



DRAFT
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McKownville
Drainage Analysis
Town of Guilderland, New York



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Drainage Analysis for the McKownville Area

**Town of Guilderland
Albany County, New York**



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TABLE OF CONTENTS

1.0 INTRODUCTION 1
 1.1 Purpose and Need 1
 1.2 Goals and objectives 2
2.0 WATERSHED CHARACTERISTICS 2
 2.1 Land Cover..... 2
 2.2 Soils and Groundwater..... 2
 2.3 Topography and Surface Water 4
3.0 PRELIMINARY HYDROLOGIC ANALYSIS 4
4.0 CONCEPTUAL STORMWATER IMPROVEMENTS..... 5
 4.1 Area 1 6
 4.2 Area 2 7
 4.3 Area 3 7
 4.4 Area 4 8
 4.5 Area 5 9
5.0 BUDGET ANALYSIS..... 9
6.0 RECOMMENDATIONS..... 9

APPENDICES

- APPENDIX A:** Existing Conditions Map
- APPENDIX B:** Conceptual Improvements Plans (Index Sheet)
 - Sheet B-1
 - Sheet B-2
 - Sheet B-3
 - Sheet B-4
- APPENDIX C:** Soil Mapping
- APPENDIX D:** Hydrological Study
- APPENDIX E:** Budget Estimate
- APPENDIX F:** Existing Utility Map

1.0 INTRODUCTION

McKownville is a hamlet in the Town of Guilderland, Albany County, New York. It lies along the eastern border of the Town with the City of Albany. As a hamlet, the boundaries of McKownville are not well defined but are generally considered to be the NYS Thruway to the west, the Town of Bethlehem to the south, the east branch of the Krumkill Creek and City of Albany to the east, and the City of Albany to the north.

Once a part of the Albany Pine Bush, the terrain in McKownville is relatively flat or has very gently rolling hills. It has become a heavily developed suburb of Albany. Development includes residential, commercial, retail strip malls including Stuyvesant Plaza, shopping centers including Crossgates Mall, and a portion of the University at Albany, SUNY.

1.1 Purpose and Need

McKownville has historically experienced ongoing drainage problems due to over development that has impacted residents for many years. The majority of the homes in the hamlet appear to have been constructed in the 1940's and 1950's. Residential construction from that time period more than likely required minimum provisions for foundation drains and site runoff controls. Subsequently, foundation sump pumps were often connected to the sanitary sewer system to maintain dry basements. As a result, the cost of sanitary wastewater conveyance and treatment has increased over the years and most communities have adopted sewer use laws that prohibit the connection of basement sump pumps to the sanitary sewer system.

The hamlet currently has a limited stormwater infrastructure system. Street drainage is managed by overland flow to catch basins, drywells and wing gutters that either recharge into the groundwater table or direct the flow to Fuller Road and Route 20. Many of the streets are higher than the surrounding properties limiting the ability to direct runoff from the properties to the street storm sewer systems. A large portion of the homes have finished floor elevations below street grade and do not have positive drainage.

Many of the neighborhoods in McKownville had utilized a combined sanitary and stormwater sewer collection system. In recent years, a dedicated sanitary sewer system has been installed to service these neighborhoods but the combination sewer remains in place to collect and convey stormwater only. Only some areas in these neighborhoods received a new stormwater collection system to improve drainage in problem areas and to supplement the existing combined collection system. Anecdotal information suggests that the existing combined sewer system that is now used for stormwater collection is crushed in many areas causing drainage problems and at times flooding.

In addition, the hamlet is bounded by areas that have been subject to a great deal of land development over the years. The associated increase in impervious surfaces and structures in a concentrated area may have contributed to changes in the water table or in groundwater movement over the years.

The purpose of this Drainage Study is to make recommendations to design and construct a stormwater management system to mitigate drainage issues throughout the hamlet. The need for the project is to reduce future damages caused by flooding of residential basements and to alleviate flooding of Route 20 and residential roadways.

1.2 Goals and Objectives

The objective of the Town of Guilderland is to provide an economical means to mitigate drainage and water quality issues in the McKownville Hamlet that will improve drainage conditions and alleviate flooding while maintaining current discharge rates to the Krumkill drainage basin that meet applicable regulatory requirements of jurisdictional authorities.

