

**Western New York
Science & Technology
Advanced Manufacturing Park
(STAMP)**

**Stormwater Management
Preliminary Report**

Prepared for:

**Genesee County Economic Development Center
99 Medtech Drive, Batavia, NY 14020**

March 2011



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Executive Summary

The Science and Technology Advanced Manufacturing Park (STAMP) project in the Town of Alabama, in western Genesee County, New York is being planned. The project site consists of approximately 1,300 acres and is located along New York State Highway Route 77, approximately 5 miles north of the New York State Thruway. The purpose of the project is to develop a high technology manufacturing center, with a focus on renewable energy and to provide economic development opportunities within the region.

The purpose of the Stormwater Management Preliminary Report is to evaluate the necessary improvements required to manage and mitigate stormwater runoff throughout the developed STAMP project site.

Currently, the majority of the STAMP project site consists of agricultural land and some residential homes. The site can be characterized as having gentle to moderate slopes with intermittent streams. State and Federal delineated wetlands are located on the site. The site does not lie within the FEMA 100 Year Flood Plain.

Under existing conditions, the site has been divided into four distinct drainage catchment areas with associated design points. There are three streams that are within the STAMP site, two of which are unnamed (unnamed stream #1 and unnamed stream #2) and the third is Whitney Creek. Both the existing drainage catchments and the streams are shown in Appendix A.

This evaluation will consider the STAMP project at full build-out and the impact that the development will have on the existing site. At Full Build-Out, approximately 6,130,000 square feet of building development will be required and approximately 9,330 employees are projected to occupy the site. This translates to an increase in impervious area of approximately 490 acres compared to existing conditions when considering the associated buildings, roads and parking lots.

Similar to existing conditions, under developed conditions the site has been divided into four distinct drainage catchment areas with associated design points (see Appendix B). Under developed conditions, the existing flow path of unnamed stream #1 will be disrupted due to the placement of the proposed buildings, parking lots and associated roadways. Therefore, the stream has been re-routed to discharge into unnamed stream #2 traveling through proposed drainage catchment area #2. This will allow both streams to continue to contribute to the offsite wetlands.

New development within the developed drainage catchment areas will require new stormwater runoff mitigation, including both quality and quantity practices. For this analysis, it is assumed that the primary stormwater mitigation measure will be pond-type facilities. The ponds will have a forebay and permanent pool to treat water quality and additional storage volume to treat water quantity.

By comparing peak flows generated from existing conditions and developed conditions, required pond volumes can be calculated using the PondPack software. The calculation is based on an estimation of the amount of storage required to mitigate developed stormwater flows to existing flow rates or lower. For this report, the worst case scenario of the peak flow generated by the 100 year storm event is used for drainage catchment areas 1, 2 and 4. Due to the reduction of drainage area for catchment area 3 from existing to developed conditions, no pond storage estimates have been completed.

The following is a summary of existing and developed flows for each drainage area for the 1, 10 and 100 year storm events.

RUNOFF - EXISTING CONDITIONS

WATERSHED/ SUBAREA	DRAINAGE AREA	1-YEAR STORM EVENT	10-YEAR STORM EVENT	100-YEAR STORM EVENT
DA-1	706 acres	233.05 cfs	653.33 cfs	1,024.76 cfs
DA-2	437 acres	104.40 cfs	318.25 cfs	512.57 cfs
DA-3	103 acres	30.06 cfs	103.11 cfs	172.09 cfs
DA-4	126 acres	40.96 cfs	141.85 cfs	236.25 cfs

RUNOFF - DEVELOPED CONDITIONS

WATERSHED/ SUBAREA	DRAINAGE AREA	1-YEAR STORM EVENT	10-YEAR STORM EVENT	100-YEAR STORM EVENT
DA-1	725 acres	809.38 cfs	1909.57 cfs	2826.11 cfs
DA-2	465 acres	421.37 cfs	1094.23 cfs	1672.73 cfs
DA-3	78 acres	17.90 cfs	65.85 cfs	111.59 cfs
DA-4	128 acres	45.20 cfs	188.05 cfs	328.18 cfs

The following table summarizes the storage requirements for the stormwater management facilities for drainage catchment areas 1, 2 and 4. The calculations used are based on the flow rates for the 100 year storm event.

STORMWATER MANAGEMENT FACILITY STORAGE REQUIREMENTS

WATERSHED/ SUBAREA	STORAGE REQUIREMENT
DA-1	77.09 acre-feet
DA-2	47.58 acre-feet
DA-4	5.19 acre-feet

In addition to the main stormwater pond facilities in each catchment area, point source treatment practices will be implemented as required in the pending New York State Department of Environmental Conservation New York Stormwater Management Design Manual. The point source treatment practices include rain gardens for roof drainage, bio-retention swales or infiltration trenches for parking areas, and a variety of other practices. Buffers for these treatment practices have been incorporated into the overall conceptual plan for the project. As development occurs, additional stormwater studies and calculations will be required to determine compliance and adequate sizing of associated treatment methods.

For this analysis, worst case pond sizes were calculated for developed conditions. The point source treatment requirements improve infiltration and decrease runoff generated from development. Therefore, the size of the ponds will generally decrease as more of these practices are implemented.

The point source treatment practices include rain gardens for roof drainage, bio-retention swales or infiltration trenches for parking areas, and a variety of other practices. Buffers for these treatment practices have been incorporated into the overall conceptual plan for the project. As development occurs and more design details are available, additional stormwater studies and calculations will be required to determine more exact locations and sizing of associated treatment methods.

The final design and layout of the treatment practices will also assist in supplying water to the existing wetlands and streams on the STAMP site. By discharging treated stormwater from these practices into the streams and wetland systems, the integrity of the systems will be maintained and even enhanced.

Introduction

The Science and Technology Advanced Manufacturing Park (STAMP) project in the Town of Alabama, in western Genesee County, New York is being planned. The project site consists of approximately 1,300 acres and is located along New York State Highway Route 77, approximately 5 miles north of the New York State Thruway. The purpose of the project is to develop a high technology manufacturing center, with a focus on renewable energy and to provide economic development opportunities within the region.

