Chapter 2

Lacey Creek Watershed

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LACEY CREEK WATERSHED

STORMWATER INFRASTRUCTURE IMPROVEMENT PLAN
VILLAGE OF DOWNERS GROVE
DUPAGE COUNTY, ILLINOIS

PREPARED FOR:

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JULY 31, 2007

Lacey Creek Watershed Stormwater Infrastructure Improvement Plan

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VILLAGE OF DOWNERS GROVE
LACEY CREEK WATERSHED
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JULY 31, 2007 FINAL DRAFT

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1.0 Lacey Creek Watershed Overview

The Lacey Creek Watershed is a subwatershed of the East Branch DuPage River and is the northernmost watershed in Downers Grove. The watershed is generally located north of Ogden Avenue and contains approximately 3.3 square miles (2,100 acres) within the corporate limits. The watershed drains to Lacey Creek, which flows westerly under I-355 and I-88, through undeveloped land and Forest Preserve, and outlets to the East Branch DuPage River. The topography of the watershed is typical of DuPage County and varies from relatively flat areas that are poorly drained to areas with gently rolling hills and well defined flow paths.

Interstates 355 and 88 share a roadway corridor and run north-south through the west-central part of the watershed, splitting the watershed in half. The area west of I-355 and I-88 is mostly undeveloped and forest preserve land. The area east of I-355 and I-88 is predominantly developed, with some forest preserve (owned by the Downers Grove Park District) located at the eastern end of Lacey Creek at Lyman Woods. The developments in the watershed are primarily residential with commercial development along major roadways. Developments in the northern part of the watershed tend to be well-drained with storm sewers and stormwater detention ponds. Developments in the southern part of the watershed have less stormwater infrastructure and are generally drained by roadside ditches; these areas are also experiencing redevelopment, especially in the southeast part of the watershed. Because the area west of the interstate corridor contains little development and no identified flood problems, the focus of this study was on the eastern portion of the watershed.

2.0 Problem Area Identification

2.1 Problem Area Identification and Classification Methodology

A number of data sources were reviewed to determine the location, extent, and frequency of drainage problems within the Lacey Creek Watershed in the Village of Downers Grove. These data sources included:

- GIS data for completed resident questionnaires distributed Village-wide by the Village in 2005 as part of the Stormwater Master Plan project.
- GIS data for drainage complaints collected by the Village after the October 2, 2006 storm, including resident telephone calls and observations by Village Staff.
- Drainage Problem Master List, updated periodically by the Village and last provided on May 14, 2007.
- Stormwater Master Plan dated October 2006, prepared by Clark Dietz, including the Storm Sewer Buffer map showing areas not located within 200-feet of a Village sewer.
- List of flood complaints compiled by the Village after the 1996 storm.
- Field visits performed in winter and spring 2007.
- Follow-up telephone calls to selected residents in winter and spring 2007.
- Comment forms prepared by residents during the Neighborhood Meetings in April 2007.

GIS was used to plot the location of flood complaints on a map. Initial visual review of the map showed that problems were located throughout the watershed. A prioritization method was developed to determine which reported problems would be numerically analyzed during the infrastructure improvement planning process. Reported problems were prioritized as follows:

1. Critical Problems: problems that result in an immediate danger to public health, safety, life, or complete loss of property value structural damage (including any flooding of the first floor of a primary structure, basement flooding of more than 6 inches that resulted from overland flow through a window or door, or garage flooding of more than 7 inches.) Problems that cause disruption of major traffic routes were also classified as critical. These critical problems were quantitatively analyzed.

2. Chronic Problems: problems that are less severe than critical and do not result in costly damage or repairs, including shallow street flooding, disruption of minor traffic routes, basement flooding of less than 6 inches resulting from overland flow, garage flooding of less than 7 inches, or yard flooding of more than 12 inches (that is

not also associated with structural flooding). These problems were analyzed, either quantitatively or qualitatively, depending on the problem and perceived source of damage.

3. Nuisance Problems: minor, isolated problems that are less severe than chronic and do not generally result in damage or require repair, or are not caused by surface flooding/drainage problems. Nuisance problems include yard flooding of less than 12 inches; basement flooding resulting from foundation cracks, sump pump failure, seepage or other non-overland causes; or other minor, isolated problems. These problems were not analyzed in detail in this report, except to acknowledge that these problems exist and to make recommendations towards a general toolkit of solutions that individual property owners could consider to mitigate these problems on their own.

2.2 Problem Areas in Lacey Creek Watershed

2.2.1 Typical Drainage Problems in the Lacey Creek Watershed

A review of available data sources shows a wide range of drainage problems in the watershed. Problem Area locations are shown on the Lacey Creek Watershed Map in Section 2.2.2 of Chapter 2. The data review suggests eleven critical problems, fifteen chronic problems and numerous nuisance problems.