This study evaluates hydrologic conditions for five distinct areas within the hamlet and makes recommendations for stormwater management improvements and flood mitigation. These recommendations include a network of catch basins, residential sump pump connections, underground conveyance piping and surface swales to redirect stormwater to a series of small downstream detention basins. These stormwater conveyances direct water to other conveyance systems that eventually discharge into the Krumkill drainage basin. This analysis considers the fact that while these improvements will mitigate flooding in the McKownville area, they may also concentrate stormwater flow which has the potential to impact existing stormwater handling facilities and streams within the watershed.

2.0 WATERSHED CHARACTERISTICS

2.1 Land Cover

The land use within the study area is predominantly single family residential with a mix of commercial and retail development. The surrounding areas are heavily developed and are comprised of residential, commercial, retail strip malls including Stuyvesant Plaza, shopping centers including Crossgates Mall, and a portion of the University at Albany, SUNY.

2.2 Soils and Groundwater

According to the Albany County soil maps from the Natural Resource Conservation Service (NRCS), the subject area generally consists of three different map units that include Colonie loamy fine sand, Elnora loamy fine sand and Udipsammments/

Urban. These soils are described to be well to moderately well drained and somewhat excessively drained. However, groundwater depths in the study area are considered to be shallow with many places having a depth to groundwater of less than 20 feet.

Soils are typically classified into hydrologic soil groups (HGS's) to indicate infiltration rate and transmission rate. Infiltration rate is the rate at which water enters a soil at the surface and is dependent on surface conditions. Transmission rate is the rate at which water moves within a soil and is dependent on the soil profile.

As summarized in the table below, on site soils are predominately classified as HSG A and B. HSG A soils have low run-off potential and high infiltration rates even when thoroughly wetted. They generally consist of deep, well to excessively drained sands or gravels and typically have a high rate of water transmission. HSG B soils generally have moderate infiltration and transmission rates with a low to moderate potential for run-off. However, site specific conditions include high groundwater and saturated soils and field observations suggest that these conditions are adversely affecting or inhibiting the movement of water (transmission) in the soil causing frequent flooding.

The NRCS rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning and design. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

A vast majority of the site can be classified as a HSG A or B with a high concentration of residences that are problematic. These soils and groundwater conditions can be described as very limited due to depth to the saturated zone.

A Soils Map that identifies all of the map units within the study area is presented in Appendix C. The table below summarizes the predominate on-site soil types as well as the rating class and limiting features.

| Map Unit Symbol | Map Unit Name | Dwellings with basements | |
|-----------------|--|--------------------------------------|-------|
| | | Rating Class/ Limiting Feature | Value |
| CoD | Colonie Loamy Fine Sand, HSG A | not limited | N/A |
| Ud Uf Ur | Udipsamments, HSG A Udipsamments-Urban Land Complex, HSG A Urban, Not classified | not limited | N/A |
| EnA | Elnora Loamy Fine Sand, HSG B 0 to 3% slopes | very limited/depth to saturated zone | 1.00 |

Note: The NRCS numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions and range from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

2.3 Topography and Surface Water

The project area is immediately adjacent to natural and manmade drainage features that ultimately discharge to the Krumkill. The existing topography of the study area is relatively flat with some hilly areas with most grades approximately 5%. Drainage generally flows southeast across the sites on the north side of Route 20. Sheet flow then is either directed via roadside swales to the east to the existing New York State Department of Transportation (NYSDOT) stormwater system or to the west where flow is directed under Route 20 via a 3' X 4' box culvert where it ultimately discharges to the Krumkill.

On the south side of Route 20, flow is generally in a southerly direction and ultimately discharges to the Krumkill via natural and manmade drainage features. An Existing Site Conditions map is presented in Appendix A.

There are no jurisdictional wetland impacts in the project area based on New York State Department of Environmental Conservation (NYSDEC) Freshwater Wetlands Maps and the U.S. Fish & Wildlife Service National Wetlands Inventory (NWI) maps for the Town of Guilderland.