The purpose of the Stormwater Management Preliminary Report is to evaluate the necessary improvements required to manage and mitigate stormwater runoff throughout the developed STAMP project site.

Existing Conditions

Currently, the majority of the STAMP project site consists of agricultural land and some residential homes. The site can be characterized as having gentle to moderate slopes with intermittent streams. State and Federal delineated wetlands are located on the site. The site does not lie within the FEMA 100 Year Flood Plain.

The STAMP site is comprised of many different soils with different Hydrologic Soil Group classifications. The site contains mostly Type C & D soils as defined by the National Cooperative Soil Survey, which generally describes the site as moderate to poorly drained. An existing soils map has been included in Appendix A-1.

Under existing conditions, the site has been divided into four distinct drainage catchment areas with associated design points as follows (see Appendix A-2):

- DA-1 – This subarea consists of approximately 706 acres of agricultural land, residences and roadways. The subarea contains approximately 46 acres of wetlands, 52 acres of wooded area and 5.50 acres of impervious area. The main drainage feature of this subarea is a small stream and a series of culverts which generally drain from NYS Route 77 towards the northwest portion of the site. Design Point 1 (DP1) for this analysis is located in the northwest corner of the STAMP project site.
- DA-2 – This subarea consists of approximately 437 acres of agricultural land, residences and roadways. The subarea contains approximately 66 acres of wetlands, 108 acres of wooded area and 5.60 acres of impervious area. The main drainage feature of this subarea is a series of swales and culverts which drain from NYS Route 77 to the northwest, to the point along the western property line of the STAMP project site. Design Point 2 (DP2) for this analysis is located at the west side of the STAMP site.
- DA-3 – This subarea consists of approximately 103 acres of agricultural land, residences and roadways. The subarea contains approximately 8 acres of wetlands, 4

acres of wooded areas and 2.11 acres of impervious area. The main drainage feature is Whitney Creek which drains to the southwest portion of the site. Design Point 3 (DP3) for this analysis is located at the southwest property line of the STAMP site.

- DA-4 – This subarea consists of approximately 126 acres of agricultural land, residences and roadways. The subarea contains approximately 1.2 acres of wetlands, 2.6 acres of wooded area and 4.71 acres of impervious area. The drainage for this subarea is primarily sheet flow to a swale that drains to the northeast portion of the site. Design Point 4 (DP4) for this analysis is located at the northeast portion of the STAMP site.

Existing Streams

There are three streams that are within the STAMP site, two of which are unnamed and the third is Whitney Creek.

- Unnamed stream #1 is the northern most stream on the STAMP site and travels through drainage catchment area #1. The stream begins as a headwater stream for the wetlands located on the northwestern portion of the site and is the main drainage feature of the catchment area. The stream leaves the site along the western boundary line of the property and continues north approximately 5,890 feet and discharges to the southern portion of Oak Orchard Swamp. The onsite drainage area contributing to the stream is approximately 700 acres. The flows calculated for DA-1 for the 1, 10 and 100 year storm events are provided in Table 2.
- Unnamed stream #2 begins at an existing pond located on the southeastern portion of the STAMP site and acts as the main drainage feature of drainage catchment area #2. The stream leaves the site along the western boundary of the STAMP site and continues northward approximately 4,300 feet where it combines with unnamed stream #1. The onsite drainage area contributing to the stream is approximately 440 acres. The flows calculated for DA-2 for the 1, 10 and 100 year storm events are provided in Table 2.
- Whitney Creek enters the site at the south portion of the property near Crosby Road and leaves the site at a point along the southwestern boundary. The creek continues to flow northward where it eventually discharges into a tributary of Oak Orchard Creek and then Oak Orchard Swamp, approximately 20,700 feet away from the discharge point. The onsite drainage area contributing to the creek is approximately 100 acres. The flows calculated for DA-3 for the 1, 10 and 100 year storm events are provided in Table 2 below.

Hydrologic Analysis Methodology

The quantity of stormwater runoff generated from a watershed is affected by land development and site improvement projects. Construction activities that change the surface vegetation and grades, along with new impervious areas, typically decrease the groundwater

infiltration. This reduction in infiltration will result in an increase in overland stormwater runoff rates. As a result, a hydrologic analysis is required to evaluate the net effect the proposed site improvements will have on the existing site.

The USDA Soil Conservation Services TR-55 hydrologic models were used to calculate the peak runoff rates for each drainage catchment area. The TR-55 Model uses an empirical method to express storm events as unit hydrographs. The unit hydrographs are developed for each subarea and are hydrologically added to develop peak discharge rates for each storm event. This method has been incorporated into a computer analysis software program, "PondPack", developed by Haestad Methods, Inc. This program was used to generate the peak stormwater runoff rates for the subareas (see Appendices A and B).

The guidelines outlined by USDA Soil Conservation Services TR-55 hydrologic models were followed while calculating the runoff curve number and time of concentration for each subarea. The runoff curve number (CN) is based on a weighted average of ground cover and soil type. Topographic maps, soils surveys and site visits were used to determine ground cover and underlying soils.

Time of concentration (T_c) represents the time it takes for surface runoff to travel from the hydraulically most distant point within the catchment area to the design point. Surface slope, roughness, channel slope and shape, flow patterns and runoff velocities are factors that directly affect the time of concentration. Runoff velocities are based on ground characteristics and flow type. Stormwater runoff flows through drainage areas as sheet flow, shallow concentrated flow, open channel flow or flow in storm sewers. Runoff begins as sheet flow in the upper limits of the subarea and can be characterized as flow over a broad surface area such as short stretches of grass and/or pavement. Sheet flow then gradually develops into shallow concentrated flow. Open channel flow or concentrated flow occurs when shallow concentrated flow converges into well defined ditches or storm sewers. The sum of each travel time over the individual surfaces within the subarea determines the time of concentration.