Perhaps the most severe drainage problem is related to the Lacey Creek flood plain at Highland Avenue. The culverts at Venard and Saratoga are restrictive and create a backwater flood plain that extends from Venard to and across Highland Avenue; Barneswood Avenue is also flooded. A review of the Flood Insurance Study profile and redevelopment plans for Highland Avenue suggest that Highland Avenue may be under 3.25 feet of water during a ten-year storm event and 3.75 feet of water in a 100-year event. Highland Avenue serves as a major roadway into and through the Village; the Lacey Creek crossing is located immediately north of Good Samaritan Hospital. The flood plain also results in inundation of several residential structures.

Other reported problems in the watershed include roadway flooding, basement flooding, first-floor structure flooding, yard flooding and septic field flooding. These problems appear to result from a number of sources including inadequate (or lacking) downstream conveyance systems, lack of maintenance on storm sewers or drainage ditches, debris-clogged inlets, and backwater from flood plains and stormwater detention basins. Grading on private property has also altered flow paths in some locations and has contributed to drainage problems.

The watershed contains 22 depressional storage areas (identified as such by the Village of Downers Grove), many of which include wetland habitat.

Lacey Creek itself has been channelized as it flows through the Village. Parts of the streambank consist of vertical timber retaining walls which are in disrepair, pose a possible safety hazard, and are scheduled for repair or replacement by the Village.

A description of each problem area is provided in Table 2.1.

2.2.2 Lacey Creek Watershed Map

The Lacey Creek Watershed Map follows.

2.3 Existing Drainage Problems

Table 2.1 follows.

Table 2.1: Problem Areas in Lacey Creek Watershed

Prob. Area ID	Sub-water-shed	Sub-basin	Location	Complaint Data Source	Problem Description							Severity	Description/Comments
					House	Base-ment	Garage	Yard	Street	Depr. Area	Other		
LA1	G	LA1	West of the intersection of Pomeroy Road and 35th Street	Village Records						x		Nuisance	
LA2	B	LA2, LA3	Lee Avenue between Ogden Avenue and Grant Street	Village Records, 1996 Flood Information					x	x		Critical	Street flooding at the intersection of Ogden Avenue and Lee Avenue as reported by one resident.
LA4	C	LA321	Morton Avenue between Herbert Street and 40th Street	Village Records						x		Nuisance	
LA6	C	LA6	Downers Drive between Herbert Street and 40th Street	Village Records, 1996 Flood Information					x	x		Chronic	Street flooding along Downers Drive as reported by one resident.
LA7	C	LA7	40th Street between Downers Drive and Seeley Avenue	Village Records						x		Nuisance	
LA8	C	LA8	Virginia Street between Seeley Avenue and Belle Aire Lane	Village Records						x		Nuisance	
LA11	C	LA11	Intersection of Janet Street and Seeley Avenue	Village Records, Property Owner Survey				x	x	x	x	Chronic	Five resident reports with multiple recurrences of yard and street flooding in addition to other reports of flooding.
LA12	D	LA12	Venard Road between Parrish Court and Drove Avenue	Village Records, Property Owner Survey						x	x	Nuisance	
LA13	C	LA13	Venard Road between Drove Avenue and Ogden Avenue	Village Records, 1996 Flood Information					x	x		Chronic	Street flooding along Venard Road as reported by one resident.
LA14	E	LA14	North of intersection of Washington Street and 40th Street	Village Records, 2006, Flood Information, Property Owner Survey	x	x	x	x		x		Critical	Four resident reports with multiple recurrences of yard and garage flooding and one instance of house flooding in addition to other reports of flooding.
LA15	E	LA15	South of 40th Street, between Lindley Street and Washington Street	Village Records						x		Nuisance	
LA16	E	LA16	Intersection of 40th Street and Glendenning Road	Village Records, 2006, Flood Information, Property Owner Survey	x	x	x	x	x	x		Critical	Thirteen resident reports with multiple recurrences of yard and street flooding and one instance of house flooding in addition to other reports of flooding.
LA18	E	LA16	Douglas Road between 39th Street and 40th Street	Village Records, Property Owner Survey				x		x		Nuisance	
LA19	E	LA19	West of the intersection of Fairview Avenue and 40th Street	Village Records						x		Nuisance	