3.0 PRELIMINARY HYDROLOGIC ANALYSIS

A preliminary hydrological analysis was conducted to determine if the proposed stormwater detention facilities had sufficient capacity to detain stormwater runoff from

the McKownville area without significantly impacting downstream drainage areas. The analysis was conducted using HydroCad (Version 8.0) developed by Applied Microcomputer Systems. HydroCad incorporates procedures from the United States Department of Agriculture (USDA) Soil Conservation Service's (SCS) Technical Release No. 20, for analyzing the hydrologic and hydraulic characteristics of a given watershed and associated stormwater management facilities. It utilizes the latest techniques to predict the consequences of any given storm. HydroCAD has the capability of computing hydrographs (which represents discharge rates characteristic of specified watershed conditions, precipitation, and geologic factors) combining hydrographs and routing flows through pipes, streams and ponds.

Three detention basins (Proposed Storage Areas A, B & C) are proposed on the West Branch of the Krum Kill (West Branch). The proposed location of these three storage areas are existing low lying areas along the West Branch that currently provide some stormwater detention. The areas would be expanded to increase the detention capacity. One stormwater detention area is proposed on the east side of Area 2 (Proposed Storage Area D) and would direct stormwater runoff to the East Branch of the Krumkill.

The preliminary hydrological analysis evaluated the potential impact of re-routing stormwater runoff from Area 1, which currently discharges to the East Branch of the Krum Kill, to the West Branch of the Krum Kill. The proposed expansions to the existing detention areas A, B and C on the West Branch of the Krum Kill are intended to provide increased stormwater runoff detention capacity along the West Branch of the Krum Kill to counter the increased stormwater runoff from Area 1.

The preliminary modeling for a 10-year storm indicates no significant increase in the discharge rate to the West Branch of the Krum Kill or to where the East and West Branches of the Krum Kill merge. A more detailed analysis of proposed McKownville drainage improvements would be required to document no downstream impacts related to the proposed stormwater drainage improvements. Hydrologic modeling output is presented in Appendix D.

4.0 CONCEPTUAL STORMWATER IMPROVEMENTS

This section describes in detail the conceptual stormwater improvements for each of the five identified areas. These areas are prioritized according to need and the proposed improvements that offer the greatest potential to alleviate flooding are described. Also proposed is the milling of various streets to lower their elevation to provide positive drainage to adjacent properties.

Delaware Engineering (the Town Representative) and members of the McKownville Neighborhood Association took several site walks to discuss site specific drainage issues and areas of flooding. While many members of the association were in

attendance, not all members participated. Those residents who attended site walks and reported problems are identified on a map and is presented in Appendix B.

The proposed improvements generally include a network of catch basins, residential sump pump connections, underground conveyance piping and surface swales to redirect stormwater to a series of small downstream detention basins.

4.1 Area 1

Existing Conditions

Area 1 is located on the north side of Route 20 and encompasses Norwood Street, a portion of Glenwood Street and Parkwood Street East and West. This area represents approximately 28 acres and encompasses approximately 100 residential properties. Many homeowners in this area experience frequent flooding in their basements, yards and in the streets.

Currently, stormwater from this area sheet flows across the properties and streets, where some is captured by the existing catch basins. Flow then enters the existing NYSDOT stormwater management system near the intersection of Norwood Street and Route 20 and flows east along Route 20 where it ultimately discharges to the east branch of the Krumkill.

Proposed Improvements

Proposed improvements for this area include a stormwater system comprised of a series of small detention basins located on the south side of Route 20 that will serve to provide additional storage, maintain current discharge rates to the Krumkill and alleviate flow to the existing NYSDOT system. Specifically, these improvements include three detention basins along the Krumkill as well as conveyance piping to carry flow from Area 1 under Route 20 to the south side.

Improvements in the residential portion of Area 1 on the north side of Route 20 include a stormwater sewer system that will utilize the low points in the existing roads for catch basins and provide sump pump laterals or gravity discharge for foundation drainage. Flow from this area will be re-directed away from the existing NYSDOT system to the proposed system on the south side of Route 20. Further consideration is given to the possibility of milling the top surface of portions of the streets within Area 1 so as to provide positive drainage away from the adjacent properties to the new and existing catch basins.

Anecdotal information suggests that there may be several sections of collapsed stormwater sewer line that may be the cause of frequent flooding of many back yards and most alley ways during heavy rainfall and during periods of snowmelt. It is also

purported that residents direct their sump pump discharges into their front yards where water either ponds or drains to the existing stormwater collection system. Many sump pumps operate 24 hours a day at times.

