THE CITY OF GREEN, OHIO

COMPREHENSIVE STORM WATER STUDY

PREPARED BY:

environmental design group

THE CITY OF GREEN, OHIO

COMPREHENSIVE STORM WATER STUDY

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CITY OF GREEN, OHIO

COMPREHENSIVE STORM WATER STUDY

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Section 1

1.0 SUMMARY AND RECOMMENDATIONS

1.1 Summary

This comprehensive Storm Water Study addresses a 44 square mile area including the City of Green and an additional 13 square miles of land outside the City that influences the storm water in Green.

This study includes an inventory of main drain channels, ditches of record, bridges and main culverts, minor culverts and allotments. Further, the study includes a hydraulic analysis of the main channels, bridges and main culverts, and an evaluation of the minor culverts and storm sewers within the various allotments. Based on the analysis and evaluations, deficiencies in the storm water system are identified. With this, a solution is developed with an associated cost estimate to correct the deficiency. When possible, multiple solutions are developed and evaluated to determine the best solution.

The recommended improvement projects and suggested priority for implementation are provided in Sections 6 and 8, respectively. The prioritization of projects is based on addressing the most severe existing drainage problems initially, while maintaining the principle that improvements should be made working from downstream to upstream to mitigate the impact of the improvements on downstream areas. The highest priority project include:

The study identified numerous potential storm water improvement projects at a total cost of approximately $11,000,000.

1.2 Recommendations

The following steps are recommended actions to be taken by the City to implement this report.

1. Adopt this study.
2. Evaluate the relative importance of the top priority storm water drainage improvements in relationship to other infra-structure needs to the City. Prioritize and budget storm water improvements based on this evaluation.
3. Modify existing subdivision regulations to require storm water management for up to and including the 100-year storms and adopt these modifications.
4. Consider the establishment of a storm water utility.
5. Authorize design as soon as funding is identified for a specific improvement project. If easements are required, initiate procuring them concurrently.
6. Establish a preventative maintenance program to periodically inspect, clean and repair ditches, culverts and storm sewers. This will help to ensure that the storm water drainage system will function as designed, and prolong its life.
7. Conduct a physical inspection and structural evaluation of the major roadway culverts in the City to identify structural problems. This study considered the ability of the structures to carry storm water. Culverts and storm sewers that have structural problems should be repaired or replaced.
8. Consider establishing riparian zones along main drainage channels to protect stream habitat. Further study the potential of incorporating natural or constructed storm water areas in these zones.

Section 2

2.0 INTRODUCTION

2.1 Authorization

The City of Green recognizes the importance of providing the proper facilities to manage and control storm water. The Green City Council authorized Environmental Design Group, Inc. to prepare a Comprehensive Storm Water Study to identify deficiencies in the existing storm water management system and develop solutions.

2.2 Purpose and Scope

This Study will provide a plan to eliminate deficiencies in the hydraulic capacity of the existing storm water system, and identify storm water improvements needed in the existing system.

In order to accomplish the above, the following Scope has been developed:

1. Determine drainage areas within the City (in the form of a drainage area map).
2. Collect data relative to existing drainage culverts, ditches, and storm sewer systems. Data collection includes obtaining existing information from the Summit County Engineer's office and the Ohio Department of Transportation supplemented by field data collected by EDG.
3. Calculate storm water runoff to each of the culverts, bridges, channels, and ditches being analyzed, along with the hydraulic capacity of each of these items.
4. Compare capacity to runoff. The item being analyzed must have sufficient capacity to pass the storm water runoff.
5. Review existing allotments and identify drainage problems.
6. Identify items having insufficient capacity or other drainage problems and develop solutions (projects) to correct the problems. Develop cost estimates for the projects and prioritize them.

2.3 Study Area

The City of Green is located in the southwest corner of Summit County. Formerly Green Township, the City borders Springfield and Coventry Townships on the north, Lake Township (Stark County) on the east, Jackson Township (stark County) on the south, and Franklin Township on the west. The City's land mass is approximately 21,400 acres or 33.4 square miles. A location map is provided on Figure 2-1.

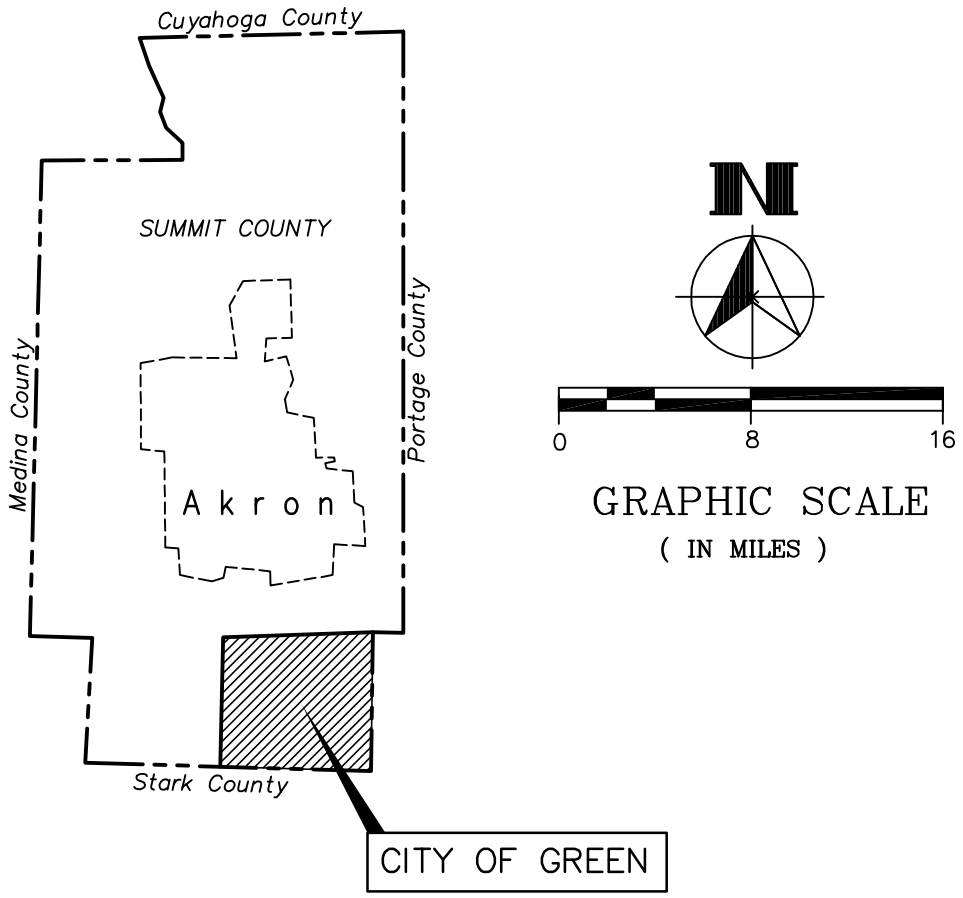

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FIGURE 2-1

COMPREHENSIVE STORM WATER STUDY
LOCATION MAP
CITY OF GREEN

Section 3

3.0 BASIS OF DESIGN

3.1 General

This chapter provides a basic description of the methodology(s) used to perform the technical analysis for this study. Currently the City follows County of Summit Storm Water Management Program Guidelines set forth by the Summit County Engineer's Office for the design of new storm water facilities. These guidelines have been in effect since about 1984, and were utilized in Green by the Summit County Engineer prior to Green becoming a City. In addition, the City's subdivision regulations require that these guidelines be utilized for designing storm water facilities in new subdivisions.

These storm water guidelines require that culverts, channels and storm water management ponds be designed for storm events up to and including the 25 year-24 hour storm (4.0 inches of rain over a 24 hour period). Storm sewers and storm sewer systems typically found in allotments and subdivisions are designed for a 10 year storm. The above noted requirements are typical for many communities and are generally accepted engineering criteria. In some communities, the requirements for storm management ponds to control storm water for the 100 year-24 hour storm has been adopted. This provides insurance that areas downstream of developed areas will not receive increased storm water when major storms occur. EDG recommends that Green adopt this requirement by modifying its subdivision regulations accordingly.

As the above requirements are currently followed in Green and are generally accepted in the engineering field, EDG will follow them for this study. The hydraulic capacity of bridges will be checked for the 25 year storm as well.

The methodologies referenced in the Summit County guidelines that EDG utilizes in the technical analysis are described in the following sections:

3.2 Estimating Runoff

Storm water runoff is estimated using two methodologies. For drainage areas under 25 acres in size, the Rational Method is used. For areas 25 acres and larger, the Soil Conservation Service Technical Release No. 55 (TR-55) method is used.

The formula for the Rational Method is expressed as follows:

$$Q=CIA$$

Where: Q= Storm water runoff rate in cubic feet per second

C= Runoff coefficient, a dimensionless number relating to the permeability of the surface on which the rainfall occurs.

I= Rainfall intensity in inches per hour. Typically the shorter the storm duration, the higher the intensity.

A= Measured areas of the drainage basin being evaluated, in acres.

The TR-55 Method is preferred for all runoff calculations involving project areas of twenty five acres to three square miles. The three procedures described in TR-55 are the Graphical, Chart, and Tabular Methods.

The basis for the TR-55 Method is that the volume of runoff (Q) depends upon the volume of precipitation (P) and the volume of storage that is available for retention. The actual retention is the difference between the volumes of precipitation and runoff. The potential maximum retention (S) is a function of land use, treatment and condition; interception; infiltration; depression storage; and antecedent soil moisture.

Inherent in the determination of (S) is the SCS curve number (CN). The CN for an area is dependent upon the soil type. Combining all of the above factors, the SCS rainfall-runoff equation estimates the volume of runoff.

3.3 Analysis of Drainage Structures

For the purpose of this study, the hydraulic capacity of storm pipes and ditches is calculated using Manning equation. The hydraulic capacity of culverts and bridges is calculated using the U.S. Department of Commerce, Bureau of Public Roads, Hydraulic Engineering Circular No. 5.

The Manning equation for capacity at full flow is expressed as follows:

$$Q = \frac{0.463}{N} (D)^{2.56} \times (S)^{0.5} \text{ for pipe flow}$$

$$Q = \frac{1.486}{N} (R)^{0.67} \times (A)^{0.5} \text{ for ditch flow}$$

Q= The capacity of the storm sewer or ditch in cubic feet per second.

N= Roughness coefficient. A dimensionless number relating to the roughness of the pipe wall or ditch sides and bottom.

D= Pipe diameter in feet.

S= Slope of the energy grade line of the pipe or ditch in feet per foot.

R= Hydraulic radius, the area of the ditch section divided by the wetted perimeter of the section. Units are in feet.

The Hydraulic Engineering Circular No. 5 provides charts and nomographs for calculating the water elevation at the culvert entrance and exit for a given storm water flow and culvert size, the purpose being that the culvert permits sufficient flow to pass without overtopping the roadway or encroaching on adjacent buildings or structures. The charts and nomographs are based on equations relating to the energy required to transport the storm water through the culvert. A copy of this circular is available from EDG upon request.

Section 4

4.0 DESCRIPTION OF STUDY AREA

4.1 Study Area Boundaries

Geographic boundaries for the study area include the City of Green as previously described in Section 2.3. The main focus of this study is the storm water within the City of Green. However, there are areas east and south of the City in Stark County that influence storm water in some of the City's main drainage channels. The boundary for these areas has been defined based on topography and is provided on Figure 4-1. The influence from these areas on storm water within the City is included in the Hydraulic evaluations discussed in Section 6.

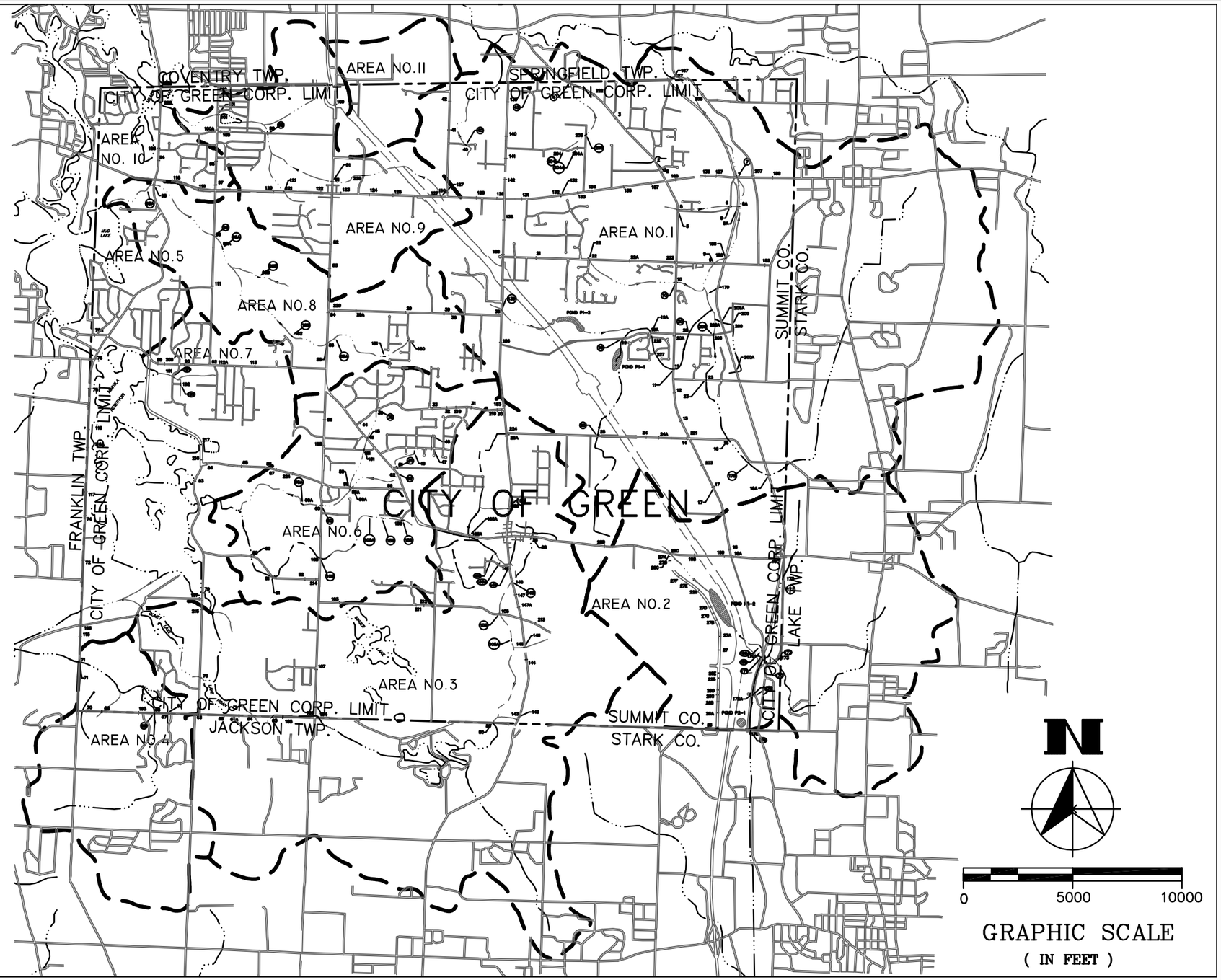

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FIGURE 4-1
DRAINAGE AREA MAP

4.2 Topography

The topography within the City of Green is rolling with elevations generally ranging between 1200 and 1100 feet above mean sea level in the eastern one half of the City, and between 1200 and 1000 feet above mean seal level in the western one half of the City. Typically the higher elevations are found along a ridge that runs from East Liberty to the Akron/Canton Regional Airport.

The highest elevation within the City, located at the north end of Tabs Drive is approximately 1286 feet above mean sea level. The lowest elevation, located where Nimisila Creek crosses South Main Street, is approximately 964 feet above mean sea level.

4.3 Soils and Geology

Soils within the Study Area consist of two major soil types (see Figure 4-2). These are the Canfield-Wooster Association and the Chili Association. Both types are generally moderately well to well drained soils that were formed by deposits when the last glacier receded. In the Canfield-Wooster Association, approximately 50 percent are Canfield soils, 20 percent are Wooster soils, with the remaining 30 percent made up of less extensive soils including Ravenna, Loudonville, Dekalb, Chili, Sebring and Holly soils. Soils in this association generally provide good pasture for dairy farming and grain crops. Exposed soils on slopes (within the Association) are also very susceptible to erosion.

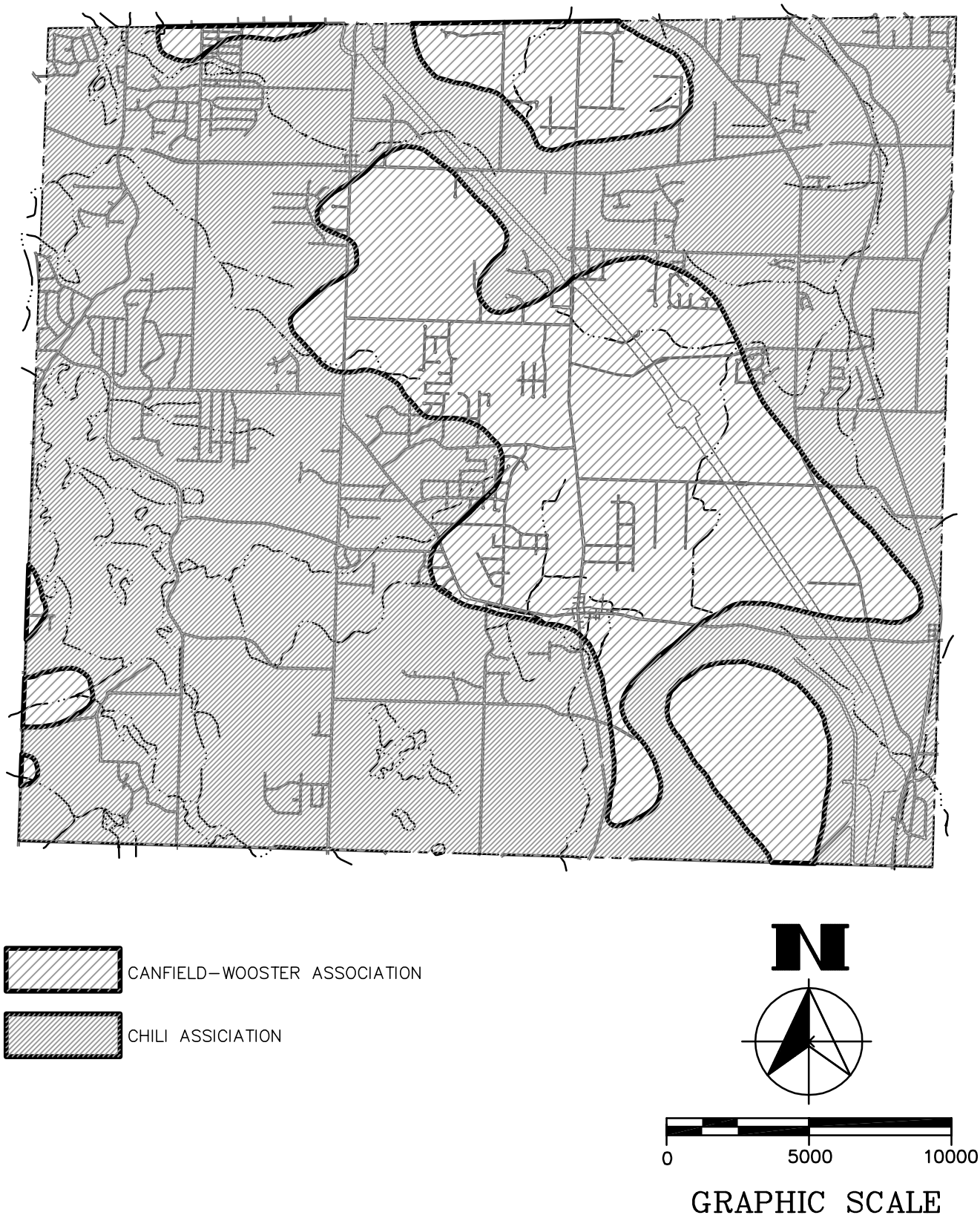

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FIGURE 4-2

COMPREHENSIVE STORM WATER STUDY
SOILS MAP

CITY OF GREEN

Typically, soils in this Association are suitable for building and roadway construction. In the Chili Association, approximately 50 percent is Chili soil with less extensive soils making up the remaining portion of the Association. These include Conotton, Oshtemo, Wheeling, Jimtown, Fitchville, Damascus, Sebring & Holly soils, and also areas of Carlisle muck. Typically the well drained Chili, Conotton, Oshtemo and Wheeling soils are used for farming and sand and gravel operations. These soils when exposed on slopes are susceptible to erosion. These soils are also suitable for building and roadway construction. The remaining soils in this Association are typically low, wet soils that are limited with respect to construction and require dewatering for farm use. Depth to bedrock for the soil types is generally greater than five (5') feet. As most storm drainage facilities are at relatively shallow depths, rock is not considered as a significant factor in the construction of storm drainage improvements within the City.

4.4 Wetlands

Wetlands within the City as determined by the United States Department of Interior are shown on Figure 4-3 and 4-4. In general, wetland areas are spotty throughout the City with the greatest concentration located in the south and west portions of the City in the vicinity of Singer Lake and Nimisila Reservoir. Construction of storm water drainage improvements in wetlands would require a permit from the U.S. Army Corps of Engineers resulting in additional time and cost to mitigate the impact of the improvements on the wetland.