Hydrologic Storm Events

The USDA Soil Conservation Services TR-55 hydrologic model uses synthetic storm events when calculating runoff hydrographs. These synthetic storm events are based on statistical analysis of actual storm events for different durations over a broad geographical area. The Soil Conservation Services categorizes rainfall by distribution type associated to a geographical area, and by the total number of inches of precipitation that is assumed to occur over 24-hour duration.

The proposed project lies within the geographical boundary of Type II rainfall distribution area. The following table lists the rainfall depth for each particular design storm event to be analyzed.

**TABLE 1
RAINFALL DEPTH – DESIGN STORM EVENTS
GENESEE COUNTY (TYPE II DISTRIBUTION)**

Design Storm Event	Total Rainfall Depth (Inches)
1-Year	2.1
10-Year	3.6
100-Year	4.8

Hydrologic Analysis Results

The following table summarizes the peak flows generated from the drainage catchment areas for the existing site for the various storm events (see Appendix A for computer calculations and results) in cubic feet per second (cfs).

**TABLE 2
RUNOFF - EXISTING CONDITIONS**

WATERSHED/ SUBAREA	DRAINAGE AREA	1-YEAR STORM EVENT	10-YEAR STORM EVENT	100-YEAR STORM EVENT
DA-1	706 acres	233.05 cfs	653.33 cfs	1,024.76 cfs
DA-2	437 acres	104.40 cfs	318.25 cfs	512.57 cfs
DA-3	103 acres	30.06 cfs	103.11 cfs	172.09 cfs
DA-4	126 acres	40.96 cfs	141.85 cfs	236.25 cfs

Developed Conditions

This evaluation will consider the STAMP project at full build-out and the impact that the development will have on the existing site. At Full Build-Out, approximately 6,130,000 square feet of building development will be required and approximately 9,330 employees are projected to occupy the site. This translates to an increase in impervious area of approximately 490 acres compared to existing conditions when considering the associated buildings, roads and parking lots.

Similar to existing conditions, under developed conditions the site has been divided into four distinct drainage catchment areas with associated design points as follows (see Appendix B-1).

- DA-1 - This subarea consists of 725 acres comprised of new buildings, parking lots and roadways. The subarea contains approximately 33 acres of existing wetlands, 127 acres of wooded area and approximately 347 acres of impervious area. The discharge from this subarea will be directed towards new stormwater management facilities by sheet flow and a new storm sewer system. The discharge outlets at the property line in the northwestern portion of the project site to Design Point 1 (DP1).
- DA-2 - This subarea consists of 465 acres comprised of new buildings, parking lots and roadways. The subarea contains approximately 66 acres of existing wetlands, 102 acres of wooded area and approximately 156 acres of impervious area. The discharge from this subarea will be directed towards a new stormwater management facility by sheet flow and a new storm sewer system. The discharge outlets at the western property line of the STAMP site at Design Point 2 (DP2).
- DA-3 - This subarea consists of 78 acres of agricultural land, residences and roadways. The subarea contains approximately 8 acres of wetlands, 4 acres of wooded areas and approximately 2.11 acres of impervious area. This drainage catchment area would remain mostly undisturbed from existing conditions. The discharge from this subarea is naturally directed towards the southwestern portion of the STAMP site by sheet flow to a swale and outlets at Design Point 3 (DP3).
- DA-4 - This subarea consists of 128 acres of agricultural land, existing residences, new buildings, parking lots and associated roadways. The subarea contains approximately 1.2 acres of wetlands, 20 acres of wooded area and approximately 32 acres of impervious area. The runoff from this subarea will be directed towards a new stormwater management facility by sheet flow and a new storm sewer system. The discharge outlets at the northeastern portion of the site near Lewiston Road at Design Point 4 (DP4).

Stream Alterations

Originally, unnamed streams #1 and #2 on the STAMP site joined at the wetlands located along the western boundary of the site. Under developed conditions, the existing flow path of the unnamed stream #1 will be disrupted due to the placement of the proposed buildings, parking lots and associated roadways. Therefore, the stream has been re-routed to discharge into unnamed stream #2 traveling through proposed drainage catchment area #2. This will allow both streams to continue to contribute to the offsite wetlands. All developed runoff within proposed drainage catchment area #1 is to be directed towards stormwater management facilities which will discharge into the existing wetlands located along the northwestern portion of the site. With the stormwater management facility discharge and the combined streams discharge, there should be no adverse impact on the existing wetlands that are located along the western boundary of the site.

Evaluation Assumptions

Due to the possibility of future alterations to the conceptual plan, the following assumptions have been used in the hydrology calculations used in this analysis:

- The time of concentration component used in PondPack to calculate drainage flow has been assumed to be 15 minutes (0.25 hours) for developed drainage catchment areas 1, 2 and 4. This is due to the large scale of the drainage areas and the lack of detailed information regarding proposed topography.
- Developed drainage catchment areas 1, 2 and 4 will all drain via runoff or new storm sewer systems to the new pond footprints. As the conceptual plan becomes more refined, the drainage areas may be altered and pond footprints may change in size and location.
- For developed conditions, all open green space will be considered maintained lawn area except for wetland areas, existing wooded areas, or proposed wooded areas.

Hydrologic Analysis Results

The following table summarizes the peak flows generated from the developed drainage catchment areas for the various storm events (see Appendix B-2 for computer calculations and results) in cubic feet per second (cfs).

TABLE 3
RUNOFF - DEVELOPED CONDITIONS

WATERSHED/ SUBAREA	DRAINAGE AREA	1-YEAR STORM EVENT	10-YEAR STORM EVENT	100-YEAR STORM EVENT
DA-1	725 acres	809.38 cfs	1909.57 cfs	2826.11 cfs
DA-2	465 acres	421.37 cfs	1094.23 cfs	1672.73 cfs
DA-3	78 acres	17.90 cfs	65.85 cfs	111.59 cfs
DA-4	128 acres	45.20 cfs	188.05 cfs	328.18 cfs

Stormwater Management Results and Requirements

New development within the developed drainage catchment areas will require new stormwater runoff mitigation, including both quality and quantity practices. For this analysis, it is assumed that the primary stormwater mitigation measure will be pond-type facilities. The ponds will have a forebay and permanent pool to treat water quality and additional storage volume to treat water quantity.