4.2 Area 2

Existing Conditions

Area 2 is located on the north side of Route 20 and encompasses Waverly Place and Knowles Terrace. This area represents approximately 14 acres and encompasses over 35 residential properties. Many homeowners in this area experience frequent flooding in their basements, yards and in the streets.

Currently, stormwater from this area sheet flows across the properties and streets, where some is captured by the existing catch basins. Flow then enters the existing NYSDOT stormwater management system and flows east along Route 20 where it ultimately discharges to the east branch of the Krumkill.

Many residents in Area 2 direct their basement sump pump discharge to the existing sanitary sewer. Many sump pumps operate 24 hours a day during periods of heavy rain or snow melt. Anecdotal information suggests that there may be a collapsed stormwater sewer line between Waverly Place and Knowles Terrace that may be exacerbating the drainage problems. It is also purported that numerous catch basins in the alleys have been covered with solid frames or concrete covers.

Proposed Improvements

Proposed improvements for this area include a stormwater system comprised of a small detention basin located on the east side of Area 2 that will serve to provide additional storage, maintain current discharge rates to the Krumkill and alleviate flow to the existing NYSDOT system. Improvements also include sump pump laterals or gravity discharge for foundation drainage. Further consideration is given to the possibility of milling the top surface of portions of the streets within Area 2 so as to provide positive drainage away from the adjacent properties to the new and existing catch basins.

4.3 Area 3

Existing Conditions

Area 3 is located on the north side of Route 20 and north of Stuyvesant Plaza. Area 3 encompasses Providence, Mercer, Warren, Ann and Tracy Streets. This area represents approximately 45 acres and encompasses over 130 residential properties. Many homeowners in this area experience frequent flooding in their basements, yards and in the streets.

Currently, a large portion of stormwater from this area sheet flows across the properties and streets, where some is captured by the existing catch basins. Flow then enters a drainage system along Fuller Road and flows south beneath Route 20 via a 3'X4' box culvert. Flow then ultimately discharges to the west branch of the Krumkill. The remaining portion of Area 3 is routed to the McKownville Reservoir via a system of catch basins and conveyance piping.

Anecdotal information suggests that there may be a collapsed stormwater sewer line between Mercer Street and Warren Street which may be the cause of frequent flooding of many back yards during heavy rainfall and during periods of snowmelt. It is also purported that residents direct their sump pump discharges into their front yards where water either ponds or drains to the existing stormwater collection system. Many sump pumps operate 24 hours a day at times.

Proposed Improvements

Proposed improvements for this area include sump pump laterals or gravity discharge for foundation drainage. Further consideration is given to the possibility of milling the top surface of the streets within Area 3 so as to provide positive drainage away from the adjacent properties to the new and existing catch basins.

4.4 Area 4

Existing Conditions

Area 4 is located on the north side of Route 20 and encompasses Elmwood, Parkwood and Glenwood Streets. This area represents approximately 25 acres and encompasses approximately 100 residential properties. Many homeowners in this area experience frequent flooding in their basements, yards and in the streets.

Currently, stormwater from this area sheet flows across the properties and streets, where some is captured by the existing catch basins. Flow then enters a drainage system along Route 20 and flows west where it enters a 3'X4' box culvert and flows south beneath Route 20. Flow then ultimately discharges to the west branch of the Krumkill.

It is purported that residents direct their sump pump discharges into their front yards where water either ponds or drains to the existing stormwater collection system. Many sump pumps operate 24 hours a day at times.

Proposed Improvements

Proposed improvements for this area include sump pump laterals or gravity discharge for foundation drainage. Further consideration is given to the possibility of

milling the top surface of portions of the streets within Area 4 so as to provide positive drainage away from the adjacent properties to the new and existing catch basins.

4.5 Area 5

Existing Conditions

Area 5 is located on the south side of Route 20 and encompasses Westlyn Place, Westlyn Court, Westlyn Avenue, Williams Court, Ayre Drive, Brookwood Avenue, Arcadia Avenue and Hillcrest Avenue with over 135 residential properties. Some homeowners in this area experience frequent flooding in their basements, yards and in the streets.

Currently, most of the stormwater from this area sheet flows across the properties and streets, and is captured by the existing catch basins. Flow is then conveyed via a system of pipes, culverts and drainage ditches and discharges in the west branch of the Krumkill. A small portion of the flow discharges to the east branch of the krumkill via a system of catch basins and drainage swales.