4.5 Land Use

The City of Green is primarily rural and residential with some commercial and industrial land use. Existing commercial and industrial areas include the following:

1. Arlington Road corridor between East Turkeyfoot Lake Road and Interstate 77.
2. Massillon Road corridor between Greensburg Road and the northern City boundary.
3. The southeast corner of the City including the Akron-Canton Regional Airport, and Greensburg Road, Lauby Road and Mayfair Road (in the vicinity of the Airport).

4. South Main Street and East Turkeyfoot Lake Road in the vicinity of the Portage Lakes.

Existing commercial and industrial areas plus undeveloped areas zoned for commercial/industrial use total to approximately 4,800 acres. This represents 22 percent of the City's land mass.

Recreational land use includes Nimisila Reservoir and a portion of the area surrounding it, as well as a portion of the Portage lakes located within the City. The City recently purchased land on the west side of Massillon Road (south of Koons Road) and is currently developing a plan for a City Park there.

Other recreational use includes five (5) golf courses within the City. YMCA Camp Y-Noah is located in the southwest corner of the City at Christman and Mt. Pleasant Roads. Pine Valley Lake Park is located on the west side of Arlington Road, south of Nimisila Road. Recreational areas make up approximately 10 percent of the City's land mass.

Residential developments have occurred primarily in three areas. These include:

1. The west and northwest portions of the City in the vicinity of South Main Street, Cottage Grove Road and East Turkeyfoot Lake Road.

2. The northeast portion of the City in the vicinity of Mayfair Road, Pickle Road, East Turkeyfoot Lake Road and Raber Road.

3. The central portion of the City in the vicinity of Boettler Road, Massillon Road and Greensburg Road.

Currently there are some 90 platted subdivisions of record within the City, representing approximately 18 percent of the City's land mass.

The remaining 50 percent of the City is primarily rural residential. This area is zoned primarily as single family residential.

4.6 Climate

The climate within northeast Ohio (which includes the City of Green) has wide variations in temperature and moderate precipitation. The annual mean temperature for the Akron-Canton area is approximately 50°F with an average annual precipitation of approximately 35 inches.

4.7 Population

The 1990 census recorded 19,179 persons residing in Green. This reflects an increase of approximately 8.8% when compared to the 1980 census total of 17,625 people.

4.8 Transportation

Within the City of Green there is a wide diversity of roadways, from alleys to interstate. Interstate 77, a four lane limited access highway passes through Green in a northwest to southeast direction, with the majority of the roadway located within the eastern one-half of the City. The length of I-77 in Green is approximately 6.8 miles. Other major routes within the City include South Main Street, Arlington Road and Massillon Road (all North-South routes); and East Turkeyfoot Lake Road and Greensburg Road (East-West routes). There are also a great number of local streets within the City including some alleys in the East Liberty and Greensburg areas.

Located in the east portion of the City, near the Summit/Stark County line, is an existing railway (B&O) that runs north/south between Canton and Akron (and beyond). In the past, this line was used for freight transport. Currently the line is not in use.

Finally, located in the southeast portion of the City is the Akron-Canton Regional Airport. The Airport provides commercial and passenger services with some limited military use.

Section 5

5.0 EXISTING STORM WATER DRAINAGE

5.1 General

Within the City of Green, eleven (11) drainage areas have been identified. Contained within each area are various natural and man-made storm water drainage facilities including streams, ditches, lakes, ponds, bridges, culverts and storm sewers. Of these the natural streams are probably the oldest, followed by ditches of record, some of which were established in the late 1800's. These ditches of record were cleaned or reestablished in the mid to late 1930's as W.P.A. projects. In some cases, assessments were collected for the ditch improvements from adjacent property owners. Also, right-of-ways were obtained for most of the ditches, and are currently held in the name of the Summit County Commissioners. Generally, as part of the agreement for the ditch right-of-way, the County became responsible for maintaining the ditch. Table 5-1 provides a summary of the various ditches of record in the City of Green. Appendix A (separate document) includes the historical document establishing the various ditches. Figure 5-1 shows the drainage channels, ditches of record, culverts and bridges within the City. Table 5-2 provides a summary of the various storm water structures within the City. Table 5-3 provides a summary of the various allotments and subdivisions in the City. Figure 5-2 shows the location of the various allotments and subdivisions. Also as part of these projects, culverts and bridges were constructed for roadways that crossed the ditches. As concentrated residential and commercial development occurred, centralized storm sewer systems were installed to collect storm water within the development and transport it to a convenient outfall. Although the storm sewers provided a means to help prevent flooding within a development, the areas down stream of the development sometimes suffered from the increased storm water flow rates due to the development. In more recent years retention and detention ponds are required as part of the storm sewer system for a development to insure that the rate of storm water runoff leaving a site after development is equal to or less than the runoff rate prior to development.

5.2 Drainage Area No. 1

Drainage Area No. 1 encompasses approximately 8,670 acres and is located in the northeast quarter of the City. This area includes part of northwest Lake Township and southwest Springfield Township as well. Of this area, 6,500 acres are located within the City of Green. The outfall for this drainage area is the Tuscarawas River in Springfield Township.

Within Drainage Area No. 1 there exists a main waterway (stream and ditch combination) that begins in Lake Township and flows west into Green at Wise Road. The waterway, named Yenny Ditch, parallels Wise Road for approximately 0.7 miles, then turns north and travels approximately 3 miles crossing Wise Road, Heckman Road, Graybill Road, Raber Road, East Turkeyfoot Lake Road and the northerly City boundary in route to the Tuscarawas River in Springfield Township. Yenny Ditch ends at Graybill Road. The stream that continues north from this point is called the Tuscarawas River in the documentation describing Yenny Ditch. At each roadway crossing noted above there is a culvert or bridge. Also, a house was recently constructed on the south side of Graybill Road over Yenny Ditch. The house is supported by concrete piers. Associated with the main channel are three substantial side channels located west of the main channel, along with a minor ditch to the east of the main channel near Graybill Road. The southerly most side channel is made up of Bender Ditch and Heckman Ditch, and an unnamed channel. The remaining two side channels are not ditches of record. The first of these begins at the intersection of Raber Road and Parfour Blvd and flows east through The Prestwick Golf course and condominiums to the main stream channel east of Mayfair Road. The second channel begins at Mayfair Road, just north of Spade Road. Storm water on the west side of Mayfair Road, primarily from Mayfair Country Club is collected and flows in a box culvert under Mayfair Road. From this point, there was originally an open channel that flowed east 2,300 feet to a culvert under Spade Road, and then continuing east under the railroad to the main channel that flows north. Recently, houses were built in the drainage course immediately east of Mayfair Road. The ditch located in either the front or rear yards was enclosed with an 18 inch pipe (at the upstream end). As this pipe is smaller than the culvert under Mayfair Road,

during certain rainfall events the pipe is not sufficient, and storm water flows overland through the yard areas. Also, the culvert crossing at Spade Road has not functioned for a number of years as tree roots had grown inside the pipe totally blocking it. During the development of this study, the City has replaced this culvert.

Hill Ditch begins north of Heckman Road and flows north, primarily on the east side of the railroad to Graybill Road then west across the road to the main channel flowing north. The area in the vicinity of this ditch is primarily undeveloped.

Myers Ditch is located at Mayfair Road and Long Road (north of East Turkeyfoot Lake Road) as described in Table 5-1. Flow from this ditch is currently directed to an adjacent subdivision. The portion west of Mayfair Road is an open ditch. The portion east of Mayfair Road is enclosed in storm pipes.

Within this drainage area there are 38 allotments as noted on Table 5-3. The majority of these allotments have open ditches with some catch basins and storm pipes. The newer allotments have curb and gutter streets with centralized storm sewers and storm water ponds. These newer allotments include Park Creek Estates, Park Ridge Estates, Raintree Estates, Boettler Business Park, Akron-Canton Corporate Park, Saullo's Acres and Mayfair Estates.

5.3 Drainage Area No. 2

Drainage Area No. 2 encompasses approximately 3,716 acres and is located in the southeast corner of the City,and includes a portion of southwest Lake Township. Of this area, 1,882 acres is located in the City of Green. The outfall for this drainage area is Schumacher Ditch which flows south into Stark County and eventually outfalls to the west branch of Nimisila Creek. A major portion of this area is utilized by the Akron-Canton Regional Airport.

Within Drainage Area No. 2 there exists a main waterway (Schumacher Ditch) as described in Table 5-1 that flows from north to south. Associated with this ditch are four side channels.

Two of these are mainly located in Stark County. These channels join into a single channel in Stark County and enter Green from the southwest near Aultman Road. Once in Green, the channel crosses Aultman Road and flows northwest to Schumacher ditch. The third channel, located in Green begins at the intersection of Greensburg and Lauby Road and flows southeast through Airport property, crosses Interstate 77, and flows through part of the Akan Industrial Park to Schumacher Ditch. The fourth is a ditch that flows from north to south along Lauby Road to a 48" pipe near the Lauby Road and Mt. Pleasant Road intersection. This pipe crosses Mt. Pleasant Road to Stark County, and flows east to Schumacher Ditch.

There is one recorded allotment in this area located at the southwest corner of the City. This allotment. the Akan Industrial Park has curb and gutter streets with inlets and storm sewers. There is no storm water pond for this allotment.

5.4 Drainage Area No. 3

Drainage Area No. 3 encompasses approximately 6,657 acres, and is located in the south central and southwest portion of the City. This area also includes a portion of northern Jackson Township. Of this area, approximately 3,765 acres is located within the City. The outfall for this drainage area is Nimisila Reservoir and Comet Lake.

Within Drainage Area No. 3 there is a main channel that flows from north to south beginning on the west side of Wise Road at Massillon Road. This channel includes Anderson Ditch, Leopard Ditch, Weaver Ditch and part of Thursby Ditch as described in Table 5-1. Thursby ditch ends on the west side of Massillon Road near Greenbrook Road. From this point the channel continues east across Massillon Road, then turns south and parallels it for approximately 800 feet, then turns southwest and crosses Massillon Road, then turns south crossing Koons Road and parallelling Massillon Road for approximately 1.25 miles to the City's southerly border at Mt. Pleasant Road. From this point the channel flows south into Stark County and Willowdale Lake, then west, then northwest, reentering the City at the intersection of Mt. Pleasant Road and

Arlington Road, the channel then flows west paralleling Mt. Pleasant Road, crosses back into Stark County for a short distance, then flows north into Lake Noah at the YMCA. There are two spillways at Lake Noah. One spillway permits water to flow north in a channel to Nimisila Reservoir, the other allows water to flow west to Comet Drive. The Ohio Department of Natural Resources controls the flow of water out of Lake Noah. During certain times of the year water is directed north to Nimisila Reservoir, which is in turn used to provide water to the Portage Lakes. During other times water is diverted to Comet Lake. Water flows from both Nimisila Reservoir and Comet Lake in Nimisila Creek which flows west to Franklin Township. Within this drainage area there are a number of side channels off the main channel. These are primarily located in the Greensburg area. The first of these is Thursby Ditch which begins on the east side of Thursby Road near Alma Drive and flows north paralleling Thursby Road, then turning east paralleling Greensburg Road as described in Table 5-1. Foltz Ditch and King Ditch are piped ditches that flow east beginning at Thursby Road in the vicinity of Greensburg Road. Another side channel, Dickerhoff Ditch begins on the north side of Greensburg Road approximately 2,300 feet east of Massillon Road. This ditch flows north, then west, then south crossing Greensburg Road to the main channel as described in Table 5-1. Stake Ditch is a piped ditch that begins at Stake Drive on the east side of Massillon Road and flows to Dickerhoff Ditch, at the point where Dickerhoff Ditch turns south toward Greensburg Road. Foust Ditch is also a piped ditch that begins at Greensburg Road approximately 400 feet east of Massillon Road and flows south to the main channel where it crosses Massillon Road.

There are 13 allotments within this drainage area as noted in Table 5-3. Of these, Green Meadow Estates and Greenbrook Estates have curb and gutter streets with storm sewers. Greenbrook Estates also has a storm water pond. The remaining allotments have open ditches with some catch basin and storm pipes.

5.5 Drainage Area No. 4

Drainage Area No. 4 encompasses approximately 1,607 acres, and is located in the southwestern corner of the City and part of northwest Jackson and Lawrence Townships in Stark County. Of this area, 321 acres is in the City. The outfall for this drainage area is Kauffman Ditch which flows to Nimisila Creek in Franklin Township.

Within this drainage area there is one main channel and two side channels. The main channel Kauffman Creek begins in Stark County and flows north into Green crossing Mt. Pleasant Road approximately 3,500 feet east of South Main Street. The channel eventually winds its way to the west crossing South Main Street to Franklin Township. The main side channel, Witwer Run, also flows north out of Stark County crossing Mt. Pleasant road approximately 4,300 feet east of S. Main Street, then west to Kauffman Creek near Hidden Lake Drive. The remaining side channel, which is not a ditch of record, begins in Stark County and flows north crossing Mt. Pleasant Road approximately 500 feet east of S. Main Street then continuing northeast approximately 1,800 feet to Kauffman Creek.

Within this drainage area there is one allotment, Pine Knoll Estates. This allotment has open ditches with some catch basins and storm pipes. An existing pond within this allotment is used for storm water management.

5.6 Drainage Area No. 5

Drainage Area No. 5 encompasses approximately 403 acres, and is located in the extreme west portion of the City. A portion of this area flows north to Mud Lake, and the remainder flows south to Nimisila Reservoir. There are no major drainage channels or ditches of record within this drainage area. As there are 3 allotments and portions of the other allotments within this drainage area. These allotments have local storm sewer systems comprised mainly of open ditches with some catch basins and storm pipes. These allotments have no associated storm water ponds as they were developed prior to the current storm water guidelines.

5.7 Drainage Area No. 6

Drainage Area No. 6 encompasses approximately 2,115 acres, and is located in the west central portion of the City. The outfall for this area is Krumroy Ditch which flows to Nimisila Reservoir.

Within Drainage Area No. 6 there are two main drainage channels that flow primarily from east to west. The south channel begins at Algona Drive on the west side of Greensburg Road and winds west and southwest to Arlington Road. Approximately 500 feet east of Arlington Road this channel becomes Harshberger Ditch, a ditch of record. This ditch flows west crossing Arlington Road, then winding northwest, then southwest crossing Killinger Road. At Killinger Road, this ditch becomes Krumroy Ditch, another ditch of record. From Killinger Road the ditch flows north and west again crossing Killian Road, then northwest and west to Nimisila Reservoir. The north channel begins at the High Tower Estates allotment (near Jolly Circle) and flows west, then south crossing King Drive, then southwest crossing Greensburg Road, then continuing southwest crossing East Nimisila Road, then southwest paralleling Linmar Drive and crossing Arlington Road. The channel then continues west through Pine Valley Lake Park, then winding slightly northwest and southwest to Krumroy Ditch approximately 1,700 feet west of Christman Road. This channel is not a ditch of record. Note that culverts or bridges are provided where these channels cross the various roadways.

Within this drainage area there are 14 allotments as shown on Table 5-2. Of these, Green Meadow Estates, Villages at Meadowwood, Greenwood Commons and High Tower Estates have curb and gutter streets with storm sewers. The Villages at Meadowwood and Greenwood Commons are newer allotments having storm water ponds. The remaining allotments have open ditches with some catch basins and storm pipes.

5.8 Drainage Area No. 7

Drainage Area No. 7 encompasses approximately 785 acres, and is located in the west portion of the City. The outfall for this drainage area is Nimisila Reservoir. There are no substantial drainage channels or ditches of record in this drainage area. The main drainage course for this area is shown as a swale on existing USGS topography maps This drainage course flows from east to west on the south side of Caston Road and passes through the Sherylton Hills, Solar Estates and Withering Heights allotments on its way to Nimisila Reservoir. Storm water drainage facilities in these allotments are comprised of open ditches with catch basins and storm pipes connecting the catch basins. There are no storm water management ponds for any of these allotments, as they are in close proximity to Nimisila Reservoir.

5.9 Drainage Area No. 8

Drainage Area No. 8 encompasses 1,840 acres and is located in the west central and northwest portions of the City. The outfall for this drainage area is Mud Lake. Within this drainage area there is one main channel that flows primarily to the northwest. This channel is not a ditch of record. The channel begins at the southwest corner of the Meadowwood Allotment and winds west crossing Arlington Road, then flowing northwest crossing Cottage Grove Road and South Main Street, then flowing southwest to Mud Lake. There are five allotments of record within this drainage area. Three of these are newer allotments (Highlands at Green, Green Highlands, and Meadowwood) having curb and gutter streets with centralized storm sewer systems and storm water management ponds. The remaining two allotments (Camelot Hills and Aldawood Hills) have open ditches with some catch basins and storm pipes.

5.10 Drainage Area No. 9

Drainage Area No. 9 encompasses 1,620 acres and is located in the north central and northwest portions of the City. Approximately 206 acres of this drainage area is located north of the City in Coventry Township. The outfall for this drainage area is East Reservoir.

Within the drainage area there is one main drainage channel that is not a ditch of record. The Channel begins on the south side of East Turkeyfoot Lake Road on the east side of Interstate 77 and flows northwest crossing East Turkeyfoot Lake Road, then west crossing Interstate 77 and continuing west across Interstate Parkway, Fortuna Drive and Arlington Road, then continuing Northwest crossing Moore Road, then west through Wonder Lake and crossing Cottage Grove Road, then to East Reservoir.

Associated with the main channel is a secondary channel that begins in Coventry Township on the west side of Interstate 77 and flows south crossing Jarvis Road, then southwest to the main channel, and joining the main channel approximately 2,000 feet east of Cottage Grove Road.

There are six recorded allotments in this drainage area plus some commercial development along Arlington Road. Of these, Interstate Business Park (a commercial development) has curb and gutter streets with storm sewers. Included in this development are two storm water management ponds. The remaining residential allotments noted in Table 5-3 have open ditches with catch basins and storm pipes.

5.11 Drainage Area No. 10

Drainage Area No. 10 encompasses 460 acres and is located in the northwest portion of the City. The outfall for this drainage area is Miller Lake. There are no substantial drainage channels or ditches of record in this drainage area. There are 3 allotments of record in this area including Wampeter Village, Sandy Beach and Turkeyfoot Heights. These allotments have local storm sewer systems comprised mainly of open ditches with some catch basins and storm pipes. Most

of the ditches in the Turkeyfoot Heights allotment have enclosed with various types of pipes by the lot owners. These allotments have no associated storm water ponds as they were developed prior to current storm water guidelines, plus they are adjacent to Miller Lake.

5.12 Drainage Area No. 11

Drainage Area No. 11 encompasses 241 acres and is located in the north central portion of the City. The outfall for this drainage area is the Tuscarawas River. There are no major drainage channels or ditches of record in this drainage area. The main drainage course for this area is shown as a swale on existing USGS topography maps. This drainage course begins at the south end of Chenoweth Drive at a culvert crossing Interstate 77 and flows north between some residences and apartment buildings, crossing a private road and continuing north into Springfield Township through a wetland and to the Tuscarawas River as noted above.

TABLE 5-1
DITCHES OF RECORD WITHIN THE CITY OF GREEN

Area 1

Yenny Ditch (No. 46): Open ditch 5 ft. bottom width with 1:1 side slopes from Summit/Stark line to Wise Road; 8 ft. bottom width from Wise Road to Graybill Road with 1:1 side slopes from Wise Road to Heckman Road and 1 1/2:1 side slopes from Heckman Road to Graybill Road, 60' right-of-way obtained, County to maintain ditch between Heckman and Graybill Roads (2,300 ft). Above description is based on 1928 & 1938 records for cleaning and improving the ditch. Length = 9,000 ft.

Bender Ditch (No. 77): Open ditch; established approximately 1883; cleaned and improved around 1938 as 3 ft. bottom width with 1 1/2:1 side slopes; right-of-way obtained = 33 ft. (16 1/2 ft. off each side of ditch centerline); County to maintain ditch; Length = 5,650 ft; Ditch begins 800 ft. north of Greensburg Road and flows north ending at Wise Road.

Heckman Ditch (No. 119): Open ditch; established approximately 1938 with 3 ft. bottom width at Wise Road (beginning point) with 1 1/2:1 side slopes, increasing to an 8' wide bottom width before its terminus approximately 1,100 ft. north of Wise Road where it joins an existing stream; 60 ft. wide right-of-way obtained; County to maintain ditch; Length = 13,063 ft.

Hill Ditch (No. 76): Open ditch; established around 1889, cleaned and improved around 1938 as 3 ft. wide bottom with 1 1/2:1 side slopes; begins approximately 400 ft. north of Heckman Road at railway, flows 2,000 feet north, then 800 feet west to existing channel; 60 ft. R/W obtained; maintenance by property owners adjacent to ditch except for 300 ft. in the Graybill Road right-of-way that is maintained by Green; Length = 3,300 ft.

Myers Ditch (No. 81): Open ditch; established around 1881; ditch to have a 5 ft. top width; constructed and maintained by adjacent property owners; located on Mayfair Road approximately 1,100 ft. north of East Turkeyfoot Lake Road; ditch begins approximately 1,570 ft. west of Mayfair Road and ends approximately 300 ft. east of Mayfair Road.