By comparing peak flows generated from existing conditions and developed conditions, required pond volumes can be calculated using the PondPack software. The calculation is based on an estimation of the amount of storage required to mitigate developed stormwater flows to existing flow rates or lower. For this report, the worst case scenario of the peak flow

generated by the 100 year storm event is used for drainage catchment areas 1, 2 and 4. Due to the reduction of drainage area for catchment area 3 from existing to developed conditions, no pond storage estimates have been completed.

Table 4 summarizes the storage requirements for the stormwater management facilities for drainage catchment areas 1, 2 and 4. The calculations used are based on the flow rates given in Table 2 and Table 3 for the 100 year storm event. These results are shown in Appendix B-3 and the approximate pond footprints have been shown in Appendix B-1.

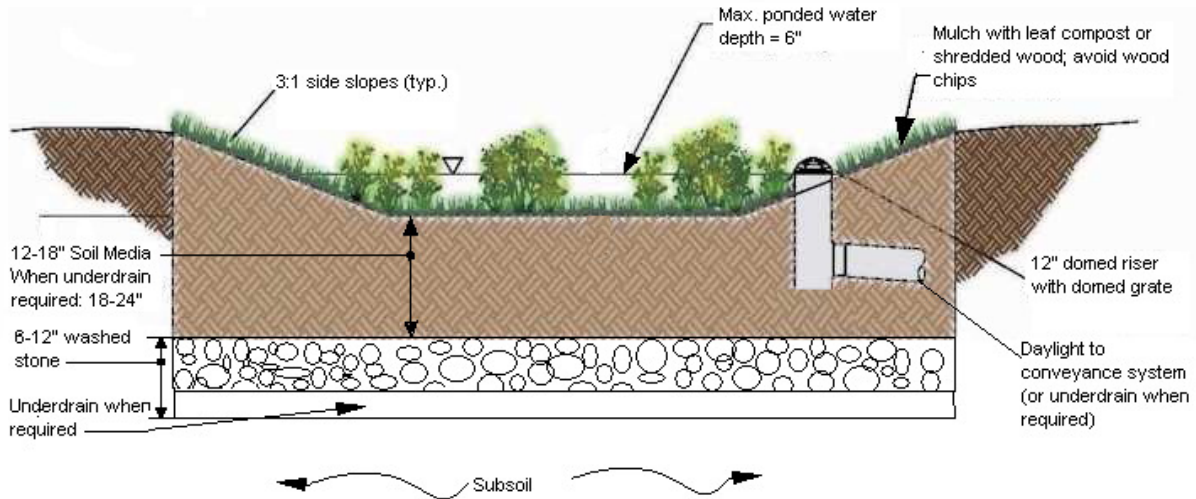
**TABLE 4
STORMWATER MANAGEMENT FACILITY STORAGE REQUIREMENTS**

WATERSHED/ SUBAREA	STORAGE REQUIREMENT
DA-1	77.09 acre-feet
DA-2	47.58 acre-feet
DA-4	5.19 acre-feet

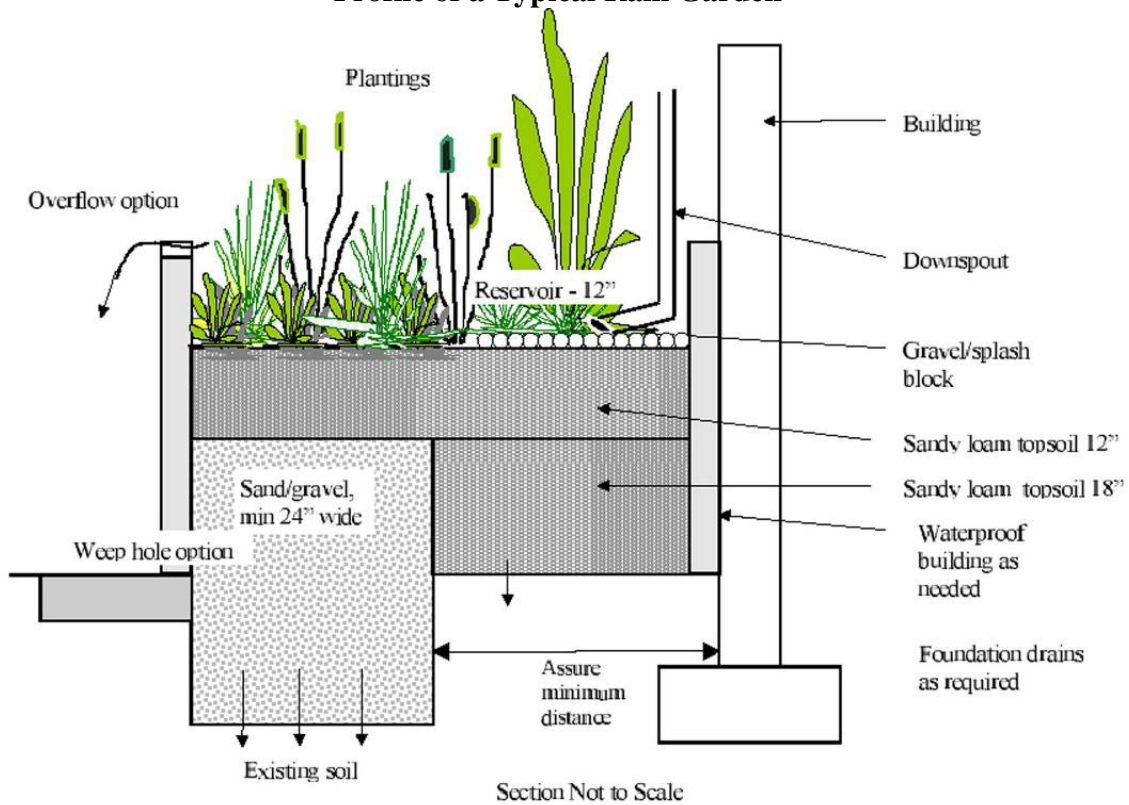
In addition to the primary stormwater pond facilities in each catchment area, point source treatment practices will also be implemented as required in the pending New York State Department of Environmental Conservation New York Stormwater Management Design Manual. Point source practices include rain gardens, stormwater planters and vegetated open swales.