Prob. Area ID	Sub-water-shed	Sub-basin	Location	Complaint Data Source	Problem Description							Severity	Description/Comments
					House	Base-ment	Garage	Yard	Street	Depr. Area	Other		
LA20	E	LA20	South of Brentwood Place, east of Fairview Avenue	Village Records						x		Nuisance	
LA22	E	LA22	South of the Intersection of Herbert Street and School Street	Village Records						x		Nuisance	
LA300	G	LA300	Intersection of Venard Road and Drew Street	Property Owner Survey		x		x	x			Chronic	Five resident reports with multiple recurrences of yard and street flooding in addition to other reports of flooding.
LA301	G	LA301	Intersection of Venard Road and Acorn Avenue	Property Owner Survey	x				x			Critical	Two resident reports with 2 incidents of house flooding in addition to other reports of flooding.
LA302	G	LA302	35th Street between Venard Road and Saratoga Avenue	2006 Flood Information, Property Owner Survey					x			Chronic	Three resident reports of street flooding.
LA303	F	LA303	Intersection of Venard Road and Barneswood Drive	Property Owner Survey		x		x	x			Chronic	Five resident reports with multiple recurrences of street flooding in addition to other reports of flooding.
LA304	G	LA304	Barneswood Drive between Saratoga Avenue and Highland Avenue	2006 Flood Information, 1996 Flood Information, Property Owner Survey		x	x	x	x		x	Critical	Thirteen resident reports with multiple recurrences of yard and street flooding in addition to other reports of flooding.
LA305	G	LA305	Highland Avenue between Barneswood Drive and Oak Hill Road	2006 Flood Information, 1996 Flood Information					x			Critical	Three resident reports of street flooding.
LA306	F	LA306	Brookside Lane near intersection with Duchess Court	2006 Flood Information					x			Chronic	Two resident reports with 2 incidents of street flooding.
LA307	D	LA307	Cul de sac of Parrish Court	Property Owner Survey	x			x	x			Critical	One resident report of house flooding in addition to other reports of flooding.
LA308	D	LA308	Cul de sac of 39th Street and cul de sac of Candlewood Court	2006 Flood Information, Property Owner Survey		x			x			Chronic	Four resident reports with 3 instances of street flooding in addition to other reports of flooding.
LA309	D	LA309	East of the Intersection of 39th Street and Saratoga Avenue	Property Owner Survey		x			x			Chronic	One resident report of street flooding in addition to other reports of flooding.
LA310	D	LA310	Candlewood Drive south of Black Oak Drive	2006 Flood Information					x			Chronic	One resident report of street flooding.
LA311	D	LA310	Intersection of Forest Avenue and 39th Street	Property Owner Survey					x			Chronic	One resident report of street flooding with multiple recurrences.
LA313	C	LA313	Ogden Avenue between Downers Drive and Belle Aire Lane	2006 Flood Information					x			Critical	Street flooding on Ogden Avenue as reported by one resident.

Prob. Area ID	Sub-water-shed	Sub-basin	Location	Complaint Data Source	Problem Description							Severity	Description/Comments
					House	Base-ment	Garage	Yard	Street	Depr. Area	Other		
LA314	B	LA314	Woodward Avenue between Ogden Avenue and Grant Street	Property Owner Survey				x				Chronic	One resident report of yard flooding with multiple recurrences.
LA315	E	LA315	Main Street between Herbert Street and 41st Street	2006 Flood Information, Property Owner Survey		x		x	x			Critical	Three resident reports with multiple recurrences of yard and street flooding in addition to other reports of flooding.
LA316	G	LA316, LA310	Hospital	2006 Flood Information					x			Critical	
LA317	E	LA16	West of intersection of 39th Street and Glendenning Road	Property Owner Survey				x				Chronic	One resident report of yard flooding.
LA318	E	LA318	Intersection of 39th Street and Cumnor Road	2006 Flood Information					x			Chronic	One resident report of street flooding.
LA320	D	LA320	Cul de sac of Almond Court	Village Records	x							Critical	One resident report of house flooding.
LA321	B	LA321, LA4, LA6, LA7, LA8	Unsewered Area north of Ogden, east of Lacey and I-355, south of Herbert, west of Seeley	Sewer Buffer Map							x	Nuisance	No reported flooding problems. Review of "Sewer Buffer Map" shows a large unsewered area.
LA322	G	LA322	Unsewered area west of Highland and north of 35th Street.	Sewer Buffer Map							x	Nuisance	No reported flooding problems. Review of "Sewer Buffer Map" shows a large unsewered area.
LA323	F	LA323	Residential Property on Coral Berry	Village Records			x					Chronic	One resident report of street flooding.
LA324	B	LA314	Unsewered area south of Ogden, west of Cornell	Sewer Buffer Map							x	Nuisance	Review of "Sewer Buffer Map" shows a large unsewered area. One reported flooding problem at LA314, remainder of unsewered area reported no problems.