TABLE 5-1
DITCHES OF RECORD WITHIN THE CITY OF GREEN

Area 2

Schumacher Ditch (No. 58): Open ditch; established about 1888 with a bottom width of 1 1/2 ft. at its beginning in Stark County (2,500 ft. north of Greensburg Road near Aultman) and increasing to a 2 1/2 ft. bottom width prior to its terminus at Mt. Pleasant Road. From this point south the ditch is in Stark County; 33 ft. right-of-way obtained; Length = 7,200 ft. in Green.

Area 3

Anderson Ditch (No. 72): Established about 1885; cleaned and improved around 1938 as 2 ft. bottom width with 1 1/2:1 side slopes; begins on west side of Massillon Road at Wise Road where it flows west and then south to Leopard Ditch; Length = 4,570 ft; 60 ft right-of-way obtained; County to maintain the ditch.

Leopard Ditch (No. 74): Established in 1883; cleaned and improved around 1938 as 4 ft. bottom width with 1 1/2:1 side slopes, begins approximately 700 ft. west of Massillon Road at Anderson ditch and it flows south to Weaver Ditch; Length = 3,300 ft; 33 ft. right-of-way obtained; County to maintain the ditch.

Weaver Ditch (No. 73): Established around 1904; 4 ft. bottom width with 1 1/2:1 side slopes; begins approximately 200 ft. north of Greensburg Road and flows south to Thursby Ditch, Length = 600 ft, 33 ft. right-of-way obtained; County to maintain ditch.

King Ditch (No. 106): Established around 1937; 8", 10", & 15" clay pipe beginning at Thursby Road and Greensburg Road intersection and flowing east 1,400 feet along Greensburg Road to Weaver Ditch, 20 ft. right-of-way obtained; ditch right-of-way currently located in Greensburg Road right-of-way, County to maintain ditch.

Foltz Ditch (No. 102): Established around 1937; 12" clay pipe beginning at Thursby Road and flowing east to Thursby Ditch; Length = 880 ft; 20 ft. right-of-way obtained, County to maintain the ditch. The only evidence of this ditch are a marshy area and a tree line along the property lines east of Thursby Road.

TABLE 5-1
DITCHES OF RECORD WITHIN THE CITY OF GREEN

Thursby Ditch (No. 71): Established around 1882; cleaned and improved around 1938 as 2 ft. bottom width 1 1/2:1 side slopes at its beginning with a 6 ft. bottom width prior to its terminus; Begins 1,000 ft. north of Koons and 1,400 ft east of Thursby Road where it flows north approximately 2,400 ft, then turns east and flows 1,000 ft, then turns southeast and flows 1,100 ft. to an unnamed stream approximately 600 ft. west of Massillon Road; right-of-way obtained = top of bank width plus 20 ft. on each side; Length = 4,500 ft., maintenance responsibility of ditch not stated. The only evidence of this ditch are a marshy area found on the properties described above.

Foust Ditch (No. 5): Established around 1923; 15" clay pipe beginning at Greensburg Road approximately 470' east of Massillon Road and flowing 1,400 ft. south to an existing channel that crosses Massillon Road near Greenbrook Road. No right-of-way obtained, constructed as an assessment project to adjacent property owners.

Stake Ditch (No. 69): Established around 1898 with 6" clay pipe installed; pipe cleaned and relayed around 1927; begins at an alley in Greensburg area 600 ft. north of Greensburg Road and 800 ft. east of Massillon Road. Pipe flows 400 ft. southeast, then 114' east to Dickerhoof Ditch, Constructed by adjacent property owners, County Commissioners responsible for portion in Greensburg Road. No right-of-way obtained for this ditch.

Dickerhoff Ditch (No. 70): Established around 1883; improved around 1940 with part of the ditch enclosed with 10" and 24" clay pipe; ditch begins at north side of Greensburg Road (1,500 ft. east of Massillon Rd.) flows 250 ft north, then turns west and flows 1,000 ft. partially enclosed in a 10" clay pipe, then turns south and flows 250 ft crossing Greensburg Road and continuing 2,560 ft. south to its terminus at an unnamed stream 200 ft. east of Massillon Road; part of the ditch south of Greensburg is enclosed with a 24" pipe; ditch section north of 24" pipe has 2 ft. bottom width with 1 1/2:1 side slopes; ditch section south of 24" pipe has 3 ft. bottom width with 1 1/2:1 side slopes; no right-of-way obtained; maintenance by property owners.

Humbert Ditch (No. 79): Open ditch; established around 1911 as 1 ft. bottom width with 1:1 side slopes; ditch begins at north spillway of Lake Noah (Camp Y-Noah) and flows north approximately 3,700 feet, then 3,200 ft. northwest across Christman Road and continuing to Nimisila. Currently all of the ditch west of Christman Road to Nimisila. Currently all of the ditch west of Christman Road and 1,200 ft. east of Christman Road is part of Nimisila Reservoir. Ditch construction by adjacent property owners. No right-of-way contained; no notation of maintenance responsibility.

TABLE 5-1
DITCHES OF RECORD WITHIN THE CITY OF GREEN

Area 4

Kauffman Creek (No. 113): Open ditch; established 1939 as 5 ft. bottom width with 1 1/2:1 side slopes; begins on Mt. Pleasant Road approximately 3,500 ft. east of S. Main Street; flows 1,100 ft. north; then 3,800 ft. west to South Main; continues west into Franklin Twp; 60 ft. right-of-way obtained; County to maintain the ditch.

Witwer Run (No. 118): Open ditch; established 1939 as 4 ft. bottom width with 1 1/2:1 side slopes; begins on Mt. Pleasant Road approximately 3,200 ft. east of South Main Street; flows northwest 1,675 ft. to Kauffman Creek; 60 ft. right-of-way obtained; County to maintain the ditch.

Area 5

Harshbarger Ditch (No. 78): Open ditch; established 1910, cleaned and improved in 1938 as 4 ft. bottom width with 1 1/2:1 side slopes; begins 500 ft. east of Arlington Road and 1,000 ft. north of Killinger Road; flows west and southwest to Killinger Road; 33 ft. right-of-way obtained; maintenance responsibility of ditch not stated; Length = 3,784 ft.

Krumroy Ditch (No. 75): Open ditch; established in 1887; cleaned and improved in 1938 as 4 ft bottom width with 1 1/2:1 side slopes; begins at Killinger Road (terminus of Harshbarger Ditch); flows west then north crossing Killinger Road again; then continuing north approximately 2,300 ft. to Nimisila Creek; 33 ft. right-of-way obtained; County to maintain ditch; Length = 4,404 ft.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY
TABLE 5-2
INVENTORY OF STORMWATER STRUCTURES

Structure No.	Size	Type	Location
143	6'x4'	RCB	Massillon Road (St. Rt. 241)
144	24	VCP	Massillon Road (St. Rt. 241)
146	4'x4'	RCB	Massillon Road (St. Rt. 241)
147A	12"	RCP	Massillon Road (St. Rt. 241)
147	18"	VCP	Massillon Road (St. Rt. 241)
148	8'x5'	RCB	Massillon Road (St. Rt. 241)
149	6'x4'	RCB	Massillon Road (St. Rt. 241)
150	4'x2.5'	RCB	Massillon Road (St. Rt. 241)
25A	4'x4'	RCB	Massillon Road (St. Rt. 241)
183	15"	VCP	Massillon Road (St. Rt. 241)
184	18"	VCP	Massillon Road (St. Rt. 241)
36	11'x6.5'	Bridge	Massillon Road (St. Rt. 241)
186	15"		Massillon Road (St. Rt. 241)
138	24"	Steel	Massillon Road (St. Rt. 241)
142	18"	VCP	Massillon Road (St. Rt. 241)
141	15"	VCP	Massillon Road (St. Rt. 241)

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY
TABLE 5-2
INVENTORY OF STORMWATER STRUCTURES

Structure No.	Size	Type	Location
140	18"	VCP	Massillon Road (St. Rt. 241)
139	3'x3'	RCB	Massillon Road (St. Rt. 241)
118	24"	RCP	East Turkeyfoot Lake Road (St. Rt. 619)
119	21"	CMP	East Turkeyfoot Lake Road (St. Rt. 619)
120	27"	RCP	East Turkeyfoot Lake Road (St. Rt. 619)
121	2-48"	CMP	East Turkeyfoot Lake Road (St. Rt. 619)
122	27"	RCP	East Turkeyfoot Lake Road (St. Rt. 619)
123	18"	VCP	East Turkeyfoot Lake Road (St. Rt. 619)
124	3'x3'	RCB	East Turkeyfoot Lake Road (St. Rt. 619)
125	24"	VCP	East Turkeyfoot Lake Road (St. Rt. 619)
127	4'x3'	RCB	East Turkeyfoot Lake Road (St. Rt. 619)
128	3'x3'	RCB	East Turkeyfoot Lake Road (St. Rt. 619)
129	15"	VCP	East Turkeyfoot Lake Road (St. Rt. 619)
131	15"	VCP	East Turkeyfoot Lake Road (St. Rt. 619)
132	4'x4'	RCB	East Turkeyfoot Lake Road (St. Rt. 619)

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY
TABLE 5-2
INVENTORY OF STORMWATER STRUCTURES

Structure No.	Size	Type	Location
133	24"	VCP	East Turkeyfoot Lake Road (St. Rt. 619)
134	15"	VCP	East Turkeyfoot Lake Road (St. Rt. 619)
135	15"	VCP	East Turkeyfoot Lake Road (St. Rt. 619)
187	15"	VCP	East Turkeyfoot Lake Road (St. Rt. 619)
188	15"	VCP	East Turkeyfoot Lake Road (St. Rt. 619)
136	15"	VCP	East Turkeyfoot Lake Road (St. Rt. 619)
137	15"	VCP	East Turkeyfoot Lake Road (St. Rt. 619)
7	28.5'x6.5'	Bridge	East Turkeyfoot Lake Road (St. Rt. 619)
189	15"	VCP	East Turkeyfoot Lake Road (St. Rt. 619)
70	4'x3'	RCB	Mt. Pleasant Road
69	15"	CMP	Mt. Pleasant Road
193	24"	CMP	Mt. Pleasant Road
68	10' wide	Bridge	Mt. Pleasant Road
67	5'x3'	RCB	Mt. Pleasant Road
66	15"	CPP	Mt. Pleasant Road
65	24"	CPP	Mt. Pleasant Road
64A	3'x2'	RCB	Mt. Pleasant Road
64	47' wide	Bridge	Mt. Pleasant Road
63	14' wide	Bridge	Mt. Pleasant Road

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY
TABLE 5-2
INVENTORY OF STORMWATER STRUCTURES

Structure No.	Size	Type	Location
194	36' wide	Bridge	Mt. Pleasant Road
50	10'x8'	Bridge	Mt. Pleasant Road
168	48"	CMP	Mt. Pleasant Road
176	40'x5'	Bridge	Mt. Pleasant Road
106	36' wide	Bridge	Arlington Road
107	30"	CMP	Arlington Road
108	48"	CMP	Arlington Road
60	12'x4.5'	Bridge	Arlington Road
195	18"	CMP	Arlington Road
56	30"	CMP	Arlington Road
55	10'x7'	Bridge	Arlington Road
54	10"	RCP	Arlington Road
53	12"	RCP	Arlington Road
52	4'x3'	RCB	Arlington Road
51	9'x6'	Bridge	Arlington Road
109	36"	CMP	Arlington Road
71	16' wide	Bridge	South Main Street
115	24"	RCP	South Main Street
72	15"	CMP	South Main Street
74	60"	RCP	South Main Street
117	18"	CMP	South Main Street
116A	15"	CMP	South Main Street
116	15"	CMP	South Main Street
75	12"	RCP	South Main Street
76	15"	VCP	South Main Street

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY
TABLE 5-2
INVENTORY OF STORMWATER STRUCTURES

Structure No.	Size	Type	Location
95	8'x4'	RCB	South Main Street
94	18"	VCP	South Main Street
195	15"	RCP	South Main Street
196	12"	CMP	Comet Road
77	10.5'x7.5'	RCB	Comet Road
197	12"	VCP	Comet Road
110	18"	CMP	Pickle Road
41	24"	CMP	Pickle Road
42	18"	CMP	Pickle Road
45	4'x5'	RCB	Greensburg Road
62	30"	CMP	Greensburg Road
165	72"	RCP	Greensburg Road
28	3'x3'	RCB	Greensburg Road
28B	24"	VCP	Greensburg Road
28C	54"	RCP	Greensburg Road
198	12"	CMP	Greensburg Road
199	10"	CMP	Greensburg Road
18A	12"	VCP	Greensburg Road
18C	2'x3'	RCB	Greensburg Road
207	15"	CMP	Meyersville Road
208	30"	CMP	Meyersville Road
76A	24"	CMP	Caston Road
89	36"	CMP	Caston Road
209	36"	CMP	Caston Road
90	24"	RCP	Caston Road

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY
TABLE 5-2
INVENTORY OF STORMWATER STRUCTURES

Structure No.	Size	Type	Location
112A	12"	RCP	Caston Road
113	18"	RCP	Caston Road
92	12"	RCP	Cottage Grove Road
111	15"	CPP	Cottage Grove Road
96	7'x5'	RCB	Cottage Grove Road
97	24"	CPP	Cottage Grove Road
98	24"	CMP	Cottage Grove Road
100A	24"	CMP	Cottage Grove Road
100	18"	CMP	Cottage Grove Road
101	17'x10'	RCB	Cottage Grove Road
210	12"	CMP	Cottage Grove Road
103	18"	CMP	Koons Road
211	12"	VCP	Koons Road
212	15"	CMP	Koons Road
105	12'x5'	RCB	Koons Road
213	15"	CMP	Koons Road
80	10'x5'	RCB	Killinger Road
81	10'x4'	RCB	Killinger Road
82	15"	CMP	Killinger Road
214	15"	CMP	Killinger Road
78	30' wide	Bridge	Christman Road
215	15"	VCP	Christman Road
79		Bridge	Christman Road
83	18"	CMP	Christman Road
216	8'x4'	RCB	Christman Road

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY
TABLE 5-2
INVENTORY OF STORMWATER STRUCTURES

Structure No.	Size	Type	Location
217	4'x2'	RCB	Christman Road
44	12"	RCP	Steese Road
35	66"	CMP	Steese Road
33	12"	CMP	Steese Road
32	36"	CMP	Steese Road
218	18"	CMP	Steese Road
31	24"	VCP	Steese Road
219	12"	CMP	Steese Road
30	18"	VCP	Steese Road
220	18"	VCP	Boettler Road
29A	24"	CMP	Boettler Road
29	36"	CMP	Boettler Road
39	30"	CMP	Boettler Road
38	12"	RCP	Boettler Road
37	30"	RCP	Boettler Road
36	42"	RCP	Boettler Road
170	90"	CMP	Mayfair Road
18	2'x3'	RCB	Mayfair Road
17	6'x3.5'	RCB	Mayfair Road
203	4'x2.5'	RCB	Mayfair Road
221	15"	CMP	Mayfair Road
13	18"	CMP	Mayfair Road
12	24"	CMP	Mayfair Road
20A	12"	RCP	Mayfair Road
10	2-5'x2.5'	RCP	Mayfair Road

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY
TABLE 5-2
INVENTORY OF STORMWATER STRUCTURES

Structure No.	Size	Type	Location
5	3'x3'	RCB	Mayfair Road
1	24"	CMP	Mayfair Road
2	18"	RCP	Mayfair Road
3	24"		Mayfair Road
222	12"	CMP	Mayfair Road
4	12'x3'	Bridge	Mayfair Road
21	24"	CPP	Raber Road
22	4'x4'	RCB	Raber Road
22A	18"	CMP	Raber Road
223			Raber Road
9	3-96"	CMP	Raber Road
182	18"	CPP	Raber Road
224	3'x3'	RCB	Wise Road
25	6'x4'	RCB	Wise Road
24	24"	CPP	Wise Road
24A	18"	CPP	Wise Road
14	15"	CMP	Wise Road
16	23'x6'	Bridge	Wise Road
84	12"	CMP	East Nimisila Road
85	18"	VCP	East Nimisila Road
86	2'x4'	RCB	East Nimisila Road
87	3'x3'	RCB	East Nimisila Road
224	15"	VCP	East Nimisila Road
58	10'x4'	RCB	East Nimisila Road
58A	6'x4'	RCB	East Nimisila Road

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY
TABLE 5-2
INVENTORY OF STORMWATER STRUCTURES

Structure No.	Size	Type	Location
59	3'x3'	RCB	E. Nimisila Road
26	18"	CMP	Lauby Road
26A	18"	RCP	Lauby Road
26B	15"	RCP	Lauby Road
26C	42"	RCP	Lauby Road
26D	24"	RCP	Lauby Road
225	42"	RCP	Lauby Road
26E	30"	RCP	Lauby Road
27	30"	RCP	Lauby Road
27A	12"	RCP	Lauby Road
27B	18"	RCP	Lauby Road
27C	24"	RCP	Lauby Road
27D	18"	RCP	Lauby Road
226	18"	RCP	Lauby Road
27E	42"	RCP	Lauby Road
27F	12"	RCP	Lauby Road
27G	15"	RCP	Lauby Road
27H	24"	RCP	Lauby Road

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TABLE 5-3
ALLOTMENTS WITHIN THE CITY OF GREEN

NO.	NAME	PLANS AVAILABLE
Area 1		
1-1	Wise's Mayfair Allotment	No
1-2	Green Acres (unrecorded)	No
1-3	Greenfield Farms	Yes
1-4	Park Creek Estates	Yes
1-5	Park Ridge Estates	Yes
1-6	Ann Marie Estates	Yes
1-7	Raintree Estates	Yes
1-8	Courtney Allotment	No
1-9	Boettler Business Park	No
1-10	Akron-Canton Corporate Park	Yes
1-11	Fairway Villas	No
1-12	The Village, Mayfair Condominiums	No
1-13	Country Club Apt.	No
1-14	Villas at Prestwick	No
1-15	Country Club Townhouses	No
1-16	Prestwick	Yes
1-17	Saullo's Acres	Yes
1-18	Robinwood Estates	No
1-19	Mayfair Estates	Yes
1-20	Miller Industrial Park	No
1-21	Kungle Heights	No
1-22	Newman Heights Allotment	No
1-23	Imrek Acres	No
1-24	Acadian Heights	No
1-25	Poston Allotment	No
1-26	Beechtree Estates	Yes
1-27	Walnut Hills	No
1-28	Kimmel Allotment	No
1-29	Huffine Allotment	No
1-30	Graham-Smith Allotment (unrecorded)	No
1-31	Mayfair Heights	No
1-32	Lindale Heights	No
1-33	Pressler Heights	No
1-34	Hoover Lake Heights	Yes
1-35	Lawnfield Estates	Yes
1-36	Kimberly Valley	Yes
1-37	Pine Lake Allotment	Yes
1-38	McChesney Acres	No

TABLE 5-3
ALLOTMENTS WITHIN THE CITY OF GREEN

NO.	NAME	PLANS AVAILABLE
Area 2		
2-1	Akan Industrial Park	Yes
Area 3		
3-1	Greensburg Heights Allotment	No
3-2	Green Meadow Estates	No
3-3	Greensburg Woodlands	No
3-4	Greenbrook Estates	Yes
3-5	Tousleys Addition to Greensburg	No
3-6	Herrings Addition to Greensburg	No
3-7	Dislers Addition	No
3-8	First Adventure Allotment	Yes
3-9	Fox Run Meadows	Yes
3-10	Apple Ridge Allotment	Yes
3-11	Pleasant Hills Estates	Yes
3-12	Hemlock Green Estates	No
3-13	Mount Pleasant Estates	No
3-14	Koons-Thursby Allotment	No
Area 4		
4-1	Pine Knoll Estates	Yes
Area 5		
5-1	Tamarak Lake Estates	Yes
5-2	Tamarak Highlands	Yes
5-3	Homewood Farm Allotment	No

TABLE 5-3
ALLOTMENTS WITHIN THE CITY OF GREEN

NO.	NAME	PLANS AVAILABLE
Area 6		
6-1	Green Meadows Estates	Yes
6-2	Villages at Meadowwood	Yes
6-3	Greenwood Commons	Yes
6-4	High Tower Estates	Yes
6-5	Springview Estates	No
6-6	Mirror Lake Allotment	No
6-7	Rolling Greens	No
6-8	Rolling Greens Estates	No
6-9	Highlands Subdivision	No
6-10	New Haven Greens	Yes
6-11	Alpine Village	No
6-12	Lake Breeze Allotment	No
6-13	Rabl Subdivision	Yes
6-14	Hidden Trail Estates	Yes
	Hidden Trail #3	Yes
	Hidden Trail #2	Yes
Area 7		
7-1	Sherylton Hills Allotment	No
7-2	Solar Estates	No
7-3	Hearthstone Estates	Yes
7-4	Withering Heights	Yes
7-5	Nimisila Sunset Heights	No
Area 8		
8-1	The Highlands at Green	Yes
8-2	Green Highlands	Yes
8-3	Meadowwood	Yes
8-4	Camelot Hills	Yes

TABLE 5-3
ALLOTMENTS WITHIN THE CITY OF GREEN

NO.	NAME	PLANS AVAILABLE
Area 9		
9-1	Interstate Business Park	Yes
9-2	Arlington Knolls	No
9-3	Brookwood Estates	No
9-4	Hillcrest Highlands Homesites	No
9-5	Wonder Lake Allotment	No
9-6	Bingo Estates	Yes
Area 10		
10-1	Wampetek Village Allotment	No
10-2	Sandy Beach Allotment	No
10-3	Turkeyfoot Heights	No
10-4	Aldawood Hills	No
Area 11		
11-1	Chenoweth Estates	Yes

Section 6

6.0 EVALUATIONS

6.1 General

Evaluations of the various storm water drainage facilities are presented on tables included at the end of this Section. The tables are set-up by areas with separate tables provided for the main culverts and drainage channels in each area.