Vegetated open swales are natural drainage paths which can be used instead of constructing underground closed storm sewers to increase the time of concentration, reduce the peak discharge, and provide infiltration. Rain gardens manage and treat small volumes of stormwater runoff using a conditioned planting soil bed and planting materials to filter runoff stored within a shallow depression. Stormwater planters are defined as small landscaped stormwater treatment devices that can be designed as infiltration or filtering practices. Stormwater planters use soil infiltration and biogeochemical processes to decrease stormwater quantity and improve water quality. Bioretention areas are defined as shallow stormwater basins or landscaped areas which utilizes engineered soils and vegetation to capture and treat runoff. The practice is often used at parking lots where stormwater can sheet flow into the swale.

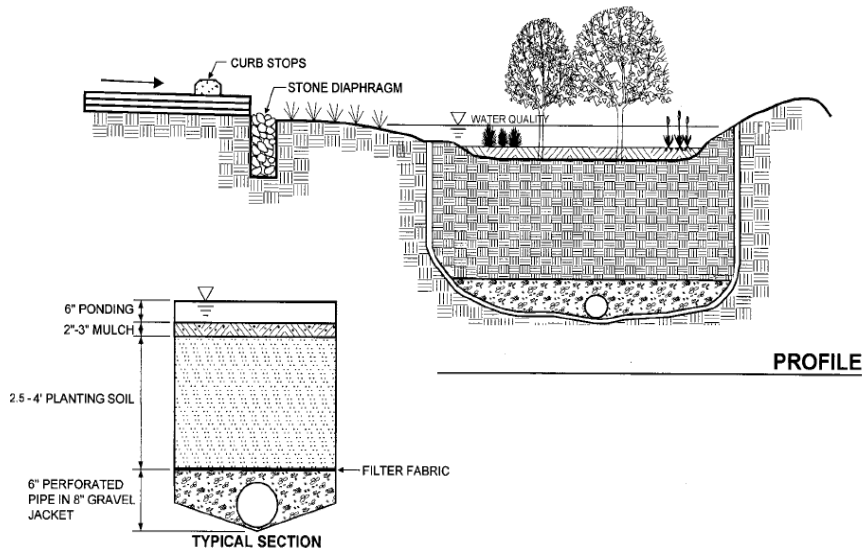
As the exact layout of the development is unknown at this time, the design and layout of the point source treatment practices cannot be clearly defined. However, buffer areas for these features have been reserved on the concept plan for future planning purposes. The following sketches from the New York Stormwater Management Design Manual show a typical rain garden profile, an infiltration stormwater planter and a bioretention swale for reference.



Profile of a Typical Rain Garden



Typical Infiltration Stormwater Planter



Profile of Typical Bioretention Swale

Conclusions

The purpose of this Stormwater Management Preliminary Report is to evaluate the necessary improvements required to provide stormwater management for the STAMP project site. The project site consists of approximately 1,300 acres and is located along New York State Highway Route 77, approximately 5 miles north of the New York State Thruway. The project requires new stormwater management facilities to mitigate runoff created from the increase in impervious surfaces in development.

Under proposed conditions, drainage catchment areas 1, 2 and 4 will require stormwater ponds to mitigate the majority of the required water quality and quantity volumes. Catchment area 3 will remain essentially undisturbed. In addition, several point source treatments will be incorporated to improve water quality throughout the developed STAMP site.

For this analysis, worst case pond sizes were calculated for developed conditions. The point source treatment requirements improve infiltration and decrease runoff generated from development. Therefore, the size of the ponds will generally decrease as more of these practices are implemented.

The point source treatment practices include rain gardens for roof drainage, bio-retention swales or infiltration trenches for parking areas, and a variety of other practices. Buffers for these treatment practices have been incorporated into the overall conceptual plan for the project. As development occurs and more design details are available, additional stormwater studies and calculations will be required to determine more exact locations and sizing of associated treatment methods.