3.0 Hydrologic and Hydraulic Analysis

Various hydrologic and hydraulic tools and methods were used to analyze the existing drainage problems and to analyze alternatives for reducing the extent of problems. Analyses were performed with a conceptual planning-level of detail using available data and a number of assumptions. The analyses and assumptions are appropriate for this conceptual plan but must be refined in preliminary and final design. Typical methods used in this study are described below.

3.1 Hydrologic Methods

Event hydrograph hydrologic computer programs were generally used to model hydrology. Complex drainage systems were modeled using the XPSWMM dynamic modeling software. When XPSWMM was used, the SCS method was selected for modeling runoff hydrology. For simpler drainage systems that did not require the complexity of an XPSWMM model, TR-20 software was used which also uses the SCS computation method.

The SCS method requires drainage area, runoff curve number, time of concentration, rainfall depth and rainfall distribution as major inputs:

- Drainage areas were delineated using DuPage County's 2-foot topographic mapping as provided by the Village of Downers Grove. In some areas, this topographic mapping was supplemented with field survey or data from design or as-built/record drawings.
- Runoff curve numbers were computed using typical SCS methodology. Curve numbers were computed using the land use shown on the Village of Downers Grove Zoning Map.
- Times of concentration were determined using typical SCS methodology. Flow paths were delineated using the 2-ft topography with a maximum sheet flow length of 100 feet.
- Rainfall depths were obtained from Table 13 of Bulletin 70: Frequency Distributions and Hydroclimatic Characteristics of Heavy Rainstorms in Illinois by Floyd A. Huff and James R. Angel, 1989.
- Rainfall distributions were obtained from Circular 173: Time Distribution of Heavy Rainstorms in Illinois by Floyd A. Huff, 1990.

The hydrologic models often include storage areas. Stage-storage relationships for these storage areas were developed based on the DuPage County two-foot topographic mapping. When design or as-built/record drawings were available for a given storage area, topographic data from these drawings was also used to establish the stage-storage relationship. Volume was computed using XPSWMM methodologies or the average-end-area method. The outlet characteristics of storage basins were obtained from reviewing design or as-built/record drawings

for a storage basin, or from a field survey when design plans were unavailable.

Unless a field visit, sewer atlas or field survey indicated otherwise, it was assumed that natural depressional areas had no outlet other than overtopping. The overtopping elevations were established based on a review of two-foot topographic mapping or design/record drawings if available.

Hydrologic methods were used to establish the base flood elevation (BFE) of depressional areas that were identified as LPDAs by the Village. If the depressional area was near or adjacent to other reported drainage problems, then detailed modeling of the depressional area was performed to determine the 10- and 100-year BFE. If the review of drainage complaints and Village records showed no reports of problems adjacent to the depressional area, then a BFE was assigned based on the apparent overflow elevation.

Some problem areas were analyzed with other methods. Deviations from these typical methods are described in Appendix A of Chapter 2.

3.2 Hydraulic Methods

Complex drainage systems were modeled using the XPSWMM dynamic modeling software. For simpler drainage systems that did not require the complexity of an XPSWMM model, other hydraulic software may have been employed, such as HydraFlow which uses the energy based standard step method to compute the hydraulic profile. Improvements to Lacey Creek were modeled using the U.S. Army Corps of Engineers HEC-RAS hydraulic model to compute the water surface profile. FEQ modeling was not performed as part of this conceptual planning-level study but may need to be performed during preliminary and final engineering to meet DuPage County regulatory criteria.

Hydraulic input parameters include storm sewer characteristics such as length, slope, pipe roughness, and pipe diameter; and open channel characteristics such as channel shape, channel roughness, and channel slope. These input parameters were obtained from a variety of sources including: field survey performed for this infrastructure improvement plan, field survey performed for other purposes, as-built/record drawings of the systems, design drawings for the systems, stormwater permit application reports for various developments and improvements, and Village storm sewer atlas. A list of all as-built/record drawings and stormwater permit application reports used in the study is included in Appendix A of Chapter 2.

The hydraulic models developed for this conceptual planning-level study were not intended to represent every pipe segment and every storm sewer structure, but rather to provide general characterizations of the system and identify areas with deficient conveyance. The hydraulic

models often represented multiple pipe segments as a single segment, and often combined several locations with stormwater runoff inflow (inlets, catch basins, flared end sections, etc) into a single inflow point.

Some problem areas were analyzed with other methods. These deviations from the typical methods described here are presented in Appendix A of Chapter 2.