It is purported that very few residents experience drainage problems and flooding, and neighborhood complaints are minimal. Area 5 is included in this study because there are a few reports of flooding and the surrounding areas have on-going drainage problems that cause subsequent flood damage. At this time, recommendations for proposed improvements are not considered. Should the Town consider improvements at the same time as Areas 1 through 4, similar methods would be proposed.

5.0 BUDGET ANALYSIS

Preliminary cost estimates were prepared for each of the area improvements. Costs are summarized below and cost tables for each area are presented in Appendix E.

| COST ESTIMATE SUMMARY | | | | |
|-----------------------|-------------|-----------|-----------|-------------|
| Area | Area 1 | Area 2 | Area 3 | Area 4 |
| Total Cost | \$3,700,000 | \$800,000 | \$700,000 | \$1,500,000 |

6.0 CONCLUSIONS & RECOMMENDATIONS

In order to facilitate drainage improvements within the Hamlet of Mckownville, a

phased approach should be considered. Each of the five areas addressed in this report have a contributing stormwater impact to either the east or west branch of the Krumkill. The proposed stormwater improvements in McKownville are intended to minimize the impact on the existing State Route 20 structures as well as downstream properties and structures within the Krumkill & Normans kill watershed.

The drainage improvements proposed for each area will be accomplished in a phased progression and are discussed in detail below. These areas are prioritized according to need and the proposed improvements that offer the greatest potential to alleviate flooding.

Area 1

Proposed improvements within Area 1 must be constructed first to facilitate additional drainage from adjacent areas. Costs associated with this area are the highest because proposed improvements in this area include the construction of three new detention basins. These basins will be constructed along the west branch of the Krumkill. Two of the basins will provide detention from Fuller Road (Area 3) and one of the basins would provide detention from stormwater improvements in Area 1. A new trunk storm sewer will be installed from the west branch of the Krumkill on McKown Road to Norwood Street. Area 1 would no longer contribute flow to State Route 20 and the box culvert crossing at Stuyvesant Plaza and would alleviate flooding in this area.

The existing drainage from Area 3 flows behind the dentist building located at 14XX Western Avenue to the office building at 1450 Western Avenue. The existing system that includes a 48" culvert discharges to the to the west branch of the Krumkill. Based on initial site investigations, this culvert appears to be undersized and replacement with a larger culvert is proposed as part of the Area 1 improvements. The closed drainage system is located on privately owned property and legal agreements will need to be obtained to make improvements in this area. Once this portion of the work is complete, residential drainage improvements within the Parkwood East/West and Norwood streets can be initiated. The improvements are illustrated on Appendices Map B-1, B-3 and B-4

Area 2

Once improvements are made to Area 1, work in Area 2 can be initiated. Existing maps, documentation and the general history of the Areas 1,2,3 and 4 indicate a large portion of each area drained at one time to the east branch of the Krumkill. In order to facilitate drainage improvements in Area 2, stormwater flows from Area 1 will be redirected to the west branch of the Krumkill.

Area 2 improvements will require a stormwater detention basin on Town owned property near the State University entrance. The detention basin is intended to

minimize the impact to downstream structures on Western Avenue, Arcadia and Hillcrest. This work would be completed prior to initiating the proposed residential drainage improvements. Residential drainage improvements include milling, regrading, paving, installation of new catch basins, storm piping, and storm laterals to the residential properties for home owner sump pump connections. These improvements are illustrated on Appendix Map B-1.

Area 3

Stormwater in Area 3 currently flows in three directions. Area 3A - Fuller Road collection system, Area 3B - Stuyvesant Plaza collection system, and Area 3C - State I-90 drainage system that includes 850 acres west and north of I-90. Fuller Road drainage flows directly to Route 20 and through a box culvert at the Stuyvesant Plaza entrance. The Stuyvesant Plaza drainage flows directly to the same box culvert under Western Avenue. The State I-90 stormwater system and 850 acre watershed flows directly to the new McKownville Park detention basin (Former McKownville Reservoir) and then through the same box culvert under Western Avenue.