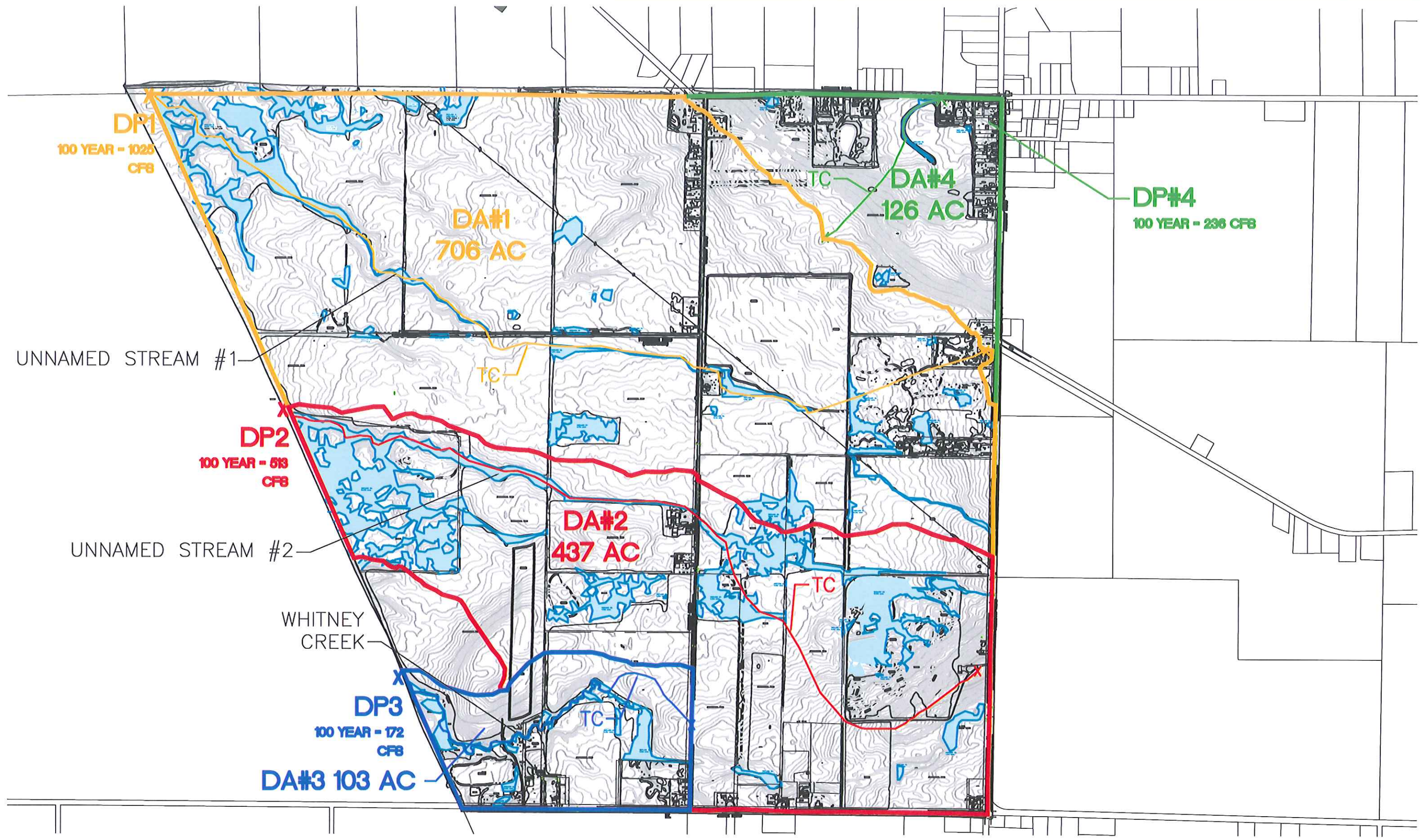
The final design and layout of the treatment practices will also assist in supplying water to the existing wetlands and streams on the STAMP site. By discharging treated stormwater from

these practices into the streams and wetland systems, the integrity of the systems will be maintained and even enhanced.

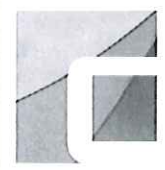
**APPENDIX A – 1:
EXISTING SOILS MAP**

**APPENDIX A – 1:
EXISTING DRAINAGE MAP**

Drawing Name: G:\PROJECTS\GCEDC\STAMP\ACAD\CIVIL\STORM\STORM FIGURES.DWG Date: 03/08/11 Time: 08:23 am
 Referenced Drawings: Aerial survey base alabama contours Aerial survey base Concept-PV



REVISIONS				
NO.	DATE	BY	CHKD	DESCRIPTION



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GENESEEE COUNTY
ECONOMIC DEVELOPMENT CENTER
 TOWN OF ALABAMA GENESEEE COUNTY NEW YORK

DATE: 01/19/10
 DRAWN: ARK
 DESIGNED: ARK
 CHECKED: TAC
 SCALE: 1"=1000'

SCIENCE AND TECHNOLOGY
 ADVANCED MANUFACTURING PARK (STAMP)
EXISTING DRAINAGE CATCHMENT
AREAS MAP

PROJECT NUMBER
 11790.00
 DRAWING NUMBER
D-001
 000950

**APPENDIX A – 2:
EXISTING RUNOFF RATES
FROM PONDPACK**

MASTER DESIGN STORM SUMMARY

Network Storm Collection: Genesee County

Return Event	Total Depth in	Rainfall Type	RNF ID
Pre 1	2.1000	Synthetic Curve	TypeII 24hr
Pre 10	3.6000	Synthetic Curve	TypeII 24hr
Pre100	4.8000	Synthetic Curve	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*DESIGN POINT 1	JCT	1	42.063		12.5500	233.05		
*DESIGN POINT 1	JCT	10	109.681		12.5500	653.33		
*DESIGN POINT 1	JCT	100	170.554		12.5500	1024.76		
EXISTING AREA #1	AREA	1	42.063		12.5500	233.05		
EXISTING AREA #1	AREA	10	109.681		12.5500	653.33		
EXISTING AREA #1	AREA	100	170.554		12.5500	1024.76		

MASTER DESIGN STORM SUMMARY

Network Storm Collection: Genesee County

Return Event	Total Depth in	Rainfall Type	RNF ID
Pre 1	2.1000	Synthetic Curve	TypeII 24hr
Pre 10	3.6000	Synthetic Curve	TypeII 24hr
Pre100	4.8000	Synthetic Curve	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
AREA #2	AREA	1	22.736		12.8500	104.40		
AREA #2	AREA	10	62.486		12.7000	318.25		
AREA #2	AREA	100	99.010		12.7000	512.57		
*DESIGN POINT 2	JCT	1	22.736		12.8500	104.40		
*DESIGN POINT 2	JCT	10	62.486		12.7000	318.25		
*DESIGN POINT 2	JCT	100	99.010		12.7000	512.57		

MASTER DESIGN STORM SUMMARY

Network Storm Collection: Genesee County

Return Event	Total Depth in	Rainfall Type	RNF ID	
1	2.1000	Synthetic Curve	TypeII	24hr
10	3.6000	Synthetic Curve	TypeII	24hr
100	4.8000	Synthetic Curve	TypeII	24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation; Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*DESIGN POINT 3	JCT	1	4.307		12.3500	30.06		
*DESIGN POINT 3	JCT	10	12.889		12.3500	103.11		
*DESIGN POINT 3	JCT	100	21.036		12.3000	172.09		
EXISTING AREA #3	AREA	1	4.307		12.3500	30.06		
EXISTING AREA #3	AREA	10	12.889		12.3500	103.11		
EXISTING AREA #3	AREA	100	21.036		12.3000	172.09		