3.3 Model Calibration

Upon completion of existing hydraulic models, a simple model calibration was performed to compare simulated results versus recorded results. The October 2, 2006 storm event was modeled using rain gage information as measured by the Downers Grove Sanitary District. The Thiessen Polygon Method was used to assign the appropriate rain gage to each subwatershed. The simulated results were compared against the Village flood records to determine whether the models simulated flooding in the same locations as reported. Measured high water marks were not available for detailed calibration of the October 2, 2006 storm.

4.0 Existing Condition Analysis

4.1 Introduction

The results of the existing condition analyses are summarized in this section of the report. Refer to Appendix A of Chapter 2 for detailed descriptions of the existing problems and additional documentation to support the analyses and calculations.

4.2 Lacey Creek Watershed

Table 4.1 of Chapter 2 below summarizes the results of the existing condition analysis for problem areas in the Lacey Creek watershed. Table 4.2 of Chapter 2 presents BFEs for depressional storage areas identified as such by the Village.

Table 4.1: Existing Conditions Results

Table 4.1 follows.

Table 4.1: Existing Condition Results in Lacey Creek Watershed

Prob. Area ID	Sub-water-shed	Sub-basin	Location	Problem Description							Severity	Problem Source	Comments
				House	Base-ment	Garage	Yard	Street	Depr. Area	Other			
Subwatershed A			West of Tollways								N/A	No reported problems	
Subwatershed B			Generally south of Tollways, west of Downers				x	x	x	x	Nuisance - Critical	Depressional Areas, Restrictive Outlets, Unsewered Areas	
LA2	B	LA2, LA3	Lee Avenue between Ogden Avenue and Grant Street					x	x		Critical	Depressional Area LA2 and LA3 with restrictive sewer outlet. (Problem reduced by recent CIP).	See Table 4.2 for depressional area base flood elevations. The area tributary to Depressional Area 3 represents one of the larger unsewered areas in the Village.
LA314	B	LA314	Woodward Avenue between Ogden Avenue and Grant Street				x			x	Chronic	Overland flow to low area in driveway and yard. Unsewered area.	Based on field visit, neighboring properties and street drains to property.
LA321	B, C	LA321, LA4, LA6, LA7, LA8	Unsewered Area north of Ogden, east of Lacey and I-355, south of Herbert, west of Seeley							x	Nuisance	Unsewered area	Area is not within 200 feet of storm sewer, however, review of Village Records shows no complaints of flooding.
LA324	B	LA314	Unsewered Area south of Ogden, west of Cornell							x	Nuisance	Unsewered area	Area is not within 200 feet of storm sewer, however, review of Village Records shows one complaint of flooding at LA314.
Subwatershed C			Generally South of Herbert, east of Downers, west of Saratoga				x	x	x	x	Nuisance - Critical	Depressional Areas, Restrictive Sewers	
LA4	C	LA321	Morton Avenue between Herbert Street and 40th Street						x		Nuisance	Depressional Area	See Table 4.2 for depressional area base flood elevations
LA6	C	LA6	Downers Drive between Herbert Street and 40th Street					x	x		Chronic	Depressional Area and restrictive downstream conveyance system	Downstream conveyance system is restrictive.
LA7	C	LA7	40th Street between Downers Drive and Seeley Avenue						x		Nuisance	Depressional Area	See Table 4.2 for depressional area base flood elevations
LA8	C	LA8	Virginia Street between Seeley Avenue and Belle Aire Lane						x		Nuisance	Depressional Area	See Table 4.2 for depressional area base flood elevations
LA11	C	LA11	Intersection of Janet Street and Seeley Avenue				x	x	x	x	Chronic	Depressional Area and restrictive downstream conveyance system	Increased storm sewer capacity or detention area needed, but must not increase flows to restrictive downstream system.
LA13	C	LA13	Venard Road between Drove Avenue and Ogden Avenue					x	x		Chronic	Depressional Area and restrictive downstream conveyance system	Area poorly drained.