The culvert evaluation table (from left to right) identifies the culvert by number (the culvert number is also shown on the Drainage System Evaluation Map, Figure 6-1), the structure size and type, the calculated storm water flow to the structure and the calculated capacity of the structure. The storm water flow is compared to the capacity of the structure and an indication of the hydraulic adequacy of the structure is noted. If inadequate, then a recommended improvement is provided. The right column on the table lists the street name where the structure is located. In general, the tables do not include structures within the Interstate 77 limited access right-of-way and the railroad right-of-way. These structures are not within the City's jurisdiction.

Both ODOT and the railroad require that Hydraulic Circular No. 5 (previously described in Section 3.3) be utilized for design of culverts within their right-of-ways.

The drainage channel evaluation table (from left to right) identifies the channel section from downstream to upstream (the number is also shown on Figure 6-1), provides measured upstream and downstream channel section dimensions, calculated channel capacity and calculated storm water flow to the channel section. The storm water flow is compared to the channel capacity and an indication of the hydraulic adequacy is provided. If in adequate, then a recommended improvement is provided. Some measured channel sections are very wide due to the limited depth at the measured section. If in the final design, the depth can be increased, the width may be reduced to a more reasonable number. This cannot be determined until detailed field survey is obtained, generally, during the detailed design for the improvement.

The results of the allotment survey are shown in Table 6-17 which is arranged by area number, allotment name, general description, detail comments and recommended action. In general, where excessive vegetation or clogging of ditches is present the word maintained was not used in

the description. New allotments, constructed in recent years were not inspected as EDG has been directly involved in the construction plan review and construction inspection.

A copy of the computer print out of the storm water flow calculations for each structure and channel, and the capacity calculations for each structure and channel is provided as a separate document. Also provided is a copy of the printout for the capacity calculations for improving the deficient structures or channels.

Note that flows are estimated based on existing land use. As the City requires on-site storm water management ponds for all new developments, there should be a negligible increase in storm runoff from future developments.

The storm water collection systems within the existing allotments were evaluated based on field investigations. Current topography maps are not sufficient to develop the drainage areas needed to complete a hydraulic analysis of the older allotments. Topography is provided as part of the plans for all new allotments, which are designed to current standards.

Appendix B (separate document) provides a copy of the cost estimates for those channels and structures found to be deficient. The estimates were prepared using general quantities associated with the work involved. With the exception of the pond alternative, no allowances have been made for land acquisition. All labor rates are based on the Ohio Department of Industrial Relations Wage Rates. Once the cost of the proposed construction was determined, 5 percent was added for General Conditions, along with 15 percent for Engineering Services and 15 percent for Contingency. These costs are shown in a colmnu for the appropriate structure or channel.

6.2 System Deficiencies and Improvements

Due to the magnitude of items analyzed, a detailed description of the system deficiencies will not be provided. Tables 6-1 through 6-17 address this item.

In Area No. 1, 13 structures were found to be inadequate. Of these, one is privately owned. Of the remainder 7 are classified as culverts and are within City street right-of-ways. The rest are classified as bridges and maybe the responsibility of ODOT or the County Engineer. EDG estimated a total cost of $521,350.00 for improving all of the 13 structures. If the private culvert is not included, the total cost would be $470,600.00.

In addition to the structure, 17 channel sections were found to be inadequate totaling 8.9 miles. These seven sections are on channels that are privately owned. The remaining sections are the responsibility of Summit County Commissioners per the ditch records obtained from the Summit County Engineer. It is not known whether this responsibility was passed on to Green when incorporation incurred. Determination of the maintenance responsibility of these ditches is beyond the scope of this report. EDG estimated a total cost of $2,080,080.00 for improving the 17 sections. If the private ditches are not included the total cost would be $1,133,210.00.

Finally, in Area No. 1 the allotment storm water collection survey identified several deficiencies ranging from clogged ditches to failed storm sewers. These items are within road right-of-ways and are the responsibility of the City. EDG estimated a total cost of $104,000.00 for these improvements.

In Area No. 1 items of special note include a private ditch enclosure on the north side of Spade Road east of Mayfair Road as described in Section 5 of this report. It was noted that the ditch enclosure was not adequately sized there by causing flooding in the yard areas. The most practical solution to this problem would be to provide a parallel storm sewer along the existing sewer. Since the sewers are on private property and not on the public right-of-way, the cost of these improvements rests with the property owner unless the City determines otherwise. Another item is an existing pond on the east side of Myersville Road north of Sweitzer Road. According to records obtained from the Summit County Engineer, an existing culvert crosses Myersville Road in this area. The field survey found the lot on the west side of the road being filled and possibly blocking this culvert.

A new culvert should be installed from the pond across Myersville Road west to the main channel. Another solution is to install a pipe from the pond along Myersville Road and then west across the road to an existing channel.

In Area No. 2, 8 structures were found to be inadequate. Of these 2 are privately owned. Of the remainder, 3 are culverts and are within the City road right-of-ways. The rest are classified as bridges and maybe the responsibility of ODOT or the County Engineer. EDG estimated a total cost of $611,140.00 for improving the 8 structures. If the private culverts are not included the total cost would be $513,280.00.

In addition to the structures, 9 channel sections were found to be inadequate totaling 2.4 miles. All the sections are privately owned. EDG estimates a total cost of $722,650.00 for improving the 9 sections.

Finally, in Area No. 2, the allotment storm water collection survey identified no system deficiencies.

In Area No. 3, 7 structures were found to be inadequate. Of these, one is privately owned. Of the remainder, 2 are culverts and are within the City right-of-way. EDG estimated a total cost of $254,970.00 for improving the 3 structures. If the private culvert is not included, the total cost would be $216,150.00.

In addition to the structures, 11 channel sections were found to be inadequate totaling 3.1 miles. All of these channels are privately owned. EDG estimated a total cost of $919,000.00 for improving the sections.

Finally, in Area No. 3, the allotment storm water collection survey identified several system deficiencies ranging from clogged ditches to failed storm sewers. These items are the responsibility of the City. EDG estimated a total cost of $340,000.00 for these improvements.

In Area No. 3, an item of special note is improving Dickerhoof Ditch to alleviate flooding problems near Greensburg Road. EDG has evaluated the existing enclosed portion of the ditch and finds that a larger pipe is required at a cost of $126,880.00. A copy of the EDG cost estimate is provided in Appendix B.

In Area No. 4, 2 structures were found to be inadequate. They are classified as bridges and maybe the responsibility of ODOT or the County Engineer. EDG estimated a total cost of $16,380.00 for improving the 2 structures.

In addition to the structures, one channel section was found to be inadequate totaling 0.2 miles. This channel is privately owned. EDG estimated a total cost of $2,970.00 for improving the section.

Finally, in Area No. 4 the allotment storm water collection survey identified no system deficiencies.

In Area No. 5, there are no main structures or channels. However, the allotment storm water collection survey identified several system deficiencies ranging from clogged ditches to failed storm sewers. The items are the responsibility of the City. EDG estimated a total cost of $25,000.00 for these repairs.

In Area No. 6, 9 structures were found to be inadequate. Of these, 2 are privately owned. Of the remainder, 6 are culverts and are within City road right-of-ways. The rest are classified as bridges and maybe the responsibility of ODOT or the County Engineer. EDG estimated a total cost of $377,320.00 for improving the 9 structures. If the private culverts are not included, the total cost would be $231,550.00.

In addition to the structures, 18 channel sections were found to be inadequate totaling 1.5 miles. Of this number 17 sections are on channels that are privately owned. The remaining sections are the responsibility of Summit County Commissioners per the ditch records obtained from the Summit County Engineer. EDG estimated a total cost of $306,860.00 for improving the 18 sections. If the private ditches are not included, the total cost would be $9,640.00.

Finally, in Area No. 6 the allotment storm water collection survey identified several system deficiencies ranging from clogged ditches to failed storm sewers. These items are the responsibility of the City. EDG estimated a total cost of $55,000.00 for these improvements.

In Area No. 6, an item of special note in this area includes restoration of an existing drainage swale between Newcomb Drive and Kingston Road. EDG previously analyzed this swale and roadway culverts. Based on this analysis, the suggested improvements include enlarging and defining the sales from Newcomb Drive to East Nimisila Road including roadway culvert replacements. EDG estimated a total cost of $77,850.00 for this improvements. A copy of the EDG cost estimate is provided in Appendix B.

In Area No. 6, the hydraulics of Nimisila Creek after it leaves Nimisila Reservoir was not analyzed due to the complex interrelationship caused by the manual regulation of its level by the Ohio Department of Natural Resources. Note that Nimisila Creek is not a ditch of record in the City of Green.

In Area No. 7, 2 structures were found to be inadequate. Of these, 1 is a culvert within City road right-of-ways. The other is classified as bridges and maybe the responsibility of ODOT or the County Engineer. EDG estimated a total cost of $63,810.00 for improving the 2 structures.

In addition to the structural repairs, 2 channel sections were found to be inadequate totaling 0.2 miles. These sections are on channels that are privately owned. EDG estimated a total cost of $63,710.00 for improving the sections.

Finally, in Area No. 7, the allotment storm water collection survey identified several system deficiencies ranging from clogged ditches to failed storm sewers. These items are the responsibility of the City. EDG estimated a total cost of $900,000.00 for these improvements.

In Area No. 8, 6 structures were found to be inadequate. Of these, 5 are privately owned. The remaining are within the City road right-of-ways. EDG estimated a total cost of $377,210.00 for improving the 6 structures. If the private culverts are not included the total cost would be $2,590.00.

In addition to the structures, 8 channel sections were found to be inadequate totaling 2.8 miles. All sections are privately owned. EDG estimated a total cost of $507,800.00 for improving the sections.

Finally, in Area No. 8, the allotment storm water collection survey identified several system deficiencies ranging from clogged ditches to failed storm sewers. These items are the responsibility of the City. EDG estimated a total cost of $26,500.00 for these improvements.

In Area No. 9, 1 structure was found to be inadequate. The culvert is the responsibility of the City. EDG estimated a total cost of $96,900.00 for improving the structure.

In addition to the structures, 12 channel sections were found to be inadequate totaling 2.6 miles. Of this number all sections are on channels that are privately owned. EDG estimated a total cost of $624,320.00 for improving the ditches.

Finally, the Area No. 9 the allotment storm water collection survey identified several system deficiencies ranging from clogged ditches to failed storm sewers. These items are the responsibility of the City. EDG estimated a total cost of $26,500.00 for these improvements.

In Area No. 10 there are no structures or channels. The allotment storm water collection survey identified several system deficiencies ranging from clogged ditches to failed storm sewers. The items are the responsibility of the City. EDG estimated a total cost of $750,000.00 for these repairs.

In Area No. 11, there are no main structures or channels. However, EDG has previously analyzed the main drainage swale that flows from the south end of Chenoweth Drive northerly towards Springfield Township. During heavy rainfall events the area adjacent to this drainage course has extensive flooding. EDG has estimated a cost of $465,000.00 to improve this channel. These improvements must be made in conjunction with other improvements to the channel in Springfield Township. A joint project between the Summit County Engineer and the City of Green is recommended. A copy of the EDG cost estimates is provided in Appendix B.

6.3 Prioritizing Projects

As the top priority, EDG recommends that the City begin improvements to the system by replacing failed or failing culverts identified in this study. Furthermore, a detailed structural inspection of culverts and bridges should be conducted to further identify additional structural deficiencies. Any deficient structure should receive a high priority for improvement. Structural deficiencies are given a high priority due to the possible loss of life or property due to a complete failure. Projects included in this category would be the culvert on Dewalt Drive, Provens Drive and the storm sewers in the Turkeyfoot Heights Allotment.

As a second priority, EDG recommends maintaining and improving the existing allotment storm water collection systems and developing a rotating schedule to insure that all the allotment storm water collection systems in the City receive maintenance at least once every four years. This would include ditch cleaning, catch basin repair, roadway, culvert replacement and like items as noted in Tables 6-1 through 6-17.

Coupled with the above, the City should begin reestablishing main drainage channels, storm sewer systems, and culverts. Since this report identified numerous problems in this category, at least two projects a year should be budgeted. Identifying specific projects should be based on the premise of working from the downstream of the drainage area to the upstream, while leaving the least populated areas for the future projects.

6.4 Stormwater Management Pond Alternative

In Area No. 2, due to the inadequacy of the main channel and associated structures in the City of Green, as well as those areas south in Stark County, EDG evaluated an alternative for constructing a storm water retention pond on each of the two side channels. The preliminary design is based on storing the differences between the 100 year storm and the 25 year storm or the capacity of the downstream channel (lesser of the two). These calculations yielded pond sizes of 1.4 acres and 15 acres each at 5 foot deep. Areas similar to this that deliver flow from Stark County to the main drainage channel in Green should be evaluated by the Stark County Engineer for the development of retention ponds. Ultimately, the design of ponds in the City of Green and Stark County should be coordinated to insure that the storm water runoff rates are properly controlled. Refere to Figure 6-1 for their location. EDG estimated a total cost of $471,460.00 for the installation of these ponds.

In Area No. 1, EDG identified an area that has had inherent flooding problems in recent years. To control this problem, EDG evaluated a retention pond on each of the two upstream channels. The area in questions is located on the north side of Graybill Road between I-77 and Mayfair Road. The preliminary design is based on storing the difference between the 100 year storm and the 25 year storm or the capacity of the downstream channel as stated above. These calculations yield pond sizes of 11 acres, and 13 acres each at 5 foot deep. Refer to Figure 6-1 for their location. EDG estimated a total cost of $633,190.00 for the installation of these ponds.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-1
DRAINAGE AREA NO. 1
ANALYSIS OF PRIMARY STORM WATER STRUCTURES

Structure Number	Size	Type *	Drainage Area (acres)	25 Year Flow (cfs)	100 year flow (cfs)	Capacity of Structure (cfs) **	Hydraulic Analysis	Recommended Improvement *,**,***	Improvement Cost	Location
167	2-17'x10'	RCB	7,713	856	1,172	1,558	OK		----	Pressler Road
7	28.5'x6.5'	Bridge	6,422	851	1,159	601	No Good	Improve outlet channel to 20' wide bottom to meet capacity	$6,390.00	East Turkeyfoot Lake Road
180	10'x6'	Wood Bridge							----	B.&O. Railroad
9	3-96"	CMP	5,747	929	1,256	960	OK		----	Raber Road
179	6-60"	CMP							----	Golf Course (private)
206	11.82'x 7.61'	CMP	2,970	409	567	409	OK	Improve headwalls due to erosion	$6,390.00	Graybill Road
23	19.5x8	Bridge	2,935	413	572	428	OK		----	Heckman Road
16	23'x6'	Bridge	2,588	435	604	471	OK		----	Wise Road
178	2-48"	CMP	2,423	419	582	52	No Good	2-11x4 RCB, Imp outlet channel to 35' wide	$50,750.00	Wise Road Private Drive
5	3'x3'	RCB	140	53	81	102	OK		----	Mayfair Road
22	36"	CMP	115	61	83	50	OK	36" CRP	$18,200.00	Raber Road

* For Type: RCB - Reinforced Concrete Box, RCP - Reinforced Concrete Pipe, CMP - Corrugated Metal Pipe.
** Capacity is based on a water surface one foot below the pavement surface unless indicated otherwise.
*** New structures include appurtenances such as inlet headwalls/wingwalls, upstream and downstream channel improvements, etc.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-1
DRAINAGE AREA NO. 1
ANALYSIS OF PRIMARY STORM WATER STRUCTURES

Structure Number	Size	Type *	Drainage Area (acres)	25 Year Flow (cfs)	100 year flow (cfs)	Capacity of Structure (cfs) **	Hydraulic Analysis	Recommended Improvement *,**,***	Improvement Cost	Location
10	2-5'x2.5'	3 sided RCB	560	303	409	159	No Good	10x4 RCB	$62,630.00	Mayfair Road
20	15'x7'9"	Arch	1,905	781	1,025	557	No Good	23' x 8' CSPA	$93,890.00	Graybill Road
11	24'x7.5'	Bridge	1,812	772	1,013	1,177	OK		----	Mayfair Road
19A	21'x7.8'	Arch	1,736	814	977	1,119	OK		----	Graybill Road
19	72"	CMP	894	442	581	181	No Good	9'x6'	$68,320.00	Graybill Road
25	6'x4'	RCB	400	192	252	288	OK	Clean channel @ pipe ends & rip-rap	$2,270.00	Wise Road
17	6'x4'	RCB	110	89	116	230	OK		----	Mayfair Road
4	12'x3'	Bridge	721	288	391	279	No Good	Clean channel	$3,320.00	Mayfair Road
205	72"	CMP	491	218	296	350	OK	Replace culvert due to structural failure	$59,280.00	Dewalt Drive
204	2-24"	Plastic	165	97	134	47	No Good	New 4'x3' RCB	$29,910.00	Berna Drive
204A	2-36"	CMP	326	136	184	106	No Good	2-42" RCP	$52,930.00	Berna Drive
43	60"x46"	Ell. CMP	92	101	127	89	No Good	48" RCP	$51,010.00	Fairview Drive
40	60"x46"	CMP	154	79	113	79	No Good	---	---	Beechnut Drive

* For Type: RCB - Reinforced Concrete Box, RCP - Reinforced Concrete Pipe, CMP - Corrugated Metal Pipe.
** Capacity is based on a water surface one foot below the pavement surface unless indicated otherwise.
*** New structures include appurtenances such as inlet headwalls/wingwalls, upstream and downstream channel improvements, etc.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-1
DRAINAGE AREA NO. 1
ANALYSIS OF PRIMARY STORM WATER STRUCTURES

Structure Number	Size	Type *	Drainage Area (acres)	25 Year Flow (cfs)	100 year flow (cfs)	Capacity of Structure (cfs) **	Hydraulic Analysis	Recommended Improvement *,**,***	Improvement Cost	Location
36	11'x6.5'	Bridge						To be replaced by ODOT-1995, 8x4 RCB	----	Massillon Road
132	4'x4'	RCB	165	120	158	141	OK		----	East Turkeyfoot Lake Road
139	3'x3'	RCB	46	75	91	110	OK	Clean channel at culvert	$3,300.00	Massillon Road

* For Type: RCB - Reinforced Concrete Box, RCP - Reinforced Concrete Pipe, CMP - Corrugated Metal Pipe.
** Capacity is based on a water surface one foot below the pavement surface unless indicated otherwise.
*** New structures include appurtenances such as inlet headwalls/wingwalls, upstream and downstream channel improvements, etc.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-2
DRAINAGE AREA NO. 1
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
255 DS	5,200	21	36	10 1/2	856	1,172	1,667	OK		$435,620
255 US		11 1/2	31	7 1/2	851	1,159	576	No Good	Widen bottom to 22' 1:1 side slope	
256 DS	4,000	17	29	7 1/2	851	1,159	649	No Good	Clean channel to improve flow	$21,310
256 US		22	26	8 1/2	929	1,256	1,000	OK		
257 DS	3,000	22	26	8 1/2	929	1,256	1,291	OK		
257 US		8	28	8	409	567	451	OK		
258 DS	2,000	8	28	8	409	567	451	OK		$97,810
258 US		8	16	6	413	572	166	No Good	Widen to 14' bottom, 1:1 side slope	

* Capacity is based on a water surface at the top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-2
DRAINAGE AREA NO. 1
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
259 DS	3,000	8	16	6	413	572	166	No Good	Widen to 14' bottom 1:1 side slope	$175,040
259 US		10	26	6	435	604	301	No Good	Widen to 14' bottom 1:1 side slope	
260 DS	3,000	6	32	5	435	604	189	No Good	Widen to 14' bottom 1:1 side slope	$156,600
260 US		10	26	8	419	582	460	OK		
261 DS	1,500	8	16	7	781	1,025	321	No Good	Widen to 14' bottom 1:1 side slope	$69,300
261 US		8	16	3	781	1,025	85	No Good	Widen to 12' bottom, deepen to 7', 1:1 side slope	

* Capacity is based on a water surface at the top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-2
DRAINAGE AREA NO. 1
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
262 DS	2,000	8	16	3	781	1,025	85	No Good	Widen to 12' bottom, deepen to 7', 1:1 side slope	$127,190
262 US		4	33	4	772	1,013	196	No Good	Widen channel to 24' bottom 1:1 side slope	
263 DS	2,000	8	32	4	772	1,013	233	No Good	Widen channel to 24' bottom 1:1 side slope	$169,040
263 US		17	37	10	814	977	1,865	OK		
264 DS	1,500	7	30	5	814	977	404	No Good	Widen to 18' bottom 1:1 side slope	$71,210
264 US		4	8	6 1/2	442	581	194	No Good	Widen to 9' bottom 1:1 side slope	

* Capacity is based on a water surface at the top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-2
DRAINAGE AREA NO. 1
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
265 DS	1,100	6	8	6 1/2	442	581	239	No Good	Widen to 9' bottom, 1:1 side slope	$46,950
265 US		13	17	2 1/2	344	449	178	No Good	Widen to 13' bottom, deepen to 3', 2:1 side slope	
266 DS	3,500	13	17	2 1/2	344	449	178	No Good	Widen to 13' bottom, deepen to 3', 1:1 side slope	$102,890
266 US		6	8	5	192	252	150	No Good	Clean channel provide 2:1 side slope	