MASTER DESIGN STORM SUMMARY

Network Storm Collection: Genesee County

Return Event	Total Depth in	Rainfall Type	RNF ID
Pre 1	2.1000	Synthetic Curve	TypeII 24hr
Pre 10	3.6000	Synthetic Curve	TypeII 24hr
Pre100	4.8000	Synthetic Curve	TypeII 24hr

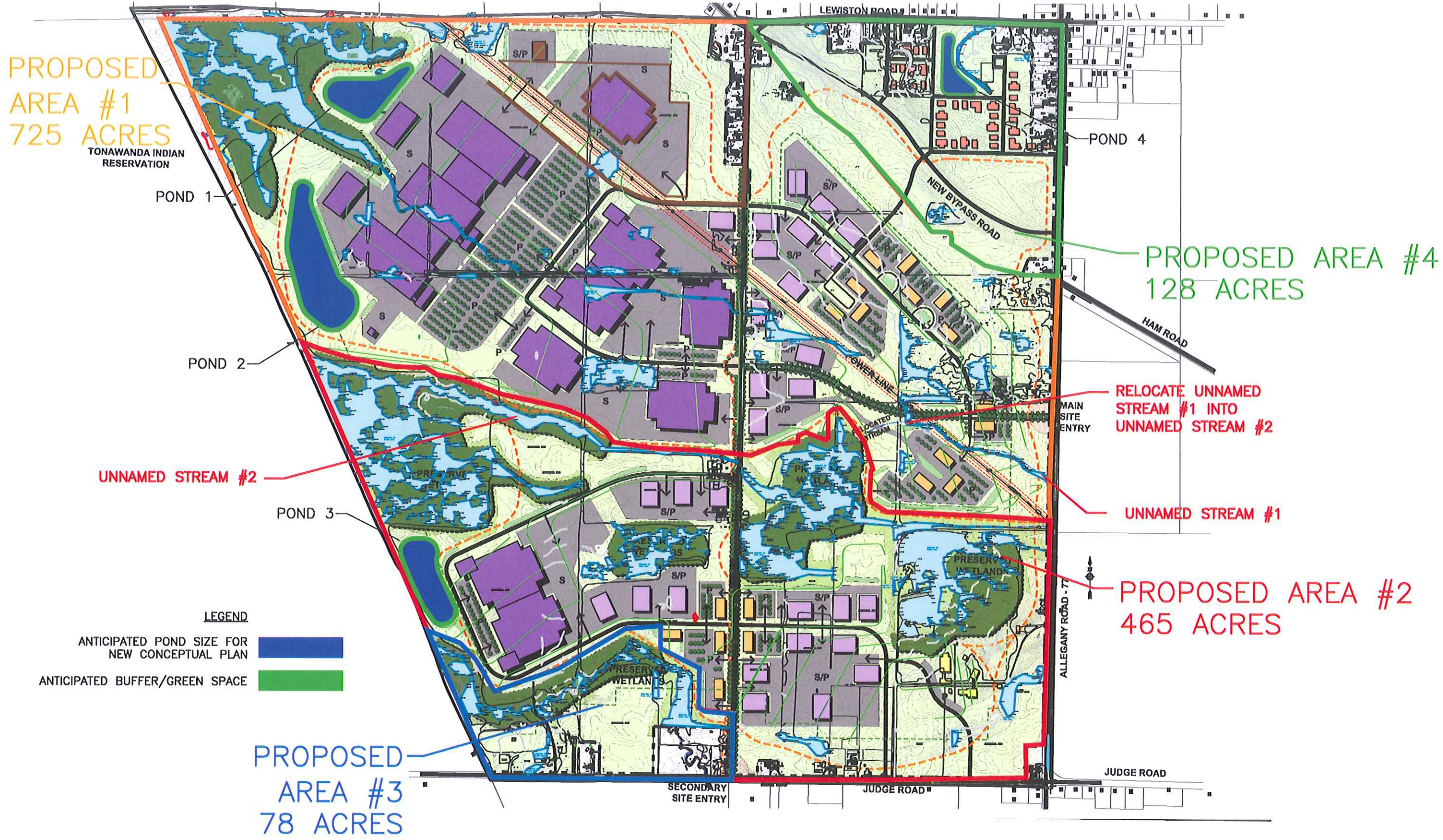
MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*DESIGN POINT 4	JCT	1	5.296		12.3000	40.96		
*DESIGN POINT 4	JCT	10	15.850		12.2500	141.85		
*DESIGN POINT 4	JCT	100	25.869		12.2500	236.25		
EXISTING AREA #4	AREA	1	5.296		12.3000	40.96		
EXISTING AREA #4	AREA	10	15.850		12.2500	141.85		
EXISTING AREA #4	AREA	100	25.869		12.2500	236.25		

**APPENDIX B – 1:
DEVELOPED DRAINAGE MAP**

Drawing Name: G:\PROJECTS\GCEDC\STAMP\ACAD\CIVIL\STORM\STORM FIGURES.DWG Date: 03/06/11 Time: 09:44 am
 Referenced Drawings: Aerial survey base alabama contours Aerial survey base Concept-PV



REVISIONS				
NO.	DATE	BY	CHKD	DESCRIPTION



CLARK PATTERSON LEE
 DESIGN PROFESSIONALS
 205 ST. PAUL STREET, SUITE 500
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GENESEE COUNTY
ECONOMIC DEVELOPMENT CENTER
 TOWN OF ALABAMA GENESEE COUNTY NEW YORK

DATE: 01/19/10
 DRAWN: ARK
 DESIGNED: ARK
 CHECKED: TAC
 SCALE: 1"=1000'