Prob. Area ID	Sub-water-shed	Sub-basin	Location	Problem Description							Severity	Problem Source	Comments
				House	Base-ment	Garage	Yard	Street	Depr. Area	Other			
LA313	C	LA313	Ogden Avenue between Downers Drive and Belle Aire Lane					x			Critical	Local Ogden Avenue drainage issues	Based on field visit and topographic reivew, this appears to be related to local Ogden Avenue drainage issues. Ogden Avenue is under the jurisdiction of IDOT, therefore no study was performed in this area.
Subwatershed D			Generally South of Lacey Creek and Black Oak, north of Herbert, east of Tollway, west of Highland	x	x	x	x	x	x	x	Nuisance - Critical	Depressional Areas, Restrictive Sewers, Private Property Grading Issues, Debris/ Maintenance Issues	
LA12	D	LA12	Venard Road between Parrish Court and Drove Avenue						x	x	Nuisance	Depressional Area	See Table 4.2 for depressional area base flood elevations
LA307	D	LA307	Cul de sac of Parrish Court	x			x	x			Critical	Reported problem possibly related to maintenance issues/debris-blocked inlets.	Based on field visit, sewer inlets appear to be properly located at the low point on the street. Type 1 inlets may clog with debris easily.
LA308	D	LA308	Cul de sac of 39th Street and cul de sac of Candlewood Court		x			x			Chronic	Floodplain, poor local drainage, maintenance issues.	Floodplain extends into side yard swale and may contribute to problem. Street improvement project raised roadway and blocked flow from lots to street. Debris in inlets also reported as problematic.
LA309	D	LA309	East of the intersection of 39th Street and Saratoga Avenue		x			x			Chronic	Possible maintenance issues/debris blocked inlets	Area well served with storm sewers and overland flow paths; Based on field visit, significant depression with inlet on street corner may result in several inches of flooding if blocked by debris.
LA310	D	LA310	Candlewood Drive south of Black Oak Drive					x			Chronic	Possible maintenance issues/debris blocked inlets	Area well served with storm sewers and overland flow paths; Based on field visit, flooding may have resulted from debris accummulated on the inlet grate.
LA311	D	LA310	Intersection of Forest Avenue and 39th Street					x			Chronic	No apparent problem	Street flooding reported but based on field visit, topographic reivew, and phone call to resident, there appears to be no problem.

Prob. Area ID	Sub-water-shed	Sub-basin	Location	Problem Description							Severity	Problem Source	Comments
				House	Base-ment	Garage	Yard	Street	Depr. Area	Other			
LA320	D	LA320	Cul de sac of Almond Court	x							Critical	Private property grading directs flow towards residential structure.	Private property grading issue. Backyard swale will reduce problem.
Subwatershed E			Generally South of Lacey Creek, east of Highland, west of Fairview	x	x	x	x	x	x	x	Nuisance - Critical	Depressional Areas, Restrictive Sewers, Unsewered Areas, Private Property Grading Issues, Debris/ Maintenance Issues	
LA14	E	LA14	North of intersection of Washington Street and 40th Street	x	x	x	x		x		Critical	Depressional Area and restrictive downstream conveyance system	Depressional area is poorly drained.
LA15	E	LA15	South of 40th Street, between Lindley Street and Washington Street						x		Nuisance	Depressional Area	See Table 4.2 for depressional area base flood elevations
LA16	E	LA16	Intersection of 40th Street and Glendenning Road	x	x	x	x	x	x		Critical	Depressional Area drained by a very restrictive sewer.	The depressional area is a Wetland Bank complex. The neighborhood in the vicinity of the wetland complex is one of the larger unsewered areas in the Village and is undergoing significant redevelopment.
LA18	E	LA16	Douglas Road between 39th Street and 40th Street				x		x		Nuisance	Depressional Area	See Table 4.2 for depressional area base flood elevations. Roadside ditches need regrading and maintenance.
LA19	E	LA19	West of the intersection of Fairview Avenue and 40th Street						x		Nuisance	Depressional Area	See Table 4.2 for depressional area base flood elevations
LA20	E	LA20	South of Brentwood Place, east of Fairview Avenue						x		Nuisance	Depressional Area	See Table 4.2 for depressional area base flood elevations
LA22	E	LA22	South of the intersection of Herbert Street and School Street						x		Nuisance	Depressional Area	See Table 4.2 for depressional area base flood elevations
LA315	E	LA315	Main Street between Herbert Street and 41st Street		x		x	x			Critical	Undersized storm sewer	This is a DuPage DOT Road and likely caused by undersized sewers on Main Street. No study performed.
LA317	E	LA16	West of intersection of 39th Street and Glendenning Road				x				Chronic	Low area in yard	Based on field visit and topographic review, there appears to be a low area in a residential yard. Localized problem, therefore no study performed.

