainage areas. These Water Quality Peak Flow calculations are based on NYSDEC requirements in Appendix B of the NYS Stormwater Design Manual and can be found in Appendix IV of this DEIS.

2. Potential Impacts

a. Stormwater Runoff Quantity (The Rate Of Stormwater Runoff And Peak Discharge Rates For The 1, 10, 25, 50 And 100 Year Storms Resulting From The Proposed Conditions)

The proposed subsurface stormwater infiltration and detention reduces the peak rates and volume of runoff below those that currently exist for the 1, 10, 25, 50 and 100-year storms, as required by the NYSDEC SPDES General Permit GP-02-01. The following table summarizes the flows at each of the design points in pre and post-development conditions.

Table IV.D-3
Comparison of Peak Rates of Flows

Storm Frequency (years)	Comparison of Peak Rates of Flows @ Design Points (c.f.s.)					
	Design Point #1		Design Point #2		Design Point #3	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
1	103.37	103.28	16.08	16.06	8.68	7.96
10	195.32	194.28	38.09	38.06	18.12	16.33
25	236.62	235.45	48.31	48.27	22.38	20.09
50	277.74	275.83	58.52	58.47	26.62	23.83
100	298.25	296.05	63.62	63.56	28.73	25.70

b. Stormwater Runoff Quality Impacts On The Site

Stormwater quality measures do not currently exist at the site due to the Center's age, having been constructed in the 1950's when stormwater quality measures were not required. Surface Water Quality will be enhanced in the post-development phase by the use of practices defined in the Manual as allowed by the NYSDEC Redevelopment Strategy. The proposed subsurface stormwater management facilities will consist of perforated pipe allowing for the infiltration and filtering of stormwater runoff into the subsoils. In addition, Vortechics devices will be installed to treat 100% of the required water quality volume and will remove 80%

total suspended solids from all contributing areas as required by the NYSDEC. The sizing of these facilities is included in Appendix IV entitled “Stormwater Management Report” prepared by John Meyer Consulting, PC.

c. Impacts On Off-Site/Downstream Stormwater Systems and Final Stormwater Destination Location

The downstream properties will not be adversely affected by the proposed development with the implementation of the proposed stormwater management plan described above.

Peak rates of runoff will not increase in the post-development condition since the proposed subsurface stormwater management facilities will provide storage to allow runoff from the additional impervious areas to leave the site at a controlled rate. The project will not increase the volume of stormwater runoff leaving the property since infiltration is also proposed (refer to Stormwater Management Plan in Appendix IV for additional information regarding runoff volume calculations).

Water quality will be enhanced by infiltration and filtering of runoff via the use of perforated subsurface pipes. Water quality will also be enhanced by mechanical means using Vortech devices which are sized to remove 80% total suspended solids from the water quality volume as required by NYSDEC in the Manual.

3. Mitigation Measures

a. Stormwater Management Plan And Permanent Improvements

The Stormwater Management Plan (Appendix IV) and proposed permanent improvements are discussed above.

b. Maintenance Of The Permanent Stormwater Management Controls

Maintenance of the proposed stormwater management systems is required for the system to properly function. The maintenance of the stormwater facilities will be the responsibility of the property owner and the owner will maintain these facilities in perpetuity. The following is a listing of the components of the system that will require maintenance and the frequency it is to be performed:

- 1) All Vortech devices and catch basin sumps shall be cleaned of all debris at least once per year.
- 2) The subsurface detention system shall be inspected at least once per year to remove accumulated sediment.
- 3) All paved areas shall be cleaned and swept twice per year to remove debris and sediment to prevent its entrance into the stormwater management facilities.

c. Sediment & Erosion Control During Construction

A Sediment and Erosion Control Plan (Figure IV.B-6) has been prepared for the project to minimize sediment transport from the site during construction activities. Some key components of this plan include:

- Retaining Walls - are structural walls constructed of rock or concrete and designed to prevent soil movement and retain soil in place in steeply sloping areas;
- Dust Control - consisting of spraying the ground surface with water to prevent dust emissions from vehicular and construction traffic;

- Temporary Storm Drain Diversion - is the redirection of a storm drain so that it will temporarily discharge to a sediment trapping device;
- Silt Fence - is a temporary geotextile fabric used to intercept sediment laden runoff from small drainage areas;
- Storm Drain Inlet Protection - is a permeable barrier placed around the inlet to reduce the amount of sediment entering the storm drainage system;
- Stabilized Construction Entrance - will be constructed at the entrance to each area of construction and will consist of a stabilized pad of aggregate underlain by filter cloth;
- Temporary Diversion or Swale - is a constructed swale or channel which intercepts sediment laden runoff and divert it to a sediment trapping device or prevents runoff from entering a disturbed area by intercepting and diverting it to a stabilized outlet;
- Temporary Sediment Basins - which act as a trap to intercept sediment laden runoff and permit the sediment to settle;
- Erosion Control Matting will be installed on newly graded slopes to provide immediate stability and to aid the establishment of vegetation. These blankets consist of photodegradable netting with a combination of straw and coconut fibers to protect exposed soil from rain and minimize erosion;
- Construction Sequence and Erosion Control Notes – Construction sequencing is included on the Sediment and Erosion Control Plan to direct the contractor how to proceed during construction to prevent and minimize erosion.