* Capacity is based on a water surface at the top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-2
DRAINAGE AREA NO. 1
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
267 DS	3,100	7	8	2	192	252	76	No Good	Widen to 12' bottom 1:1 side slope	$117,180
267 US		7	8.5	2	40	52	32	No Good	Clean channel, 2:1 side slope	
268 DS	6,000	4	13	4	378	490	134	No Good	Widen to 9' bottom 1:1 side slope	$209,250
268 US		6	10	4	205	264	129	No Good	Clean channel 2:1 side slope	
269 DS	1,200	13	17	4	303	409	285	No Good	Clean channel 2:1 side slope	$23,940
269 US		14	17	4	303	409	298	No Good	Clean channel 2:1 side slope	

* Capacity is based on a water surface at the top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-2
DRAINAGE AREA NO. 1
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
270 DS	4,300	14	17	4	303	409	298	No Good	Clean channel 2:1 side slope	$82,600
270 US		4	4	3.5	61	83	31	No Good	Clean channel 1:1 side slope	
271 DS	2,500	12	30	5	288	391	680	OK		$121,130
271 US		10	14	2.5	213	296	138	No Good	Widen to 13' bottom 1:1 side slope	
272 DS	1,100	10	14	2.5	213	296	138	No Good	Widen to 13' bottom 1:1 side slope	$54,020
272 US		12	12	4	97	134	36	OK		

* Capacity is based on a water surface at the top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-3
DRAINAGE AREA NO. 2
ANALYSIS OF PRIMARY STORM WATER STRUCTURES

Structure Number	Size	Type *	Drainage Area (acres)	25 Year Flow (cfs)	100 year flow (cfs)	Capacity of Structure (cfs) **	Hydraulic Analysis	Recommended Improvement *,**,***	Improvement Cost	Location
176	40'X5'	Bridge	3,716	970	1,339	924	No Good	Clean DS channel	$7,100.00	Mt. Pleasant Road
172	2-95"x67"	CMP	3,389	913	1,261	380	No Good	New 3-10'x6' RCB	$180,800.00	Brookline Road
170	90"	CMP	2,316	622	859	239	No Good	New 2-7'x6' RCB	$162,750.00	Mayfair Road
173	87"x 63"	CMP	1,392	495	684	280	No Good	New 121"x77" RCP	$62,920.00	Aultman Road
177	48"	CMP	643	197	273	80	No Good	New 8'x4' RCB	$50,780.00	Aultman Road
171	53"x34"	CMP	985	262	365	29	No Good	2-10'x3' RCB	$48,930.00	B&O Railroad
169	53"x34"	RCP	985	262	365	37	No Good	2-10'x3' RCB	$48,930.00	Private drive off Mayfair Rd.
169A	53"x34"	RCP	985	262	365	48	No Good	2-10'x3' RCB	$48,930.00	Private drive off Mayfair Rd.
28C	54"	RCP	175	70	96	137	OK		----	Greensburg Road

* For Type: RCB - Reinforced Concrete Box, RCP - Reinforced Concrete Pipe, CMP - Corrugated Metal Pipe.
** Capacity is based on a water surface one foot below the pavement surface unless indicated otherwise.
*** New structures include appurtenances such as inlet headwalls/wingwalls, upstream and downstream channel improvements, etc.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-4
DRAINAGE AREA NO. 2
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
240 DS	1,300	12	28	6	970	1,339	577	No Good	Widen bottom to 15', 2:1 side slope	$76,140
240 US		16	18	6.5	913	1,261	534	No Good	Widen bottom to 10', 2:1 side slope	
241 DS	1,700	14	19	7	913	1,261	431	No Good	Widen bottom to 13', 2:1 side slope	$110,430
242 US		6	13	3	622	859	64	No Good	Widen bottom to 58', 2:1 side slope	

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
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TABLE 6-4
DRAINAGE AREA NO. 2
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
243 DS	200	6	13	3	622	859	64	No Good	Widen bottom to 53', 2:1 side slope	$30,670
243 US		6	13	3	622	859	64	No Good	Widen bottom to 53', 2:1 side slope	
244 DS	700	7	25	6	495	684	539	OK		
245 US		8	34	6	495	684	706	OK		
246 DS	3,800	6	13	3	248	343	64	No Good	Widen bottom to 20', 2:1 side slope	$202,340
246 US		12	21	5.5	197	273	303	OK		

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

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COMPREHENSIVE STORM WATER STUDY

TABLE 6-4
DRAINAGE AREA NO. 2
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
247 DS	100	12	21	5.5	262	365	303	OK		$3,600
247 US		7	21	3	262	365	174	No Good	Widen bottom to 10', 2:1 side slope	
247A DS	100	7	21	4	262	365	273	OK		$3,840
247A US		3	20	3	262	365	113	No Good	Widen bottom to 15', 2:1 side slope	
248 DS	300	3	20	3	262	365	130	No Good	Widen bottom to 10', 2:1 side slope	$10,830
248 US		3	20	3	262	365	130	No Good	Widen bottom to 10', 2:1 side slope	
249 DS	800	4	18	5	262	365	281	OK		
249 US		10	18	5	262	365	400	OK		

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

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COMPREHENSIVE STORM WATER STUDY

TABLE 6-4
DRAINAGE AREA NO. 2
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
250	2,800	8	15	1.25	236	326	43	No Good	Widen bottom to 41', 2:1 side slope	$80,080
251 DS		9	12	1	236	326	24	No Good	Widen bottom to 74', 2:1 side slope	
251 US	2,600	4	12	4	70	96	134	OK		$204,360
252 DS	700	12	21	9	70	96	1,583	OK		

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-5
DRAINAGE AREA NO. 3
ANALYSIS OF PRIMARY STORM WATER STRUCTURES

Structure Number	Size	Type *	Drainage Area (acres)	25 Year Flow (cfs)	100 year flow (cfs)	Capacity of Structure (cfs) **	Hydraulic Analysis	Recommended Improvement *,**,***	Improvement Cost	Location
50	10'x8'	RCB	2,103	573	779	1,105	OK		----	Mount Pleasant Road
105A	3-36"	RCP	1,215	465	610	274	No Good	New 10'x6' RCB	$62,300.00	Green City Park
105	12'x5'	Bridge	1,163	451	592	424	No Good	Clean out and improve inlet + US and DS channel	$3,720.00	Koons Road
148	8'x5'	RCB	1,071	455	593	415	No Good	Clean out and improve inlet + US & DS channel	$3,520.00	Massillon Road
28	3'x3'	RCB	60	40	53	79	OK	Clean downstream channel	----	Greensburg Road
149	4'x6'	RCB	839	389	504	244	No Good	New 8'x6' RCB	$63,720.00	Massillon Road
149A	72"	CMP	839	389	504	50	No Good	New 10'x5' RCB	$38,340.00	Embankment off Greenbrook

* For Type: RCB - Reinforced Concrete Box, RCP - Reinforced Concrete Pipe, CMP - Corrugated Metal Pipe.
** Capacity is based on a water surface one foot below the pavement surface unless indicated otherwise.
*** New structures include appurtenances such as inlet headwalls/wingwalls, upstream and downstream channel improvements, etc.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-5
DRAINAGE AREA NO. 3
ANALYSIS OF PRIMARY STORM WATER STRUCTURES

Structure Number	Size	Type *	Drainage Area (acres)	25 Year Flow (cfs)	100 year flow (cfs)	Capacity of Structure (cfs) **	Hydraulic Analysis	Recommended Improvement *,**,***	Improvement Cost	Location
165	2-48"	Steel	839	389	504	210	No Good	New 8'x6' RCB	$38,820.00	Private drive off Greenbrook
165A	72"	RCP	653	230	302	244	OK	Currently being replaced with 72" RCP	----	Greensburg Road
150	4'x3'	RCB	245	159	205	85	No Good	6x4 RCB	$44,640.00	Massillon Road

* For Type: RCB - Reinforced Concrete Box, RCP - Reinforced Concrete Pipe, CMP - Corrugated Metal Pipe.
** Capacity is based on a water surface one foot below the pavement surface unless indicated otherwise.
*** New structures include appurtenances such as inlet headwalls/wingwalls, upstream and downstream channel improvements, etc.

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COMPREHENSIVE STORM WATER STUDY

TABLE 6-6
DRAINAGE AREA NO. 3
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
208 DS	3,000	10	18	3	573	779	264	No Good	Widen bottom to 12', deepen to 2', 2:1 side slope	$118,350
208 US		8	21	3	528	698	196	No Good	Widen bottom to 10', deepen to 4.5', 2:1 side slope	
209 DS	1,000	8	21	3	528	698	196	No Good	Widen bottom to 10', deepen to 4.5', 2:1 side slope	$38,860
209 US		5	22	4	465	610	219	No Good	Widen bottom to 10', deepen to 4.5', 2:1 side slope	

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-6
DRAINAGE AREA NO. 3
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
210 DS	1,250	5	22	4	465	610	219	No Good	10' bottom width, deepen to 4.5', 2:1	$54,470
210 US		6	16	5	451	592	261	No Good	Clean channel, 2:1 side slope	
211 DS	500	12	16	7	451	592	444	No Good	Clean channel, 2:1 side slope	$20,350
211 US		10	19	3.5	455	593	170	No Good	12' bottom width, deepen to 4.5', 2:1 side slope	

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-6
DRAINAGE AREA NO. 3
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
212 DS	500	10	19	3.5	455	593	170	No Good	12' bottom width, deepen to 4.5', 2:1 side slope	$22,290
212 US		5	16	3.25	455	593	108	No Good	12' bottom width, deepen to 4.5', 2:1 side slope	
213 DS	500	5	16	3.25	455	593	108	No Good	12' bottom width, deepen to 4.5', 2:1 side slope	$30,060
213 US		16	28	7	455	593	825	OK		

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

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TABLE 6-6
DRAINAGE AREA NO. 3
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
214 DS	1,000	12	16	7	455	593	444	No Good	Clean Channel, 2:1 side slope	$44,1000
214 US		10	16	6	389	504	327	No Good	Clean Channel, 2:1 side slope	
215 DS	1,750	12	16	7	389	504	444	OK		$131,650
215 US		3.5	11	2.5	390	502	67	No Good	11' bottom width, deepen to 3.5', 2:1 side slope	
216 DS	400	3	11	4.25	230	302	69	No Good	8' bottom width, 2:1 side slope	$14,420
216 US		8	30	7	230	302	447	OK		

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

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TABLE 6-6
DRAINAGE AREA NO. 3
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
217 DS	2,500	15	35	7	230	302	654	OK		$102,210
217 US		3	11	2	192	249	21	No Good	8' bottom width, deepen to 4', 2:1 side slope	
218 DS	2,500	3	11	2	192	249	22	No Good	8' bottom width, deepen to 4', 2:1 side slope	$73,500
218 US		3	11	2	36	46	22	No Good	6' bottom width, 2:1 side slope	
219 US	1,300	4	25	4	159	205	131	No Good	Clean channel	$2,340
289 US	1800	10	19.5	3.5	1098	1538	1890	OK		
289 DS		12	25	3	1098	1538	1819	OK		

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-7
DRAINAGE AREA NO. 4
ANALYSIS OF PRIMARY STORM WATER STRUCTURES

Structure Number	Size	Type *	Drainage Area (acres)	25 Year Flow (cfs)	100 year flow (cfs)	Capacity of Structure (cfs) **	Hydraulic Analysis	Recommended Improvement *,**,***	Improvement Cost	Location
71	16'x10'	Bridge	1,573	696	933	356	No Good	New paved channel US, DS and under bridge	$9,730.00	South Main Street
68	10'x6'	Bridge	876	708	941	362	No Good	New paved channel US, DS and under bridge	----	Mt. Pleasant Road
67	5'x3'	RCB	104	94	153	107	OK		----	Mt. Pleasant Road

* For type: RCB - Reinforced Concrete Box, RCP - Reinforced Concrete Pipe, CMP - Corrugated Metal Pipe.
** Capacity is based on a water surface one foot below the pavement surface unless indicated otherwise.
*** New structures include appurtenances such as inlet headwalls/wingwalls, upstream and downstream channel improvements, etc.

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TABLE 6-8
DRAINAGE AREA NO. 4
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
285 US	1,200	8	28	10	696	933	1,443	OK		
285 DS		4	24	6	1,498	2,027	6,607	OK		
286 DS	900	18	33	5	802	1,094	10,856	OK		$2,970
286 US		10	18	6	708	941	600	No Good	Clean and Shape	
287 US	700	5	10	5	94	153	233	OK		
288 DS	2,000	6	14	4	802	1,094	2,597	OK		

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

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TABLE 6-9
DRAINAGE AREA NO. 6
ANALYSIS OF PRIMARY STORM WATER STRUCTURES

Structure Number	Size	Type *	Drainage Area (acres)	25 Year Flow (cfs)	100 year flow (cfs)	Capacity of Structure (cfs) **	Hydraulic Analysis	Recommended Improvement *,**,***	Improvement Cost	Location
80	10'x5'	RCB	766	253	359	324	OK		----	Kilinger Road
81	10'x4'	RCB	646	208	298	324	OK		----	Kilinger Road
108	48"	CMP	432	187	265	170	No Good	New 54" RCP	$19,340.00	Arlington Road
108A	48"	Steel	120	105	143	28	No Good	New 6'x3' RCP	$47,290.00	Private drive off E. Nimisila Road
156	36"	RCP	120	105	143	47	No Good	New 6'x3' RCB	$40,670.00	Private drive off Medley Drive
158	36"	RCP	120	105	143	64	No Good	New 5'x4' RCB	$42,940.00	Medley Drive
60A	2-18" and 60"x38"	CMP CMP	1,203	377	509	114	No Good	New 2-5'x4' RCB	$98,480.00	Private drive at Pine Valley Lake
60	12'x4.5'	Bridge	940	377	509	327	No Good	Clean out silt and improve US + DS channel	$4,750.00	Arlington Road

* For Type: RCB - Reinforced Concrete Box, RCP - Reinforced Concrete Pipe, CMP - Corrugated Metal Pipe.
** Capacity is based on a water surface one foot below the pavement surface unless indicated otherwise.
*** New structures include appurtenances such as inlet headwalls/wingwalls, upstream and downstream channel improvements, etc.

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TABLE 6-9
DRAINAGE AREA NO. 6
ANALYSIS OF PRIMARY STORM WATER STRUCTURES

Structure Number	Size	Type *	Drainage Area (acres)	25 Year Flow (cfs)	100 year flow (cfs)	Capacity of Structure (cfs) **	Hydraulic Analysis	Recommended Improvement *,**,***	Improvement Cost	Location
58A	6'x4'	RCB	374	223	294	238	OK		----	E. Nimisila Road
62	3'x6'	CMP	269	187	243	178	No Good	New 54" RCP	$19,340.00	Greensburg Road
61	72"	CMP	269	187	243	113	No Good	New 6'x5' RCP	$56,900.00	King Drive
47-46	48"	RCP	180	155	198	148	OK		----	Melanie Drive
48	30" and 42"	RCP RCP	180	155	198		Storm sewer system outlet		----	Hightower Drive
58	10'x4'	RCB	494	220	300	226	OK		----	E. Nimisila Drive
151	60"	RCP	244	129	173	180	OK		----	Everbright Road
45	4'x5'	RCB	244	129	173	229	OK		----	Greensburg Road
35	60"x46"	CMP	189	108	145	73	No Good	New 6'x4' RCB	$47,610.00	Steese Road

* For Type: RCB - Reinforced Concrete Box, RCP - Reinforced Concrete Pipe, CMP - Corrugated Metal Pipe.
** Capacity is based on a water surface one foot below the pavement surface unless indicated otherwise.
*** New structures include appurtenances such as inlet headwalls/wingwalls, upstream and downstream channel improvements, etc.

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TABLE 6-10
DRAINAGE AREA NO. 6
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
100 DS	2,300				254	360				
100 US		11	35	4	253	359	321	OK		
101 DS	1,500	11	35	4	253	359	380	OK		$9,690
101 US		12	30	3	208	298	225	OK	Clean channel	
102 DS	3,400	7	12	6.5	208	298	266	OK		$16,830
102 US		9	25	4	187	265	265	OK	Clean channel	
103 DS	3,300	9	25	4	187	265	456	OK	Clean channel	$16,350
103 US		4	12	6	105	143	330	OK		
103A DS	700	4	12	6	105	143	542	OK		$3,530
103A US		3	18	4	105	143	391	OK		

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

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TABLE 6-10
DRAINAGE AREA NO. 6
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
104 DS	800	3	18	4	105	143	391	OK	Clean channel	$4,470
104 US		3	25	6	105	143	988	OK	Clean channel	
105 DS	900	3	25	6	105	143	1,035	OK	Clean channel	
107A DS	100	6	25	2.25	377	509	128	No Good	Widen to 25' 2:1 side slope	$4,660
107A US		6	25	2.25	377	509	128	No Good	Widen bottom to 25', 2:1 side slope	
108 DS	400	8	24	5.5	377	509	568	OK		$6,190
108 US		13	40	3	377	509	369	No Good	Clean channel, 2:1 side slope	
109 DS	700	13	40	3	377	509	477	OK		
109 US		Lake	Lake	Lake	377	509	Lake	Lake		

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-10
DRAINAGE AREA NO. 6
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
127 DS	100	3	5	1.5	223	294	15	No Good	Widen bottom to 33', 2:1 side slope	$4,310
127 US		6	18	2.5	223	294	110	No Good	Widen bottom to 33', 2:1 side slope	
128-30 DS	600	4	18	3	223	294	123	No Good	Widen bottom to 9', 2:1 side slope	$23,920
128-30 US		5	8	2.5	223	294	56	No Good	Widen bottom to 14', 2:1 side slope	
30-29 DS	1,400	5	8	2.5	223	294	56	No Good	Widen bottom to 14', 2:1 side slope	$65,320
30-29 US		6	19	5.5	187	243	526	OK		

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-10
DRAINAGE AREA NO. 6
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
29-129 DS	500	6	19	5.5	187	243	526	OK		$19,270
29-129 US		3	4	2	187	243	18	No Good	Widenb ottom to 20', 2:1 side slope	
130 DS	300	3	100	2	187	243	279	OK	Needs cleared	$3,070
130 US		6	21	4	187	243	254	OK	Needs cleared	
131 DS	1,100	5	21	4	187	243	253	OK		$49,590
131 US		3	6	6.5	155	193	121	No Good	Clean channel, 2:1 side slope	
132 DS	600	6	25	10	155	198	1,428	OK		
132 US		6	25	10	155	198	1,428	OK		

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-10
DRAINAGE AREA NO. 6

ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
117 DS	100	4	8	2	220	300	34	No Good	Widen bottom to 22', 2:1 side slope	$26,890
117 US		4	8	2	220	300	34	No Good	Widen bottom to 22', 2:1 side slope	
118-51 DS	400	4	8	2	220	300	34	No Good	Widen bottom to 22', 2:1 side slope	$16,630
118-51 US		10	13	3	220	300	215	No Good	Clean channel, 2:1 side slope	
51-119 DS	1,400	10	13	3	220	300	215	No Good	Clean channel, 2:1 side slope	$17,010
51-119 US		3	25	6	129	173	669	OK		

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-10
DRAINAGE AREA NO. 6

ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
120 DS	200	Pond	Pond	Pond	129	173	Pond	Pond		
120 US		5	20	7	129	173	484	OK		
121 DS	1,300	4	9	6.5	129	173	181	OK		$10,150
121 US		4	25	2	108	145	77	No Good	Clean channel, 2:1 side slope	
122 DS	400	4	8	2.5	108	145	50	No Good	Widen bottom to 5', 2:1 side slope	$8,930
122 US					108	145				

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

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COMPREHENSIVE STORM WATER STUDY

TABLE 6-11
DRAINAGE AREA NO. 7
ANALYSIS OF PRIMARY STORM WATER STRUCTURES

Structure Number	Size	Type *	Drainage Area (acres)	25 Year Flow (cfs)	100 year flow (cfs)	Capacity of Structure (cfs) **	Hydraulic Analysis	Recommended Improvement *,**,***	Improvement Cost	Location
191	2-72" x 42"	CMP	327	214	282	3,411	OK	Replace culvert due to structural failure - same size as existing	$58,790.00	Provens Drive
192	60" x 40"	CMP	88	60	85	120	OK	Install new headwalls	$5,020.00	Neptune drive

* For Type: RCB - Reinforced Concrete Box, RCP - Reinforced Concrete Pipe, CMP - Corrugated Metal Pipe.
** Capacity is based on a water surface one foot below the pavement surface unless indicated otherwise.
*** New structures include appurtenances such as inlet headwalls/wingwalls, upstream and downstream channel improvements, etc.