SCIENCE AND TECHNOLOGY
 ADVANCED MANUFACTURING PARK (STAMP)
DEVELOPED DRAINAGE
CATCHMENT AREAS MAP

PROJECT NUMBER
 11790.00
 DRAWING NUMBER
D-001
 000960

**APPENDIX B - 2:
DEVELOPED RUNOFF RATES FROM PONDPACK**

MASTER DESIGN STORM SUMMARY

Network Storm Collection: Genesee County

Return Event	Total Depth in	Rainfall Type	RNF ID
Dev 1	2.1000	Synthetic Curve	TypeII 24hr
Dev 10	3.6000	Synthetic Curve	TypeII 24hr
Dev100	4.8000	Synthetic Curve	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*DESIGN POINT 1	JCT	1	55.913		12.0500	809.38		
*DESIGN POINT 1	JCT	10	132.140		12.0500	1909.57		
*DESIGN POINT 1	JCT	100	198.218		12.0500	2826.11		
DEV. AREA #1	AREA	1	55.913		12.0500	809.38		
DEV. AREA #1	AREA	10	132.140		12.0500	1909.57		
DEV. AREA #1	AREA	100	198.218		12.0500	2826.11		
POND 10	IN POND	1	55.913		12.0500	809.38		
POND 10	IN POND	10	132.140		12.0500	1909.57		
POND 10	IN POND	100	198.218		12.0500	2826.11		
POND 10	OUT POND	1	55.913		12.0500	809.38		
POND 10	OUT POND	10	132.140		12.0500	1909.57		
POND 10	OUT POND	100	198.218		12.0500	2826.11		

MASTER DESIGN STORM SUMMARY

Network Storm Collection: Genesee County

Return Event	Total Depth in	Rainfall Type	RNF ID
Dev 1	2.1000	Synthetic Curve	TypeII 24hr
Dev 10	3.6000	Synthetic Curve	TypeII 24hr
Dev100	4.8000	Synthetic Curve	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*DESIGN POINT 2	JCT	1	29.618		12.0500	421.37		
*DESIGN POINT 2	JCT	10	75.293		12.0500	1094.23		
*DESIGN POINT 2	JCT	100	116.010		12.0500	1672.73		
POND 10	IN POND	1	29.618		12.0500	421.37		
POND 10	IN POND	10	75.293		12.0500	1094.23		
POND 10	IN POND	100	116.010		12.0500	1672.73		
POND 10	OUT POND	1	29.618		12.0500	421.37		
POND 10	OUT POND	10	75.293		12.0500	1094.23		
POND 10	OUT POND	100	116.010		12.0500	1672.73		
PROPOSED AREA #2	AREA	1	29.618		12.0500	421.37		
PROPOSED AREA #2	AREA	10	75.293		12.0500	1094.23		
PROPOSED AREA #2	AREA	100	116.010		12.0500	1672.73		

MASTER DESIGN STORM SUMMARY

Network Storm Collection: Genesee County

Return Event	Total Depth in	Rainfall Type	RNF ID	
1	2.1000	Synthetic Curve	TypeII	24hr
10	3.6000	Synthetic Curve	TypeII	24hr
100	4.8000	Synthetic Curve	TypeII	24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*DESIGN POINT 3	JCT	1	3.030		12.4500	17.90		
*DESIGN POINT 3	JCT	10	9.350		12.4000	65.85		
*DESIGN POINT 3	JCT	100	15.418		12.4000	111.59		
PROPOSED AREA #3	AREA	1	3.030		12.4500	17.90		
PROPOSED AREA #3	AREA	10	9.350		12.4000	65.85		
PROPOSED AREA #3	AREA	100	15.418		12.4000	111.59		

MASTER DESIGN STORM SUMMARY

Network Storm Collection: Genesee County

Return Event	Total Depth in	Rainfall Type	RNF ID
Dev 1	2.1000	Synthetic Curve	TypeII 24hr
Dev 10	3.6000	Synthetic Curve	TypeII 24hr
Dev100	4.8000	Synthetic Curve	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*DESIGN POINT 4	JCT	1	3.902		12.1000	45.20		
*DESIGN POINT 4	JCT	10	13.306		12.0500	188.05		
*DESIGN POINT 4	JCT	100	22.665		12.0500	328.18		
POND 20	IN POND	1	3.902		12.1000	45.20		
POND 20	IN POND	10	13.306		12.0500	188.05		
POND 20	IN POND	100	22.665		12.0500	328.18		
POND 20	OUT POND	1	3.902		12.1000	45.20		
POND 20	OUT POND	10	13.306		12.0500	188.05		
POND 20	OUT POND	100	22.665		12.0500	328.18		
PROPOSED AREA #4	AREA	1	3.902		12.1000	45.20		
PROPOSED AREA #4	AREA	10	13.306		12.0500	188.05		
PROPOSED AREA #4	AREA	100	22.665		12.0500	328.18		

**APPENDIX B – 3:
DEVELOPED STORMWATER MANAGEMENT
FACILITY SIZING FROM PONDPACK**

Results from PondMaker Design Wizard

Drainage Area #1

Return Event	Pre Development Peak (cfs)	Pre Development Volume (ac-ft)	Post Development Peak (cfs)	Post Development Total Volume (ac-ft)	Estimated Storage (ac-ft)
1	233.0501	42.06333	809.3786	55.91289	22.96575
10	653.3347	109.68050	1909.5692	132.13973	52.48437
100	1024.7595	170.55349	2826.1130	198.21754	77.09568

Drainage Area #2

Return Event	Pre Development Peak (cfs)	Pre Development Volume (ac-ft)	Post Development Peak (cfs)	Post Development Total Volume (ac-ft)	Estimated Storage (ac-ft)
1	104.4026	22.73566	421.3690	29.61770	12.42167
10	318.2548	62.48639	1094.2263	75.29288	31.19839
100	512.5728	99.00979	1672.7262	116.00961	47.58511

Drainage Area #4

Return Event	Pre Development Peak (cfs)	Pre Development Volume (ac-ft)	Post Development Peak (cfs)	Post Development Total Volume (ac-ft)	Estimated Storage (ac-ft)
1	40.9574	5.29552	45.1964	3.90183	0.34652
10	141.8497	15.85024	188.0500	13.30571	2.80270
100	236.2541	25.86863	328.1760	22.66511	5.18763