Prob. Area ID	Sub-water-shed	Sub-basin	Location	Problem Description							Severity	Problem Source	Comments
				House	Base-ment	Garage	Yard	Street	Depr. Area	Other			
Subwatershed F			Generally North of Lacey Creek, East of Tollway, east of Saratoga and Holly Ct		x	x	x	x	x		Chronic	Maintenance Issues, Poor Local Drainage	
LA303	F	LA303	Intersection of Venard Road and Barneswood Drive		x		x	x			Chronic	Reported problem possibly related to maintenance issues/debris-blocked inlets. Unable to duplicate problem through modeling	Based on Hydraflow analysis, there appears to be no problem with storm sewer conveyance. Pipes have capacity to convey the 25 year storm via gravity flow and convey the 50 year storm without surcharging. Inlets can pass the expected 10-year inflow with approximately 0.25 feet of head.
LA306	F	LA306	Brookside Lane near intersection with Duchess Court					x			Chronic	Floodplain	Based on Hydraflow analysis, with no tailwater condition, the storm sewer pipes have capacity to convey the 25-year storm via gravity flow and the 100-year storm without surcharging. However the rim elevations are lower than the 10-year expected tailwater condition; as such, with a 10-year tailwater elevation, surcharging of the storm sewer system will occur regardless of the flow rate entering the system.
LA323	F	LA323	Residential Property on Coral Berry			x					Chronic	Poor local drainage.	Street gutters direct flow down driveway into garage. Gutter capacity appears to have been filled by past roadway re-paving projects which paved to edge of curb without raising top/curb.
Subwatershed G			Generally north of Lacey Creek, south and west of Tollway, east of Lyman Woods	x	x	x	x	x	x	x	Nuisance - Critical	Floodplain, Depressional Areas, Restrictive Sewers, Unsewered Areas, Private Property Grading Issues, Debris/ Maintenance Issues	
LA1	G	LA1	West of the intersection of Pomeroy Road and 35th Street						x		Nuisance	Depressional Area	See Table 4.2 for depressional area base flood elevations

Prob. Area ID	Sub-water-shed	Sub-basin	Location	Problem Description							Severity	Problem Source	Comments
				House	Base-ment	Garage	Yard	Street	Depr. Area	Other			
LA300	G	LA300	Intersection of Venard Road and Drew Street	x			x	x			Chronic	Undersized storm sewer	Based on Hydraflow analysis, the pipes have capacity to convey the 2-year storm via gravity flow and the 10-year storm without surcharging and flooding at the inlets.
LA301	G	LA301	Intersection of Venard Road and Acorn Avenue	x				x			Critical	Undersized storm sewer	Based on XP SWMM analysis, the system appears to be undersized in the upstream sections. With a no tailwater condition, the system surcharges during the 5-year storm.
LA302	G	LA302	35th Street between Venard Road and Saratoga Avenue					x			Chronic	Undersized storm sewer	Based on Hydraflow analysis, the pipes have capacity to convey the 2-year storm without surcharging and flooding at the inlets.
LA304	G	LA304	Barneswood Drive between Saratoga Avenue and Highland Avenue		x	x	x	x		x	Critical	Floodplain, incorrectly installed/undersized storm sewers, poor roadway drainage	The profile of some of the storm sewer shows apparent settling or poor construction resulting in a negative slope. All storm sewers surcharge with 10 year tailwater conditions. Under normal water levels the system does not surcharge until the 25-year event. Field visit and resident observations suggest minimal longitudinal and transverse roadway slopes, leading to poor conveyance of runoff to inlets. Additionally, approximately 20 lots are partially located within the 10-year floodplain.
LA305	G	LA305	Highland Avenue between Barneswood Drive and Oak Hill Road					x			Critical	Floodplain, restrictive culverts	The profile of Highland Avenue between Barneswood Drive and Oak Hill Road is below the 10 year floodplain elevation. The Saratoga Avenue and Venard Road Structures are restrictive and create floodplain backwater that extends across Highland Avenue.

Prob. Area ID	Sub-water-shed	Sub-basin	Location	Problem Description							Severity	Problem Source	Comments
				House	Base-ment	Garage	Yard	Street	Depr Area	Other			
LA316	G	LA316, LA310	Hospital					x			Critical	Floodplain	The profile of Highland Avenue between Barneswood Drive and Oak Hill Road is below the 10 year floodplain elevation. The Saratoga Avenue and Venard Road Structures are restrictive.
LA322	G	LA322	Unsewered area west of Highland and north of 35th Street.							x	Nuisance	Unsewered area	Area is not within 200 feet of storm sewer, however, review of Village Records shows no complaints of flooding.
Subwatershed H			East of Lyman Woods and East of Fairview								N/A	No reported problems	
LA318	H	LA318	Intersection of 39th Street and Cumnor Road					x			Chronic	No apparent problem	Street flooding reported but based on field visit, topographic reivew, and phone call to resident, there appears to be no problem.

Italicized problem sources and comments are based on topographic review and field verification. Detailed modeling will be completed.

Table 4.2: Depressional Storage Area Elevations

Table 4.2 follows.