Area 1 improvements must be completed prior to initiating Area 3 improvements. The stormwater improvements and additional flow to the west branch of the Krumkill in Area 3 are similar to residential drainage improvements in the other areas. Improvements would include milling, regrading, and paving roads, additional catch basins, storm piping and lateral connections to the property lines for sump pump connections by the home owners. The improvements are illustrated on Appendix map B-2.

Area 4

Currently, stormwater from this area sheet flows across the properties and streets, where some is captured by the existing catch basins. Flow then enters the drainage system along Route 20 and flows west where it enters the box culvert and flows south beneath Route 20. Flow then ultimately discharges to the west branch of the Krumkill.

Improvements would be similar to those proposed for Area 3 and include milling, regrading, and paving roads, additional catch basins, storm piping and lateral connections to the property lines for sump pump connections by the home owners. These improvements would be initiated after the completion of work in Area 3 and are illustrated on Appendix map B-4.

Area 5

It is purported that very few residents experience drainage problems and flooding, and neighborhood complaints are minimal. Area 5 is included in this study

because there are a few reports of flooding and the surrounding areas have on-going drainage problems that cause subsequent flood damage. At this time, recommendations for proposed improvements are not recommended.

APPENDIX A
Existing Conditions Map

APPENDIX B
Conceptual Improvements Plans
Sheets B1-B-4

APPENDIX C
Soil Mapping

APPENDIX D
Hydrological Study

APPENDIX E
Budget Estimate

Mckownville –Drainage Analysis Cost Estimate

| Area 1 | <u>Qty</u> | <u>Unit</u> | <u>Unit Cost</u> | <u>Total Cost</u> |
|--------------------------------------|------------|-------------|----------------------------|--------------------|
| <i>Parkwood Street-West</i> | | | | |
| 15" pipe | 300 | LF | \$80 | \$24,000 |
| 18" pipe | 300 | LF | \$125 | \$37,500 |
| sump pump connections | 1 | LS | \$20,000 | \$20,000 |
| Paving | 450 | ton | \$100 | \$45,000 |
| <i>Parkwood Street-East</i> | | | | |
| 15" pipe | 400 | LF | \$80 | \$32,000 |
| 18" pipe | 400 | LF | \$125 | \$50,000 |
| sump pump connections | 1 | LS | \$20,000 | \$20,000 |
| Paving | 600 | ton | \$100 | \$60,000 |
| <i>Glenwood Street</i> | | | | |
| 15" pipe | 350 | LF | \$80 | \$28,000 |
| 18" pipe | 350 | LF | \$125 | \$43,750 |
| sump pump connections | 1 | LS | \$20,000 | \$20,000 |
| Paving | 525 | ton | \$100 | \$52,500 |
| <i>Norwood Street</i> | | | | |
| 15" pipe | 400 | LF | \$80 | \$32,000 |
| 18" pipe | 400 | LF | \$125 | \$50,000 |
| 24" pipe | 630 | LF | \$200 | \$126,000 |
| sump pump connections | 1 | LS | \$20,000 | \$20,000 |
| Paving | 2,225 | ton | \$100 | \$222,500 |
| jack-bore under Western Avenue | 100 | LF | \$800 | \$80,000 |
| 36" pipe Mckown Road | 400 | LF | \$200 | \$80,000 |
| 48" pipe Mckown Rd & off-site | 1800 | LF | \$250 | \$450,000 |
| Stormwater management system and E&S | 3 | LS | \$300,000 | \$900,000 |
| Land acquisition | 1 | LS | \$500,000 | \$500,000 |
| | | | Construction Sub-Total | <u>\$2,893,250</u> |
| | | | Engineering 15% | \$433,988 |
| | | | Contingency 10% | <u>\$289,325</u> |
| | | | Total Cost Estimate | \$3,616,563 |