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COMPREHENSIVE STORM WATER STUDY

TABLE 6-12
DRAINAGE AREA NO. 7
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
280 DS	700	2	7	1.5	224	297	18	No Good	Widen bottom to 30', 2:1 side slopes	$51,030
280 US		4	16	2	214	282	67	No Good	Widen bottom to 18', 2:1 side slopes	
281 DS	500	5	20	5	214	282	580	OK	Widen bottom to 6', 2:1 side slopes	$12,680
281 US		12	20	3	192	281	85	No Good	Widen bottom to 6', 2:1 side slopes	

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-13
DRAINAGE AREA NO. 8
ANALYSIS OF PRIMARY STORM WATER STRUCTURES

Structure Number	Size	Type *	Drainage Area (acres)	25 Year Flow (cfs)	100 year flow (cfs)	Capacity of Structure (cfs) **	Hydraulic Analysis	Recommended Improvement *,**,***	Improvement Cost	Location
95A	66"	CMP	1,688	270	400	100	No Good	New 10'x5' RCB	$79,130.00	Private drive off Main Street
95	8'x4'	RCB	1,553	267	396	267	OK		----	S. Main Street
96	7'x5'	RCB	1,310	282	409	259	No Good	Clean out silt and improve US + DS channel	$2,590.00	Cottage Grove Road
96A	4-30"	Steel	1,310	282	409	34	No Good	New 2-8'x4' RCB + raise drive 2'	$103,520.00	Private drive off Cottage Grove Road
96B	2-20"	Steel	136	48	76	6	No Good	New 2-3'x2' RCB + raise drive 1'	$43,560.00	Private drive off Cottage Grove
162	5-20"	Steel	548	200	279	35	No Good	New 2-6' x 3' RCB + raise drive 2'	$77,940.00	Private drive off King Arthur Drive
55	10'x7'	Bridge	548	200	279	357	OK		----	Arlington Road

* For Type: RCB - Reinforced Concrete Box, RCP - Reinforced Concrete Pipe, CMP - Corrugated Metal Pipe.
** Capacity is based on a water surface one foot below the pavement surface unless indicated otherwise.
*** New structures include appurtenances such as inlet headwalls/wingwalls, upstream and downstream channel improvements, etc.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-13
DRAINAGE AREA NO. 8
ANALYSIS OF PRIMARY STORM WATER STRUCTURES

Structure Number	Size	Type *	Drainage Area (acres)	25 Year Flow (cfs)	100 year flow (cfs)	Capacity of Structure (cfs) **	Hydraulic Analysis	Recommended Improvement *,**,***	Improvement Cost	Location
55A	72"	CMP	548	200	279	55	No Good	New 7'x5' RCB	$70,470.00	Private drive off Arlington Road
161	15" 36" 54"	RCP RCP RCP	548	200	279		Storm detetion pond outlet		----	S. of Walnut Wood Way
160	21" 54"	RCP RCP	548	200	279		Storm sewer system outlet to det. pond		----	Golden Wood Way

* For Type: RCB - Reinforced Concrete Box, RCP - Reinforced Concrete Pipe, CMP - Corrugated Metal Pipe.
** Capacity is based on a water surface one foot below the pavement surface unless indicated otherwise.
*** New structures include appurtenances such as inlet headwalls/wingwalls, upstream and downstream channel improvements, etc.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-14
DRAINAGE AREA NO. 8
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
139 DS	500	Reservoir	Reservoir	Reservoir	270	400	Reservoir	Reservoir		$28,060.00
139 US		12	20	3	270	400	152	No Good	Widen bottom to 17', 2:1 side slope	
140 DS	2,100	4	16	3	270	400	81	No Good	Widen bottom to 17', 2:1 side slope	$100,640.00
140 US		10	30	10	267	396	1,137	OK	Needs cleared	
141 DS	4,100	10	30	6	267	396	633	OK	Needs cleared	$86,110.00
141 DS		6	8	7	282	409	198	No Good	Widen bottom to 6', 2:1 side slope	

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-14
DRAINAGE AREA NO. 8

ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
142 DS	800	6	8	6.5	282	409	218	No Good	Widen bottom to 6', 2:1 side slope	$23,580.00
142 US		6	24	3.5	282	409	284	OK		
142A DS	500	5	10	3.5	282	409	135	No Good	Widen bottom to 6', 2:1 side slope	$15,540.00
44-44A DS	1,300	8	10	1.75	48	76	79	OK		
44-44A US		3	11	2	48	76	52	OK		
44B DS	1,900	3	11	2	48	76	49	OK		
144 US	5,000	10	15	2.5	200	279	139	No Good	Widen bottom to 12', 2:1 side slope	$204,750.00

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-14
DRAINAGE AREA NO. 8

ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
145 DS	1,400	10	14	2.5	200	279	154	No Good	Widen bottom to 10', 2:1 side slope	$31,500.00
145 US		11	17	7	200	279	810	OK		
146 DS	500	11	11	7	200	279	295	OK		$17,620.00
146 US		4	12	2	200	279	33	No Good	Widen bottom to 27', 2:1 side slope	
147 DS	Negligible	Lake	Lake	Lake	200	279	Lake	Lake		
147 US		Lake	Lake	Lake	200	279	Lake	Lake		

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-14
DRAINAGE AREA NO. 8

ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
148 DS	2,200	Lake	Lake	Lake	200	279	Lake	Lake		
148 US		5	25	6	200	279	552	OK		
149 DS	200	Det. Pond	Det. Pond	Det. Pond	200	279	Det. Pond	Det. Pond		
149 US		11	15	3	200	279	305	OK		

* Capacity is based on a water surface at top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-15
DRAINAGE AREA NO. 9
ANALYSIS OF PRIMARY STORM WATER STRUCTURES

Structure Number	Size	Type *	Drainage Area (acres)	25 Year Flow (cfs)	100 year flow (cfs)	Capacity of Structure (cfs) **	Hydraulic Analysis	Recommended Improvement *,**,***	Improvement Cost	Location
101	17'x10'	RCB	1,528	565	780	1,780	OK		----	Cottage Grove Road
99	137"x87"	CMP	1,137	491	673	135	No Good	New 11'x6' RCB	$96,900.00	Moore Road
121	2-48"	CMP	350	223	295	256	OK		----	E. Turkeyfoot Lake Road
51	9'x6'	Bridge	475	286	392	346	OK		----	Arlington Road
127	3'x3'	RCB	50	21	32	147	OK		----	E. Turkeyfoot Lake Road

* For type: RCB - Reinforced Concrete Box, RCP - Reinforced Concrete Pipe, CMP - Corrugated Metal Pipe.
** Capacity is based on a water surface one foot below the pavement surface unless indicated otherwise.
*** New structures include appurtenances such as inlet headwalls/wingwalls, upstream and downstream channel improvements, etc.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-16
DRAINAGE AREA NO. 9
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
56 DS	1,200	Reservoir	Reservoir	Reservoir	567	783	Reservoir	Reservoir		$85,860.00
56 US		7	10	2	567	783	71	No Good	Widen bottom to 42', 2:1 side slope	
56-55 DS	1,000	7	10	2	567	783	71	No Good	Widen bottom to 42', 2:1 side slope	$67,210.00
56-55 US		22	27	2.25	567	783	283	No Good	Widen bottom to 35', 2:1 side slope	
55-160 DS	1,300	22	27	2.25	367	783	283	No Good	Widen bottom to 35', 2:1 side slope	$103,650.00
55-160 US		10	20	3	565	780	282	No Good	Widen bottom to 17', 2:1 side slope	

* Capacity is based on a water surface at the top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-16
DRAINAGE AREA NO. 9
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
161 DS	200	14	20	3	565	780	477	No Good	Clean and shape	$830
161 US		Lake	Lake	Lake	565	780	Lake	Lake		
54-163 DS	500	6	10	1.75	83	124	33	No Good	Widen bottom to 17', 2:1 side slope	$16,630.00
54-163 US		8	12	1	83	124	88	OK		
165 US	300	11	15	4	491	673	196	No Good	Widen bottom to 17', 2:1 side slope	$21,030.00
166 DS	1,200	10	14	4	491	673	178	No Good	Widen bottom to 17', 2:1 side slope	$84,060.00
167 US	2,000	13	36	9	223	295	1,664	OK	Needs Cleared	$13,210.00

* Capacity is based on a water surface at the top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-16
DRAINAGE AREA NO. 9
ANALYSIS OF PRIMARY STORM WATER DRAINAGE CHANNELS

Channel Number (from-to)	Length (ft)	Bottom Width (ft)	Top Width (ft)	Depth (ft)	25 Year Flow (cfs)	100 Year Flow (cfs)	Channel Capacity (cfs)	Hydraulic Analysis	Recommended Improvement *,**	Improvement Cost
168-43 DS	1,200	6	29	5	223	295	437	OK	Needs Cleared	$5,490.00
168-43 US		2	16	3.5	223	295	198	No Good	Clean channel, 2:1 side slope	
169 US	3,100	6	9	3	305	425	82	No Good	Widen bottom to 14', 2:1 side slope	$147,410.00
170 DS	1,700	6	9	3	286	392	92	No Good	Widen bottom to 11', 2:1 side slope	$78,290.00
170 US		5	10	2	286	392	50	No Good	Widen bottom to 25', 2:1 side slope	
171 US	1,700	9	26	9	21	32	2,061	OK		
172 DS	100	9	36	7.5	21	32	2,074	OK	Needs cleared	$650.00

* Capacity is based on a water surface at the top of channel (full depth).
** General recommended improvement for all channels includes removing all trees, brush, debris, etc. to within four feet of the top of channel.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-17
ALLOTMENT STORM WATER COLLECTION SYSTEM EVALUATION

Area No.	Allotment Name	General Description	Detailed Comment	Recommended Action
1-1	Wise's Mayfair Allotment	Maintained open ditches or swales with drive way culverts.	None Noted	N/A
1-2	Green Acres (Unrecorded)	Open ditches or swales with driveway culverts.	Some areas have excessive vegetation	Clean Ditches of brush and vegetation
1-3	Greenfield Farms	Maintained open ditches or swales.	None Noted	N/A
1-4	Park Creek Estates	Curb and gutter streets with side opening catch basins and storm sewers.	Allotment retention pond	N/A
1-5	Park Ridge Estates	Curb and gutter streets with side opening catch basins and storm sewers.	Allotment retention pond	N/A
1-6	Ann Marie Estates	Maintained open ditches or swales.	None Noted	N/A
1-7	Raintree Estates	Curb and gutter streets with side opening catch basins and storm sewers.	Allotment retention pond	N/A
1-8	Courtney Allotment	No drainage system or ditching.	None Noted	Provide swales

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-17
ALLOTMENT STORM WATER COLLECTION SYSTEM EVALUATION

Area No.	Allotment Name	General Description	Detailed Comment	Recommended Action
1-9	Boettler Business Park	Curb and gutter streets with side opening catch basins and storm sewers.	Allotment retention pond	N/A
1-10	Akron-Canton Corporate Park	Curb and gutter streets with side opening catch basins and storm sewers.	Allotment retention pond	N/A
1-11	Fairway Villas	Storm sewer with open grate roadway catch basins.	There are vented sanitary lids.	Replace sanitary lids with solid lids.
1-12	The Village, Mayfair Condominiums	Storm sewer with open grate roadway catch basins.	None Noted	N/A
1-13	Country Club Apt.	Storm sewer with open grate roadway catch basins.	None Noted	N/A
1-14	Villas at Prestwick	Curb and gutter streets with side opening catch basins and storm sewers.	Drainage swales	N/A
1-15	Country Club Townhouses	Storm sewer with open grate roadway catch basins.	Raber Road construction entrance culvert plugged.	Clean culvert
1-16	Prestwick	Curb and gutter streets with side opening catch basins.	Allotment retention pond. Storm sewer and catch basin in front of 3829 Troon Drive shows signs of failure.	Repair pipe and catch basin.

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COMPREHENSIVE STORM WATER STUDY

TABLE 6-17
ALLOTMENT STORM WATER COLLECTION SYSTEM EVALUATION

Area No.	Allotment Name	General Description	Detailed Comment	Recommended Action
1-17	Saullo's Acres	Curb and gutter streets with side opening catch basins and storm sewers.	Allotment retention pond	N/A
1-18	Robinwood Estates	Maintained open ditches or swales with driveway culverts and ditch enclosures.	Ditch has excessive vegetation north of Robinwood.	1. Clean ditches of brush. 2. Remove or replace ditch enclosures with larger pipes as required.
1-19	Mayfair Estates	Curb and gutter streets with side opening catch basins. Some open ditches with catch basins, storm sewers, and driveway culverts.	None Noted	N/A
1-20	Miller Industrial Park	Curb and gutter streets with side opening catch basins and storm sewers.	None Noted	N/A
1-21	Kungle Heights	Maintained open ditches or swales, some with ditch enclosures.	Some of the ditch enclosures are undersize.	Remove or replace ditch enclosures with larger pipes.
1-22	Newman Heights	Maintained open ditches or swales with storm sewers and catch basins.	None Noted	N/A

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-17
ALLOTMENT STORM WATER COLLECTION SYSTEM EVALUATION

Area No.	Allotment Name	General Description	Detailed Comment	Recommended Action
1-23	Imrek Acres	Open ditches or swales. Some driveway culverts.	Ditches at the west end of Auberry Drive have excessive vegetation. Ditch at 315 Imrek Drive has excessive vegetation.	Clean ditches of brush and vegetation.
1-24	Acadian Heights	Maintained open ditches or swales with storm sewers and catch basins.	Large maintained swale east of the intersection of Mountain Ash and Weiler Street.	
1-25	Poston Allotment	Open ditches or swales some driveway culverts.	Standing water on the south side of Linda Kay Drive, ditch has excessive vegetation. The culvert at Dole and Linda Kay is collapsed.	1. Clean ditches of brush and vegetation. 2. Correct ditch slope. 3. Replace the culvert at Linda Kay and Dole.
1-26	Beechtree Estates	Maintained open ditches or swales with driveway culverts.	Driveway culvert is clogged.	Clear clog from driveway crossing.
1-27	Walnut Hills	Maintained open ditches or swales with storm sewers, catch basins, driveway culverts and other ditch enclosures.	Driveway culverts and ditch enclosures are clogged.	Clean or replace culverts and enclosures with larger pipes.
1-28	Kimmel Allotment	Maintained open ditches or swales with driveway culverts.	None Noted	N/A

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COMPREHENSIVE STORM WATER STUDY

TABLE 6-17
ALLOTMENT STORM WATER COLLECTION SYSTEM EVALUATION

Area No.	Allotment Name	General Description	Detailed Comment	Recommended Action
1-29	Huffine Allotment	Maintained open ditches or swales with driveway culverts and ditch enclosures.	The culvert at Mayfair and Lynne is clogged.	Clean or replace the culvert.
1-30	Graham-Smith Allotment (Unrecorded)	Maintained open ditches or swales with flow diversion embankments.	Drainage culvert at 2849 Aldis is clogged.	Clean or replace the culvert.
1-31	Mayfair Heights	Maintained open ditches or swales with storm sewers, catch basins, flow diversion embankments, some driveway culverts, and ditch enclosures.	Some catch basins have windows made by laying concrete block on side causing partial obstruction. At 2855 Lomae a 12" CMP has a collapsed end after it cross the road. A catch basin on the west side of Lomae has the outlet higher than the two inlet pipes.	1. Repair or replace catch basins. 2. Replace the pipe at Lomae. 3. Adjust outlet pipe elevation at Lomae.
1-32	Lindale Heights	Open ditches or swales with driveway culverts.	The north side of Mayo Path has standing water in the ditch. A 24" CMP under Long has outlet blocked with boards. Some ditch sections on Long have excessive vegetation.	1. Correct ditch, the slope or obstruction. 2. Clean culvert. 3. Clear brush and vegetation from ditch.

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TABLE 6-17
ALLOTMENT STORM WATER COLLECTION SYSTEM EVALUATION

Area No.	Allotment Name	General Description	Detailed Comment	Recommended Action
1-33	Pressler Heights	Open ditches or swales with driveway culverts.	The ditch at the railroad intersection of Long and Pressler has standing water and excessive vegetation. Other sections on Long have excessive vegetation. There is a large drainage swale north of Bonna with a 12" CMP road crossing.	Clean ditches of brush and vegetation. Correct drainage problem.
1-34	Hoover Lake Heights	Maintained open ditch or swales.	None Noted	N/A
1-35	Lawn Field Estates	Open ditches or swales, some with ditch enclosures.	None Noted	N/A
1-36	Kimberly Valley	Maintained open ditches or swales with driveway culverts.	Ditches terminate in Ayres Circle with no noticeable outlet.	Determine the outlet source.
1-37	Pine Lake Allotment	Maintained open ditches or swales with driveway culverts.	None Noted	N/A

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-17
ALLOTMENT STORM WATER COLLECTION SYSTEM EVALUATION

Area No.	Allotment Name	General Description	Detailed Comment	Recommended Action
1-38	McChesney Acres	Open ditches or swales, some with driveway culvert and ditch enclosures.	Excessive vegetation in ditches on Fairview Road. Ditch enclosures are clogged on Woodview Road. Culvert at the south end of Woodview is collapsed. Excessive vegetation in ditches on Woodview.	Clear ditches of brush and vegetation remove or replace ditch enclosures with larger pipes. Replace culvert.
1-39	Dewalt Drive	Maintained open ditches or swales with driveway culverts.	The culvert at the intersection of Berna and Dewalt is collapsed. The 72" CMP culvert under Dewalt shows signs of structural failure.	Replace culverts.
2-1	Akan Industrial Park	Curb and gutter streets with side opening catch basins and storm sewers.	None Noted	N/A
3-1	Greensburgh Heights Allotment	Open ditches or swales with storm sewers and catch basins, some driveway culverts and ditch enclosures.	Excessive vegetation in ditches on undeveloped lots.	Clear ditches of brush and vegetation.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-17
ALLOTMENT STORM WATER COLLECTION SYSTEM EVALUATION

Area No.	Allotment Name	General Description	Detailed Comment	Recommended Action
3-2	Green Meadow Estates	Curb and gutter streets with side opening catch basins and storm sewers. One street has maintained open ditches or swales with storm drains and catch basins.	Some storm drain pipes are under 12" in diameter. Standing water noted at 1719 King Drive.	1. Replace storm drains. 2. Correct the slope of the swales on King Drive.
3-3	Greensburg Woodlands	Open ditches or swales with driveway culverts and ditch enclosures	Driveway culverts and ditch enclosures are clogging ditches. The culvert at the intersection of Shriver and Everhart is clogged.	Replace the ditch enclosures and driveway culvert with larger pipes. Replace the culvert at the intersection.
3-8	First Adventure Allotment	Maintained open ditches or swales with storm sewers and catch basins.	None Noted	N/A
3-9	Fox Run Meadows	Maintained open ditches or swales with storm sewers and catch basins.	Standing water in ditch at 1588 Gray Fox Drive.	Correct ditch slope.
3-10	Apple Ridge Allotment	Open ditches or swales with driveway culverts.	Excessive vegetation on west side of Apple Ridge Circle. Twin 18" CMP cross Apple Ridge Drive, one is plugged.	1. Clear brush and vegetation. 2. Replace culverts.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-17
ALLOTMENT STORM WATER COLLECTION SYSTEM EVALUATION

Area No.	Allotment Name	General Description	Detailed Comment	Recommended Action
3-11	Pleasant Hills Estates	Maintained open ditches or swales with storm sewers and catch basins. Some have driveway culverts and ditch enclosures.	The ditch at the north end of Skyline Drive is paved to the top of the culvert. The outfall for the collection system at the intersection of Karla Drive and Arlington Road has excessive vegetation.	Clear outfall of brush and vegetation.
3-12	Hemlock Green Estates	No plated streets. No storm sewers.	Lot drainage is to Mt. Pleasant Road	N/A
3-13	Mount Pleasant Estates	No plated streets. No storm sewers.	Lot drainage is to Mt. Pleasant Road	N/A
3-14	Koons-Thursby Allotment	Maintained open ditches or swales with driveway culverts and ditch enclosures.	None Noted	N/A
4-1	Pine Knoll Estates	Maintained open ditches or swales with storm sewers, catch basins and driveway culverts.	Allotment retention pond	N/A

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-17
ALLOTMENT STORM WATER COLLECTION SYSTEM EVALUATION

Area No.	Allotment Name	General Description	Detailed Comment	Recommended Action
5-1	Tamarak Lake Estates	Maintained open ditches or swales with storm sewers and catch basins. There are driveway culverts and ditch enclosures.	The north and south outfalls for the storm sewer have a combined sanitary flow. Some catch basin openings are plugged or collapsing. Culvert crossing the south end of La Burnum is settling. Flow is restricted by the ditch enclosures on South Tamarak.	1. Remove or replace the ditch enclosure. 2. Replace the culvert on LaBurnum. 3. Repair or replace catch basins. 4. Correct sanitary connections or infiltration points.
5-2	Tamarak Highlands	Maintained open ditches or swales with storm sewers and catch basins. Some areas have curb and gutter streets with storm sewers. There are driveway culverts and ditch enclosures.	Catch basins on Hillview Circle are plugged with logs. Catch basins on Hicircle is settling.	1. Clean openings on catch basins. 2. Repair or replace catch basin on Hicircle.
5-3	Homewood Farms Allotment	Maintained open ditches or swales with driveway culverts.	Possible retention pond at the intersection of Bali Drive and Soma.	N/A
6-1	Green Meadows Estates	Curbs and gutter with side opening catch basins and storm sewers. Some streets have maintained open ditches or swales.	None Noted	N/A

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-17
ALLOTMENT STORM WATER COLLECTION SYSTEM EVALUATION

Area No.	Allotment Name	General Description	Detailed Comment	Recommended Action
6-2	Villages at Meadowwood	Curb and gutter streets with side opening catch basins and storm sewers.	Allotment retention pond	N/A
6-3	Greenwood Commons	Curb and gutter streets with side opening catch basins and storm sewers.	Allotment retention pond	N/A
6-4	High Tower Estates	Maintained open ditches or swales with storm sewers, catch basins and driveway culverts.	Driveway culverts are plugged.	Clean ditches at culverts.
6-5	Springview Estates	Maintained open ditches or swales with storm sewers and catch basins driveway culverts and ditch enclosures.	Some catch basins have plugged inlets. Ditch southeast of Algona has excessive vegetation.	1. Clean catch basins. 2. Clean ditch of brush and vegetation.
6-6	Mirror Lake Allotment	Maintained open ditches or swales with driveway culverts and ditch enclosures.	North south drainage swale across allotment has excessive vegetation.	Clean brush and vegetation from swale.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-17
ALLOTMENT STORM WATER COLLECTION SYSTEM EVALUATION

Area No.	Allotment Name	General Description	Detailed Comment	Recommended Action
6-7	Rolling Greens	Open ditches or swales with driveway culverts and ditch enclosures.	Ditch enclosures and driveway culverts clogged with standing water. At the intersection of Cherry Lane and Springdale culvert ends are collapsed. At 4282 Springdale twin 18" CMP's have crown failures. Excessive vegetation in ditch on Springdale.	1. Remove or replace ditch enclosures. 2. Replace road crossing culverts. 3. Clean ditches of brush and vegetation.
6-8	Rolling Greens Estates	Open ditches or swales with driveway culverts and ditch enclosures.	At the intersection of Steese and Slaughter, the road crossing culvert is collapsed. Ditches have excessive vegetation.	1. Replace road culvert. 2. Clean ditch of brush and vegetation.
6-9	Highlands Subdivision	Maintained open ditches or swales with driveway culverts.	None Noted	N/A
6-10	New Haven Greens	Maintained open ditches or swales with driveway culverts	Standing water in some ditches.	Regrade ditches to allow for flow.
6-11	Alpine Village	Maintained open ditches or swales with driveway culverts and ditch enclosures.	None Noted	N/A

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-17
ALLOTMENT STORM WATER COLLECTION SYSTEM EVALUATION

Area No.	Allotment Name	General Description	Detailed Comment	Recommended Action
6-12	Lake Breeze Allotment	Open ditches or swales with driveway culverts and ditch enclosures.	Excessive vegetation in ditches on Lake Breeze Drive.	Clean brush and vegetation from ditch.
6-13	Rabl Subdivision	Open ditches or swales.	None Noted	N/A
6-14	Hidden Estates	Maintained open ditches or swales.	None Noted	N/A
7-1	Sherylton Hills Allotment	Maintained open ditches or swales with storm sewers, catch basins, driveway culverts and ditch enclosures.	Outfall pipes for storm sewer are 24" CMP deteriorated to flow line.	Replace storm sewer.
7-2	Solar Estates	Maintained open ditches or swales with storm sewers, catch basins, driveway culverts and ditch enclosures.	Ditch enclosures covered with mesh. Standing water on Neptune. Evidence of yard flooding near the intersection of Jupiter and Saturn, with suspected under size catch basin and pipes.	1. Remove or replace ditch enclosure. 2. Replace storm sewers and catch basins.
7-3	Hearthstone Estates	Curb and gutter streets with side opening catch basins and storm sewers. One street has maintained open ditches or swales with storm drains and catch basins.	None Noted	N/A

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-17
ALLOTMENT STORM WATER COLLECTION SYSTEM EVALUATION

Area No.	Allotment Name	General Description	Detailed Comment	Recommended Action
7-4	Withering Heights	Maintained open ditches or swales with storm sewers, catch basins, driveway culverts and ditch enclosures.	Catch basins are buried at Caston. Catch basins on Neptune are collapsed. Ditches at the end of Neptune have excessive vegetation and debris. Twin elliptical culverts under Provens show signs of failure.	1. Repair or replace catch basins. 2. Clean debris and vegetation from ditches. 3. Replace elliptical culverts.
7-5	Nimisila Sunset Heights	Maintained open ditches or swales with driveway culverts.	None Noted	N/A
8-1	The Highlands at Green	Curb and gutter streets with storm sewers and side open catch basins.	None Noted	N/A
8-2	Green Highlands	Curb and gutter streets with storm sewers and side open catch basins.	None Noted	N/A
8-3	Meadowwood	Curb and gutter streets with storm sewers and side open catch basins.	Allotment retention pond controlled by a V-notched weir with a 48" diameter overflow.	N/A
8-4	Camelot Hills	Maintained open ditches or swales with driveway culverts.	None Noted	N/A

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-17
ALLOTMENT STORM WATER COLLECTION SYSTEM EVALUATION

Area No.	Allotment Name	General Description	Detailed Comment	Recommended Action
9-1	Interstate Business Park	Maintained open ditches or swales with storm sewers, catch basins and driveway culverts.	Allotment retention pond	N/A
9-2	Arlington Knolls	Open ditches or swales with driveway culverts and ditch enclosures.	Ditches have excessive vegetation. Standing water in ditches on Greenfield.	1. Clear brush and vegetation from ditches. 2. Correct the slope of the ditches on Greenfield.
9-3	Brookwood Estates	Open ditches or swales with driveway culverts and ditch enclosures. Storm drains in some rear yards.	Ditches have excessive vegetation. Standing water in ditches on Greenfield. Some storm drains are smaller than 12" diameter.	1. Clear brush and vegetation from ditches. 2. Correct the slope of the ditches on Greenfield. 3. Replace storm drains as necessary.
9-4	Hillcrest Highlands Homesites	Maintained open ditches or swales with storm sewers, catch basins, and flow diversion embankments.	At the intersection of Charleston and Bonshire the embankment has been breached and water is standing at the elevation of pond on both sides of embankment. Outfall at Cheshire has excessive vegetation.	1. Repair embankment. 2. Clear brush and vegetation at outfall.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-17
ALLOTMENT STORM WATER COLLECTION SYSTEM EVALUATION

Area No.	Allotment Name	General Description	Detailed Comment	Recommended Action
9-5	Wonder Lake Allotment	Open ditches and swales with driveway culverts. Some streets have no ditches or swales.	A drainage swale cuts across the allotment between Daisy and Madora. Standing water at culvert at the intersection of Jarvis and Madora.	Repair the grade or replace culvert at Jarvis and Madora.
9-6	Bingo Estates	Maintained open ditches or swales with storm sewers and catch basins.	Standing water on each side of street	Correct ditch grade.
10-1	Wampetek Village Allotment	Maintained open ditches or swales with storm sewers, catch basins, driveway culverts and ditch enclosures.	None Noted	N/A
10-2	Sandy Beach Allotment	No surface drainage ditches or swales or storm sewers.	None Noted	Provide drainage swales.
10-3	Turkeyfoot Heights	Maintained open ditches or swales with storm sewers, catch basin driveway culverts and ditch enclosures.	Ditch enclosures and storm sewers are failing. Some stone lined ditches.	Remove or replace ditch enclosures and storm sewers.
10-4	Aldawood Hills Allotment	Maintained open ditches or swales some with storm drains an catch basins.	Ditches on Schneiderman have debris and excessive vegetation.	Clean ditches of debris and vegetation.

THE CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY

TABLE 6-17
ALLOTMENT STORM WATER COLLECTION SYSTEM EVALUATION

Area No.	Allotment Name	General Description	Detailed Comment	Recommended Action
11-1	Chenoweth Estates	Curb and gutter streets with side opening catch basins and storm sewers.	Allotment retention pond.	N/A

Section 7

7.0 IMPLEMENTATION

7.1 Implementation Considerations

The various improvement projects have been prioritized as described in Section 6.3 understanding that there are not sufficient financial resources to implement all proposed improvements at the same time.

Factors that must be considered early in the implementation of any of the proposed improvement project include:

a. Financing
b. Easements
c. Permits
d. Interagency Coordination
e. Weather

A single improvement may include any or all of these considerations, any of which could delay the project and/or impose additional costs on the project.

Financing of the proposed improvements is, of course, critical to the implementation of any of the projects. The time and effort required to arrange financing is largely dependent on the method of financing selected. Section 7.2 discusses various financing alternatives.

The acquisition of necessary easements may take an extended period of time to complete, especially if appraisals and/or legal action is required. Therefore, the process to acquire easements should begin as soon as the required easements are identified at the beginning of the design phase.

A permit from the U.S. Army Corps of Engineers or Ohio EPA may be required for projects that involve major improvements of any existing drainage channels, particularly channels identified as perennial streams.

Currently the Ohio EPA is developing guidelines to protect certain streams from degradation due to organic enrichment and other activities impacting the stream habitat. Streams falling under these guidelines would have riparian zones or corridors established along the waterway. These zones would remain as open space within the community, and dredging or other activities that disturb the stream habitat would be limited. EDG recommends that the City consider addressing riparian corridors in its Comprehensive Planning Document. These riparian zones may be used to develop natural storm water management areas by allowing these areas to fill with water during certain storm events. Streams falling under this jurisdiction also would be limited with respect to dredging activities, so alternative methods for addressing insufficient hydraulic channel capacity would be required. This includes storm management ponds located upstream of the riparian zones. In addressing riparian zones and stream habitat, further evaluation of improvements addressing insufficient channel capacity in these zones is recommended.

Weather is a consideration in as much as the project should be designed and bid to provide for the start and completion of construction within one construction season if at all possible. Bid prices will normally be high, if the contractor has to work through the winter or suspend construction during the winter because the project could not be completed in the fall.

7.2 Financing Alternatives

The traditional methods of financing storm water drainage improvements include special assessments, general obligation bonds, general fund allocations and loan or grant programs.

Each of those financing alternatives is discussed below along with the option of creating a storm water utility.

Special assessments can be levied against property owners to finance the construction of ditching, storm sewer or culvert projects. Assessments may be based on a front foot, area, per parcel or similar basis. Historically it is very difficult to obtain a consensus among all benefiting property owners regarding what is an equitable assessment.

General obligation bonds either voted or unvoted may be used to fund storm water improvement projects. The issuance of bonds for storm water projects of course, uses up a portion of the City's allotted bonding capability which is limited by State Law. The interest rate that the City would be required to pay is dependent on market conditions and the City's bond rating. The bond process is complicated, time consuming and requires the services of a bond counsel.

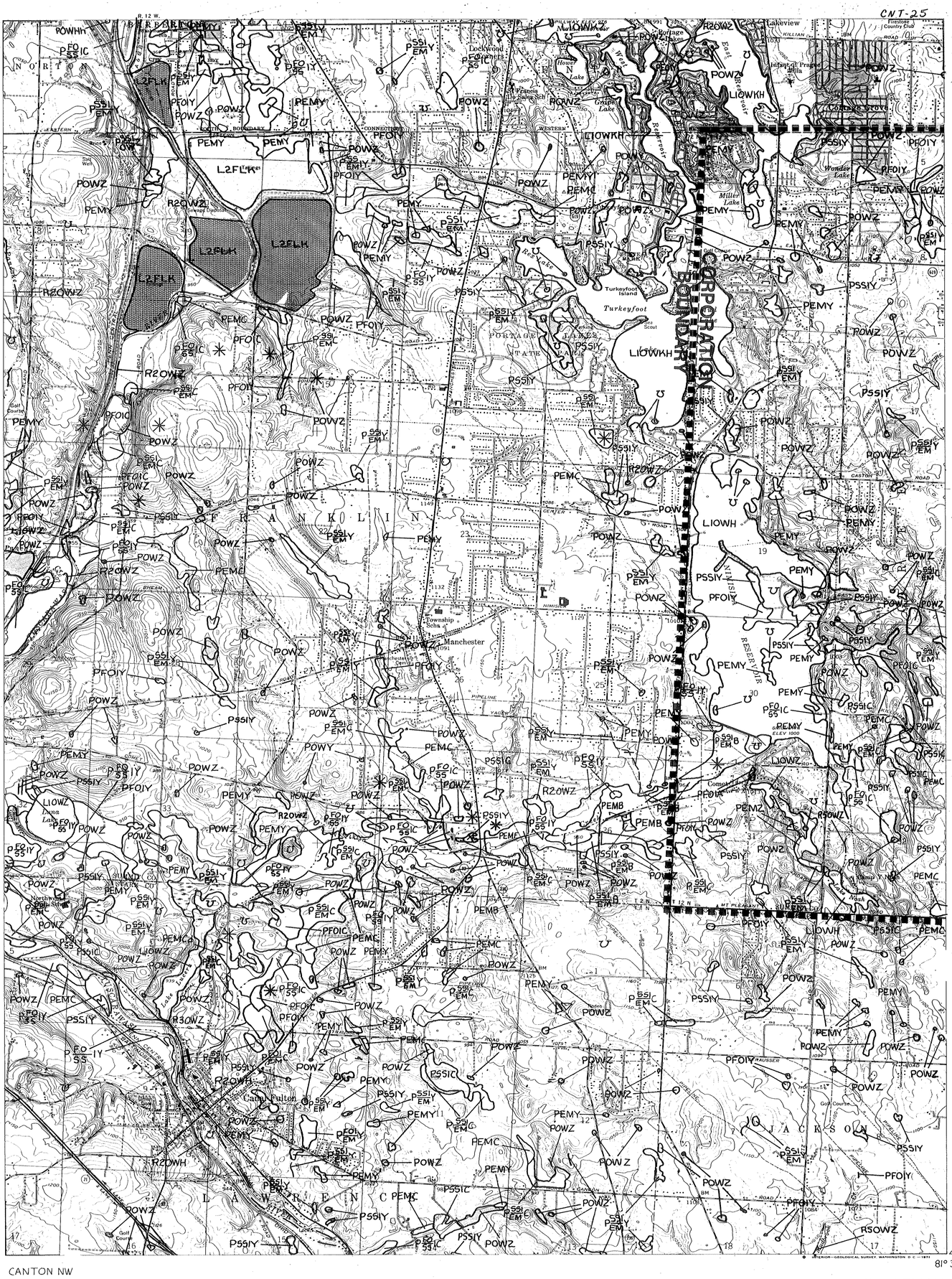
The City could finance a portion or all of the proposed improvements out of the City's general fund over time. This financing alternative would require that the City either commit to making the storm water improvements a higher priority and/or increase general fund revenues through increased taxes.

Loan and grant monies are very limited for storm water improvements projects. However, the State Issue 2 fund offers loans and/or grants up to ninety percent of the project cost for many types of projects including storm water improvements.

A recent innovation in financing storm water drainage improvements is the storm water utility, which is patterned after the water or wastewater utility concept. Under a storm water utility, each property owner is billed a fee for storm water drainage services. The storm water fees may be billed to coincide with water and wastewater billing periods. Fees are assessed based on the amount of storm water runoff generated from each parcel. Therefore, a homeowner may be assessed one unit while a commercial property may be assessed a multiple of the single home

fee. Several communities in Ohio have implemented storm water utilities and they have been tested in court.

The establishment of a storm water utility requires the preparation of the documentation to justify the fee structure and the passage of the necessary legislation. The storm water utility provides a predictable source of income which can be used to plan the implementation of the proposed storm water drainage improvements. With the storm water utility, the City has the option of using revenue bonds to finance a project.



CANTON NW
CANTON

CANAL: FULTON, OHIO

MODIFYING TERMS

In order to more adequately describe wetland and aquatic habitats one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The tilled modifier may also be applied to the ecological system.

WATER REGIME(1)

Non-Tidal	Tidal	Coastal Salinity
Permanent	Subtidal	Euhaline
Intermittent	Irregular	Mesohaline
Temporary	Regular	Oligohaline
Saturated	Diurnal	Polyhaline
Seasonal	Semi-diurnal	Mixohaline (Brackish)
Semi-permanent	Mixed	Hypersaline
Intermittently Exposed	Artificial	Euhyposaline
Permanently Flooded	Irrigated	Oligohyposaline
Artificially Flooded	Manage	Polyhyposaline
Semi-permanently Flooded	Manage Tidal	Mixohyposaline
Intermittently Flooded	Manage Irrigated	Hyperhyposaline

WATER CHEMISTRY

Hydrogen Ion (pH)	Modifiers for all Fresh Water
1 Acid	Acid
2 Circumneutral	Circumneutral
3 Alkaline	Alkaline

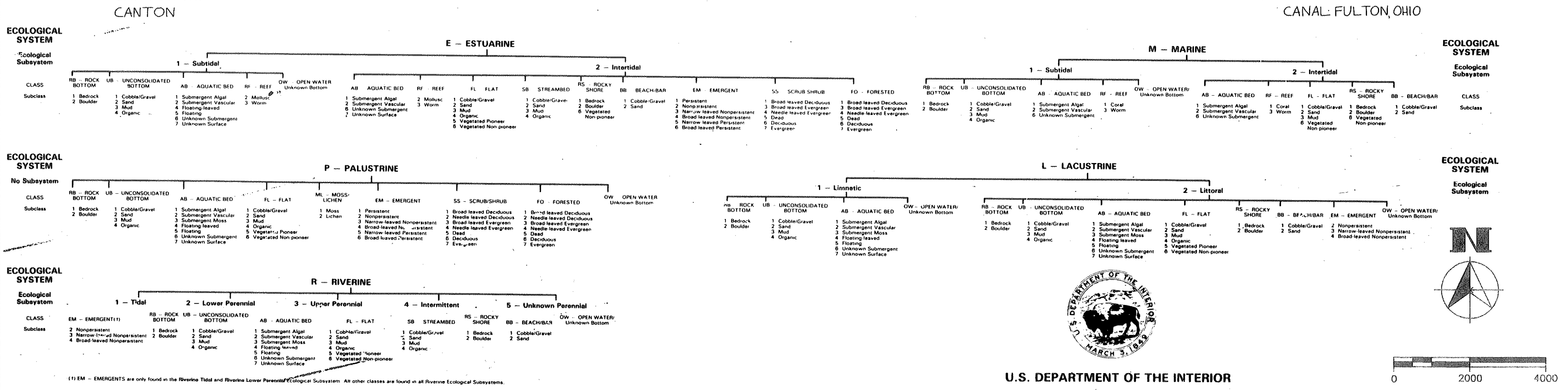
SOIL

1 Mineral
2 Organic

SPECIAL MODIFIERS

a Beaver Impoundment
b Beaver
c Artificial
d Diked
e Excavated
f Partly Drained/Ponded
g Farmed
h Diked/Impounded

(1) Information on the water regime modifiers found on this legend, but not found in the classification system, may be obtained from the above listed source.



U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Prepared by Office of Biological Services
for the National Wetlands Inventory

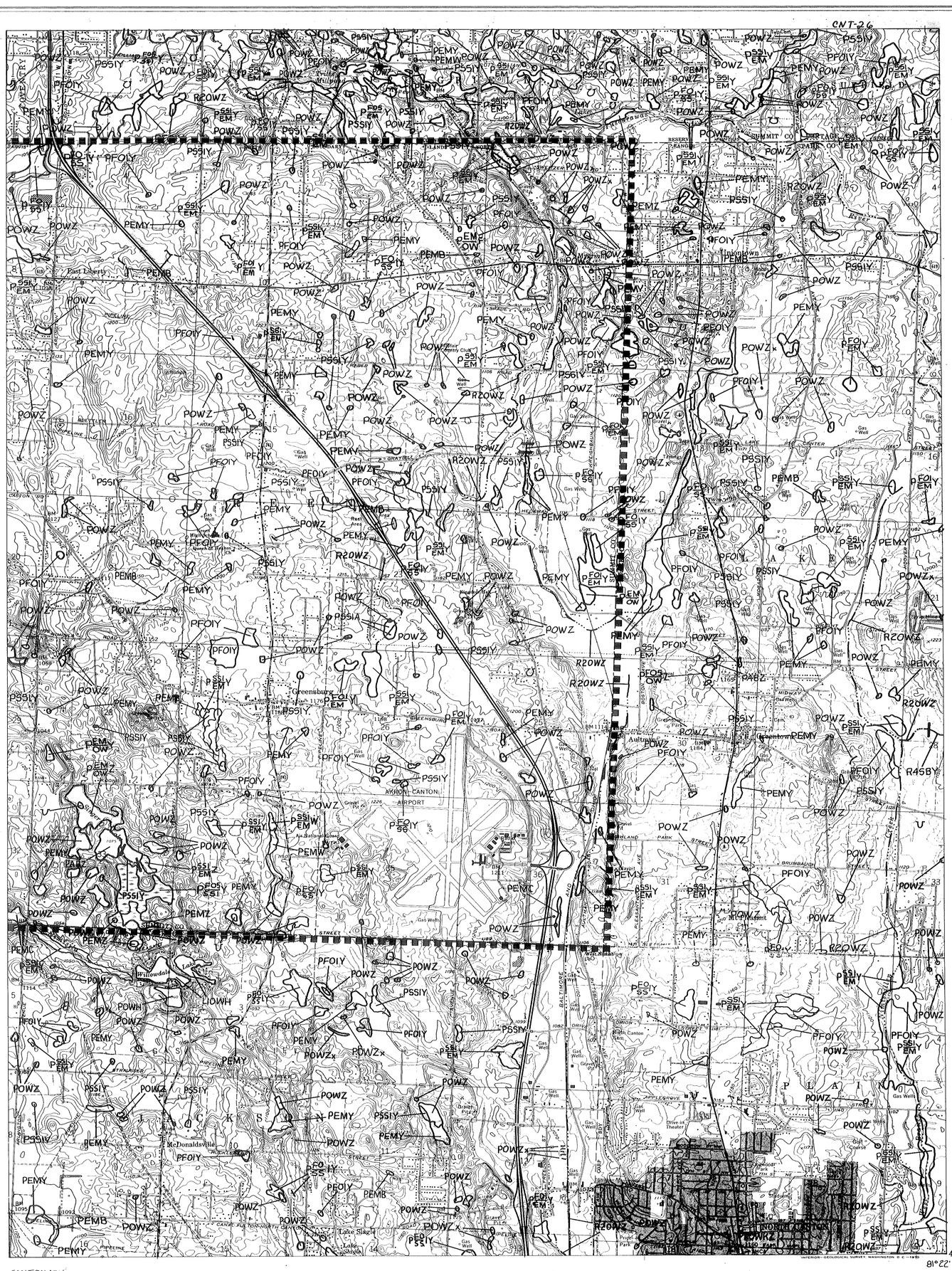
0 2000 4000
GRAPHIC SCALE
(IN FEET)

SHEET
FIG. 4-3

environmental design group
ENGINEERS • LANDSCAPE ARCHITECTS • SURVEYORS
1533 COMMERCE DR. STOW, OH. 44224-1711 (216) 686-1898
1329-A QUARRIER ST. CHARLESTON, WV 25301-6003 (304) 344-5161

CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY
WETLANDS MAP

PROJ. NO.	372602
SCALE	AS SHOWN
FILE NO.	FIG4-3
DRAWN BY:	M.D.R.
CHKD. BY:	R.J.B.
DATE ISSUED:	
REVISED:	



MODIFYING TERMS

In order to more adequately describe wetland and aquatic habitats and as many of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The formed modifier may also be applied to the ecological system.