Mckownville –Drainage Analysis Cost Estimate

| Area 2 | <u>Qty</u> | <u>Unit</u> | <u>Unit Cost</u> | <u>Total Cost</u> |
|--------------------------------------|------------|-------------|----------------------------|-------------------|
| <i>Knowles Terrace</i> | | | | |
| 15" pipe | 700 | LF | \$80 | \$56,000 |
| 15" pipe | 225 | LF | \$80 | \$18,000 |
| 18" pipe | 175 | LF | \$125 | \$21,875 |
| sump pump connections | 1 | LS | \$10,000 | \$10,000 |
| Paving | 300 | ton | \$100 | \$30,000 |
| <i>Waverly Place</i> | | | | |
| 15" pipe | 300 | LF | \$80 | \$24,000 |
| 18" pipe | 225 | LF | \$125 | \$28,125 |
| 18" pipe | 550 | LF | \$125 | \$68,750 |
| sump pump connections | 1 | LS | \$10,000 | \$10,000 |
| Paving | 394 | ton | \$100 | \$39,400 |
| Stormwater management system and E&S | 1 | LS | \$300,000 | \$300,000 |
| | | | Construction Sub-Total | <u>\$606,150</u> |
| | | | Engineering 15% | \$90,923 |
| | | | Contingency 10% | <u>\$60,615</u> |
| | | | Total Cost Estimate | \$757,688 |

Mckownville –Drainage Analysis Cost Estimate

| Area 3 | <u>Qty</u> | <u>Unit</u> | <u>Unit Cost</u> | <u>Total Cost</u> |
|---------------------------------|------------|-------------|----------------------------|-------------------|
| <i>Providence Street</i> | | | | |
| 15" pipe | 250 | LF | \$80 | \$20,000 |
| 18" pipe | 1,000 | LF | \$125 | \$125,000 |
| sump pump connections | 1 | LS | \$40,000 | \$40,000 |
| Paving | 938 | ton | \$100 | \$93,800 |
| <i>Mercer Street</i> | | | | |
| 15" pipe | 250 | LF | \$80 | \$20,000 |
| 18" pipe | 250 | LF | \$125 | \$31,250 |
| sump pump connections | 1 | LS | \$20,000 | \$20,000 |
| Paving | 375 | ton | \$100 | \$37,500 |
| <i>Warren Street</i> | | | | |
| 15" pipe | 300 | LF | \$80 | \$24,000 |
| 18" pipe | 225 | LF | \$125 | \$28,125 |
| sump pump connections | 1 | LS | \$40,000 | \$40,000 |
| Paving | 400 | ton | \$100 | \$40,000 |
| | | | Construction Sub-Total | <u>\$519,675</u> |
| | | | Engineering 15% | \$77,951 |
| | | | Contingency 10% | <u>\$51,968</u> |
| | | | Total Cost Estimate | \$649,594 |

Mckownville –Drainage Analysis Cost Estimate

| Area 4 | <u>Qty</u> | <u>Unit</u> | <u>Unit Cost</u> | <u>Total Cost</u> |
|-------------------------------|------------|-------------|----------------------------|--------------------|
| <i>Elmwood Street</i> | | | | |
| 15" pipe | 500 | LF | \$80 | \$40,000 |
| 18" pipe | 450 | LF | \$125 | \$56,250 |
| 24" pipe | 300 | LF | \$175 | \$52,500 |
| 36" pipe | 400 | LF | \$200 | \$80,000 |
| 48" pipe | 525 | LF | \$250 | \$131,250 |
| sump pump connections | 1 | LS | \$30,000 | \$30,000 |
| Paving | 975 | ton | \$100 | \$97,500 |
| <i>Parkwood Street</i> | | | | |
| 15" pipe | 600 | LF | \$80 | \$48,000 |
| 18" pipe | 1,125 | LF | \$125 | \$140,625 |
| sump pump connections | 1 | LS | \$25,000 | \$25,000 |
| Paving | 1,294 | ton | \$100 | \$129,400 |
| <i>Glenwood Street</i> | | | | |
| 15" pipe | 600 | LF | \$80 | \$48,000 |
| 18" pipe | 1,125 | LF | \$125 | \$140,625 |
| sump pump connections | 1 | LS | \$25,000 | \$25,000 |
| Paving | 1,294 | ton | \$100 | \$129,400 |
| | | | Construction Sub-Total | <u>\$1,173,550</u> |
| | | | Engineering 15% | \$176,033 |
| | | | Contingency 10% | <u>\$117,355</u> |
| | | | Total Cost Estimate | \$1,466,938 |

**McKownville Cost Estimate
Summary**

| Area | Area 1 | Area 2 | Area 3 | Area 4 |
|------------|-------------|-----------|-----------|-------------|
| Total Cost | \$3,616,563 | \$757,688 | \$649,594 | \$1,466,938 |

Notes:

\$ 6,479,763

APPENDIX F
Existing Utility Map