WATER REGIME(1)		
Non-Tidal	Tidal	
A Temporary B Saturated C Seasonal D Semi-permanent E Intermittent Flooded F Permanent G Intermittent Exposed H Permanent Flooded J Intermittent Tidal K Artificial	V Tidal W Regular X Irregular Y Diurnal Z Semi-diurnal	

Coastal Salinity	Inland Salinity	pH Modifiers for all Fresh Water
1 Hypersaline 2 Euhaline 3 Mixohaline (Brackish) 4 Polyhaline 5 Mesohaline 6 Oligohaline 7 Limnetic	1 Hypersaline 2 Euhaline 3 Mixosaline 4 Mesosaline 5 Oligosaline 6 Limnetic	1 Acid 2 Circumneutral 3 Alkaline

SOIL	SPECIAL MODIFIERS
1 Organic 2 Mineral	1 Beaver 2 Partly Impounded 3 Diked 4 Artificial 5 Farmed

(1) Information on the water regime modifiers found on this legend, but not found in the classification system, may be obtained from the above listed source.

ECOLOGICAL SYSTEM

E — ESTUARINE

Ecological Subsystem: 1 — Subtidal; 2 — Intertidal

CLASS: RB — ROCK BOTTOM; UB — UNCONSOLIDATED BOTTOM; AB — AQUATIC BED; RF — REEF; OW — OPEN WATER: Unknown Bottom; RS — ROCKY SHORE; BB — BEACH/BAR; EM — EMERGENT; SS — SCRUB/SHRUB; FO — FORESTED

Subclass:
1 Bedrock
2 Boulder
1 Cobble/Gravel
2 Sand
3 Mud
4 Organic
1 Submergent Algal
2 Submergent Vascular
3 Floating-leaved
4 Floating
5 Unknown Submergent
6 Unknown Surface
2 Mollusc
3 Worm
1 Cobble/Gravel
2 Sand
3 Mud
4 Organic
5 Vegetated Pioneer
6 Vegetated Non-pioneer
1 Cobble/Gravel
2 Sand
3 Mud
4 Organic
1 Bedrock
2 Boulder
1 Cobble/Gravel
2 Sand
1 Persistent
2 Nonpersistent
3 Narrow-leaved Nonpersistent
4 Broad-leaved Nonpersistent
5 Broad-leaved Deciduous
6 Broad-leaved Evergreen
7 Needle-leaved Deciduous
8 Needle-leaved Evergreen
9 Dead
10 Deciduous
11 Evergreen

M — MARINE

Ecological Subsystem: 1 — Subtidal; 2 — Intertidal

CLASS: RB — ROCK BOTTOM; UB — UNCONSOLIDATED BOTTOM; AB — AQUATIC BED; RF — REEF; OW — OPEN WATER: Unknown Bottom; RS — ROCKY SHORE; BB — BEACH/BAR

Subclass:
1 Bedrock
2 Boulder
1 Cobble/Gravel
2 Sand
3 Mud
4 Organic
1 Submergent Algal
2 Submergent Vascular
6 Unknown Submergent
2 Coral
3 Worm
1 Cobble/Gravel
2 Sand
3 Mud
4 Organic
5 Vegetated Non-pioneer
1 Bedrock
2 Boulder
1 Cobble/Gravel
2 Sand

P — PALUSTRINE

No Subsystem

CLASS: RB — ROCK BOTTOM; UB — UNCONSOLIDATED BOTTOM; AB — AQUATIC BED; FL — FLAT; ML — MOSS-LICHEN; EM — EMERGENT; SS — SCRUB/SHRUB; FO — FORESTED; OW — OPEN WATER: Unknown Bottom

Subclass:
1 Bedrock
2 Boulder
1 Cobble/Gravel
2 Sand
3 Mud
4 Organic
1 Submergent Algal
2 Submergent Vascular
3 Submergent Moss
4 Floating-leaved
5 Floating
6 Emergent Pioneer
7 Unknown Submergent
8 Unknown Surface
1 Moss
2 Lichen
1 Persistent
2 Nonpersistent
3 Narrow-leaved Nonpersistent
4 Broad-leaved Nonpersistent
5 Broad-leaved Deciduous
6 Needle-leaved Deciduous
7 Broad-leaved Evergreen
8 Needle-leaved Evergreen
9 Dead
10 Deciduous
11 Evergreen

L — LACUSTRINE

Ecological Subsystem: 1 — Limnetic; 2 — Littoral

CLASS: RB — ROCK BOTTOM; UB — UNCONSOLIDATED BOTTOM; AB — AQUATIC BED; OW — OPEN WATER: Unknown Bottom; RB — ROCK BOTTOM; UB — UNCONSOLIDATED BOTTOM; AB — AQUATIC BED; FL — FLAT; RS — ROCKY SHORE; BB — BEACH/BAR; EM — EMERGENT; OW — OPEN WATER: Unknown Bottom

Subclass:
1 Bedrock
2 Boulder
1 Cobble/Gravel
2 Sand
3 Mud
4 Organic
1 Submergent Algal
2 Submergent Vascular
3 Submergent Moss
4 Floating-leaved
5 Floating
6 Emergent
7 Unknown Submergent
8 Unknown Surface
1 Cobble/Gravel
2 Sand
3 Mud
4 Organic
5 Vegetated Pioneer
6 Vegetated Non-pioneer
1 Bedrock
2 Boulder
1 Cobble/Gravel
2 Sand
1 Nonpersistent
2 Narrow-leaved Nonpersistent
3 Broad-leaved Nonpersistent

R — RIVERINE

Ecological Subsystem: 1 — Tidal; 2 — Lower Perennial; 3 — Upper Perennial; 4 — Intermittent; 5 — Unknown Perennial

CLASS: EM — EMERGENT(1); RB — ROCK BOTTOM; UB — UNCONSOLIDATED BOTTOM; AB — AQUATIC BED; FL — FLAT; SB — STREAMBED; RS — ROCKY SHORE; BB — BEACH/BAR; OW — OPEN WATER: Unknown Bottom

Subclass:
1 Nonpersistent
2 Narrow-leaved Nonpersistent
3 Broad-leaved Nonpersistent
1 Bedrock
2 Boulder
1 Cobble/Gravel
2 Sand
3 Mud
4 Organic
1 Submergent Algal
2 Submergent Vascular
3 Submergent Moss
4 Floating-leaved
5 Floating
6 Emergent Pioneer
7 Unknown Submergent
8 Unknown Surface
1 Cobble/Gravel
2 Sand
3 Mud
4 Organic
1 Bedrock
2 Boulder
1 Cobble/Gravel
2 Sand

(1) EM — EMERGENTS are only found in the Riverine Tidal and Riverine Lower Perennial Ecological Subsystems. All other classes are found in all Riverine Ecological Subsystems.

DEPARTMENT OF THE INTERIOR MARCH 3, 1849

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FISH AND WILDLIFE SERVICE

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GRAPHIC SCALE (IN FEET)

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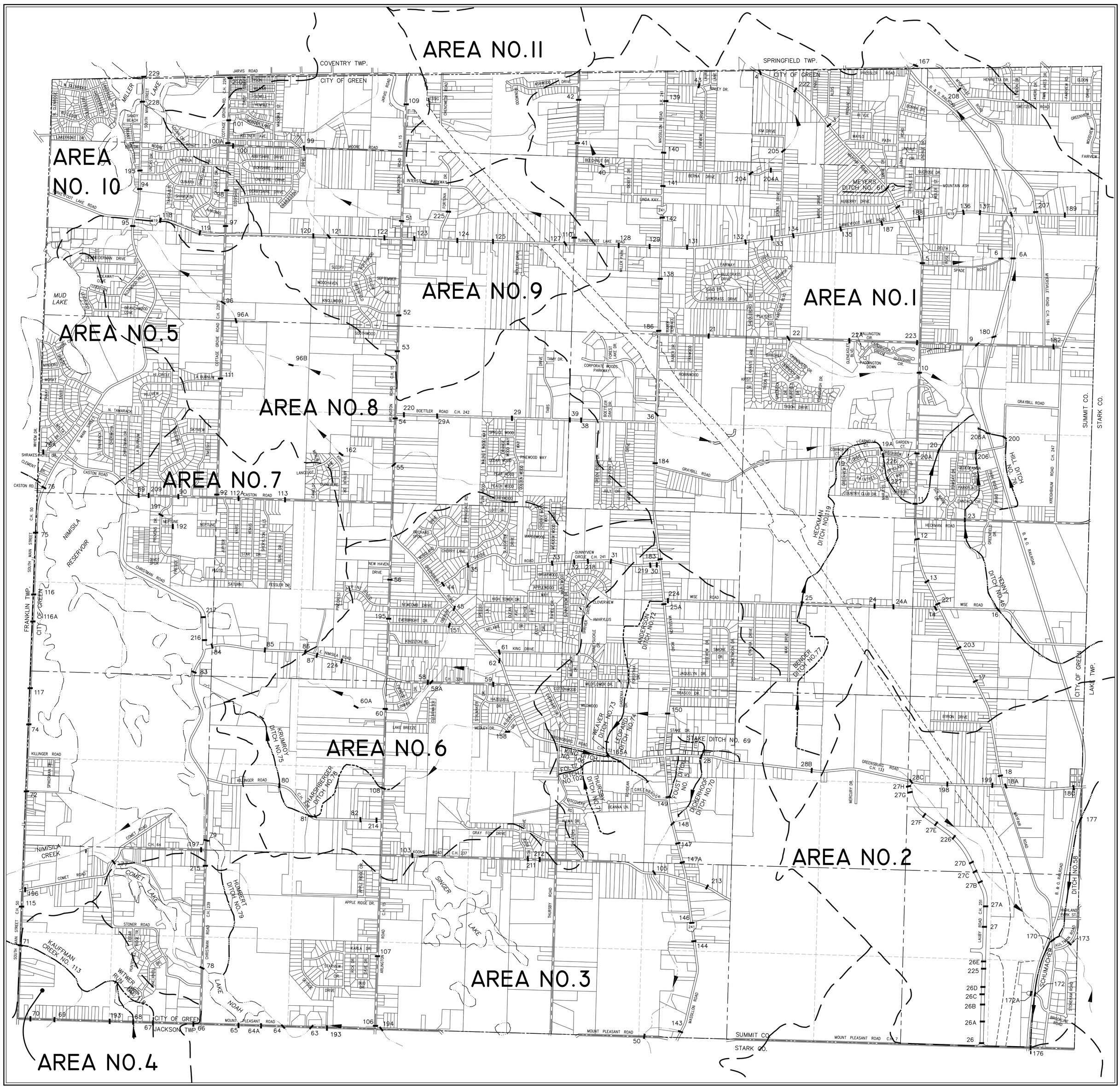
CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY
WETLANDS MAP

SHEET FIG. 4-4

PROJ. NO.	3726002
SCALE	AS SHOWN
FILE NO.	FIG4-4
DRAWN BY	M.D.B.
CHKD. BY	B.J.B.
DATE ISSUED	
REVISED	



LEGEND

- DRAINAGE AREA BOUNDARY
- DRAINAGE CHANNEL
- DITCH OF RECORD
- 101 CULVERT OR BRIDGE

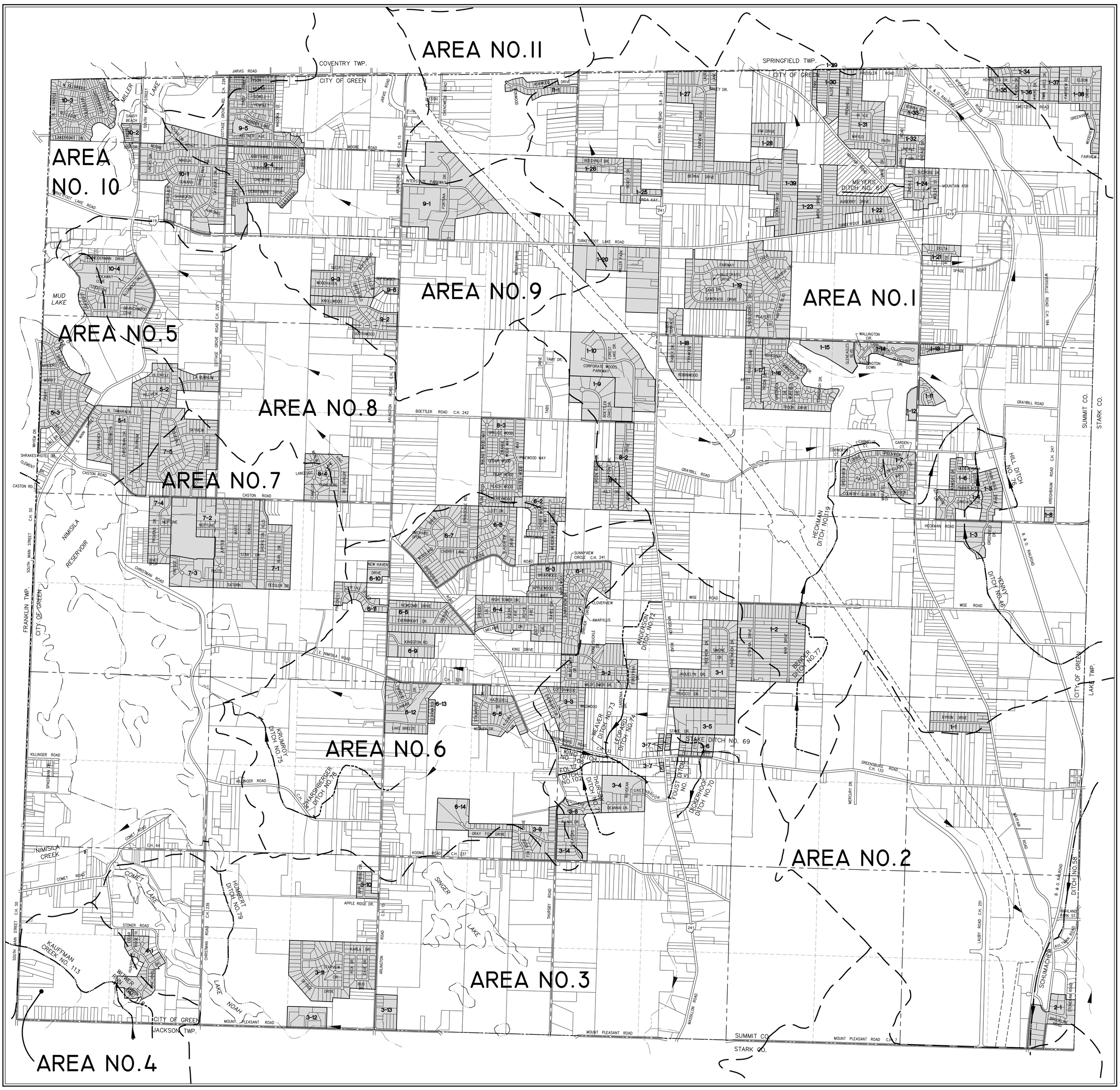
N

0 1000 2000

GRAPHIC SCALE
(IN FEET)

CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY
LOCATION MAP
CHANNELS, DITCHES OF RECORD, CULVERTS AND BRIDGES

FIGURE 5-1



LEGEND

AREA WITHIN ALLOTMENT

1 – 1 ALLOTMENT NUMBER

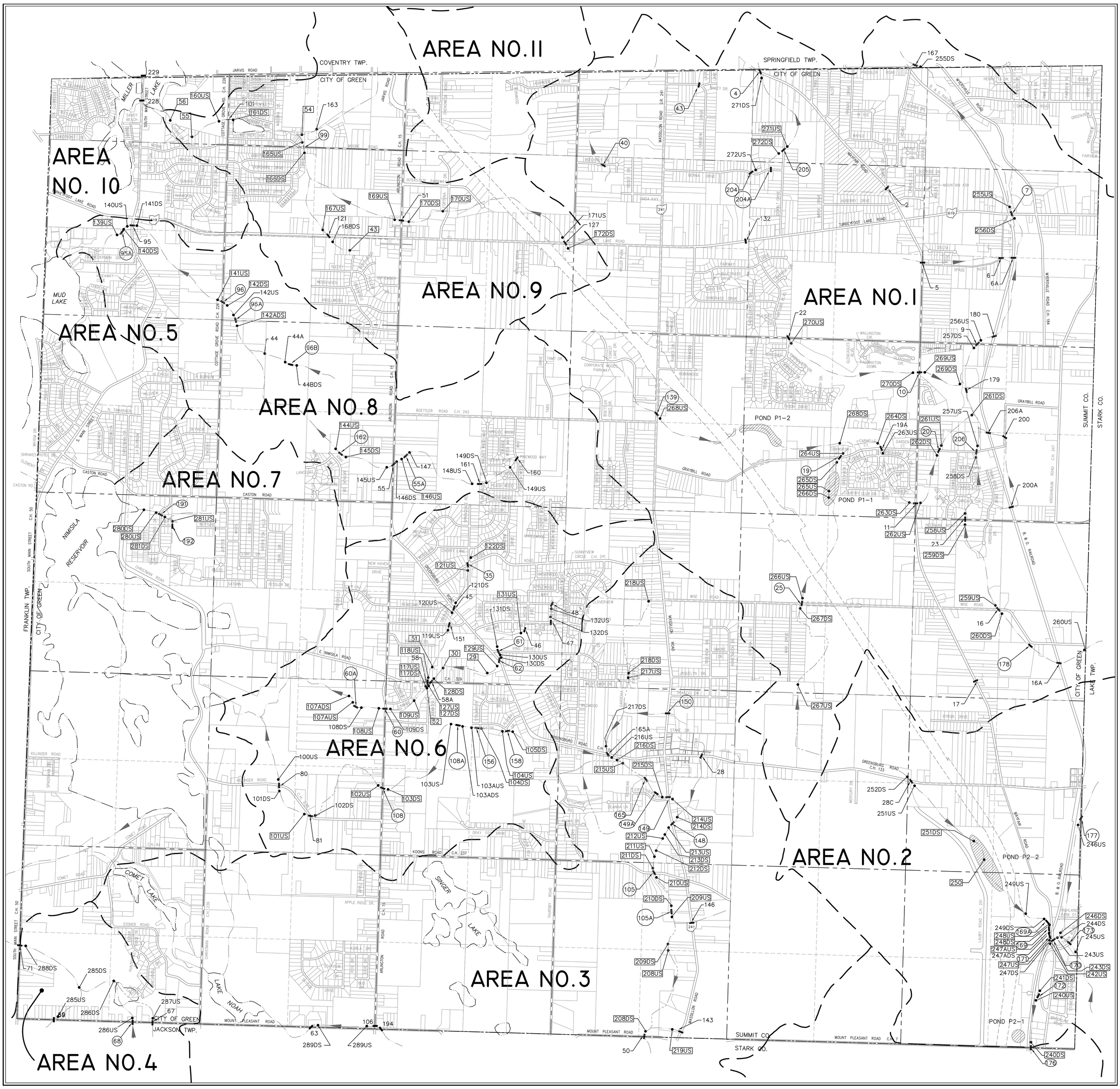
NOTE:
SEE TABLE 5–3 FOR LIST OF ALLOTMENT NAMES

N

0 1000 2000
GRAPHIC SCALE
(IN FEET)

CITY OF GREEN
COMPREHENSIVE STORM WATER STUDY
ALLOTMENT LOCATION MAP

FIGURE 5-2



LEGEND

- STRUCTURE–NO IMPROVEMENTS NEEDED
- DITCH SECTON–NO IMPROVEMENTS NEEDED
- DITCH SECTON–IMPROVEMENTS NEEDED
- STRUCTURE–IMPROVEMENTS NEEDED

GRAPHIC SCALE (IN FEET) 0 1000 2000

CITY OF GREEN

COMPREHENSIVE STORM WATER STUDY

DRAINAGE SYSTEM EVALUATION MAP

FIGURE 6-1