Table 4.2: Depressional Area Elevations in Lacey Creek Watershed

Prob. Area ID	Location	Depr. Area ID	BFE 100-yr	BFE 10-yr	Comments
LA1	West of the intersection of Pomeroy Road and 35th Street	LA1	726.7		Based on Overflow
LA2	Lee Avenue between Ogden Avenue and Grant Street	LA2	733.2		Based on Overflow
		LA3	733.2		Based on Overflow
LA4	Morton Avenue between Herbert Street and 40th Street	LA4	699 +/-		Based on Overflow
		LA5	698.4		Based on Overflow
LA6	Downers Drive between Herbert Street and 40th Street	LA6	708.58	707.31	Based on XP SWMM Model
LA7	40th Street between Downers Drive and Seeley Avenue	LA7	714.26	713.69	Based on XP SWMM Model
LA8	Virginia Street between Seeley Avenue and Belle Aire Lane	LA8	724.1	720.84	Based on XP SWMM Model
		LA9	727 +/-		Based on Overflow
		LA10	727.5		Based on Overflow
LA11	Intersection of Janet Street and Seeley Avenue	LA11	727.76	726.03	Based on XP SWMM Model
LA12	Venard Road between Parrish Court and Drove Avenue	LA12	742.4		Based on Overflow
LA13	Venard Road between Drove Avenue and Ogden Avenue	LA13	735.72	735.65	Based on XP SWMM Model
LA14	North of intersection of Washington Street and 40th Street	LA14	743.67	737.53	Based on XP SWMM Model
LA15	South of 40th Street, between Lindley Street and Washington Street	LA15	744.5		Based on Overflow
LA16	Intersection of 40th Street and Glendenning Road	LA16	differs		Based on Overflow
		LA17	736.74		Based on Overflow
LA18	Douglas Road between 39th Street and 40th Street	LA18	745 +/-		Based on Overflow
LA19	West of the intersection of Fairview Avenue and 40th Street	LA19	754.7		Based on Overflow
LA20	South of Brentwood Place, east of Fairview Avenue	LA20	756 +/-		Based on Overflow
		LA21	753.1		Based on Overflow
LA22	South of the intersection of Herbert Street and School Road	LA22	757 +/-		Based on Overflow

5.0 Proposed Alternatives Analysis and Project Prioritization

5.1 Proposed Conditions Modeling

A summary of basic design criteria and assumptions used in the proposed condition modeling and analysis are presented below. Deviations from these basic criteria and assumptions are documented in Appendix A of Chapter 2.

Basic Design Criteria

Where deficiencies have been identified in the existing stormwater infrastructure system, proposed improvements have been conceptually designed. For storm sewer systems, proposed improvements have been conceptually developed with the following parameters as design goals:

- Storm sewers to flow full under the 10-year critical duration event with a 10-year tailwater at the outlet.
- Storm sewers to have a minimum 2 foot per second velocity during the 10-year critical duration event.
- No street flooding from storm sewer surcharge during the 25-year critical duration event with a 10-year tailwater condition.
- Overland flow paths designed for the 100-year storm event.
- If required, stormwater detention designed for a 100-year 24-hour storm event.

Deviations from these design goals are noted in Appendix A of Chapter 2.

Proposed Storm Sewer Networks on New Alignments

Proposed storm sewer networks along new alignments (for example, in unsewered areas) are conceptually designed, including but not limited to the following assumptions: The design is based on a 10-year tailwater in the receiving system. The slope of the sewer is based on an assumed 3.5 feet of depth from ground elevation (as suggested on two-foot topography) to invert at the upstream end, and an assumed downstream invert based on two-foot topography at the receiving system. Tributary runoff enters the conveyance system at major break points; inlet locations and bypass flow across inlets were not considered. This conceptual planning-level design did not compute sewer inverts or pipe cover in detail and did not investigate utility crossings/clearance; these items should be considered in preliminary design.

It is assumed that the proposed storm sewers on new alignments will be constructed in conjunction with a roadway improvement project using Downers Grove's typical 30-foot cross section with curb and gutter and a 5-foot sidewalk, necessitating stormwater detention. Detention has been calculated using the DuPage County Division of Transportation methodology, which computes detention based on new impervious area (considering existing gravel shoulders as 50% impervious) and requires a

10% "penalty" for converting from a rural to urban cross section. It is assumed that the existing cross sections are 24 feet wide with a two foot gravel shoulder on each side, and it is assumed that ten feet of pervious area on each side will be disturbed.

In general, an attempt was made to identify two possible locations for stormwater detention on each new storm sewer system: oversized storm sewers, or a parcel of land which appears vacant or could be purchased through the voluntary buyout program and appears to have appropriate topography to facilitate stormwater detention. A detailed feasibility study was not performed to determine whether the grades and sewer inverts will facilitate stormwater detention in the identified detention locations.

It is assumed that the downstream receiving systems can handle the existing runoff rates (unless a review of flood records suggests otherwise). As stormwater detention will be provided to mitigate for increases in impervious area, it is assumed that the downstream receiving system has sufficient capacity to handle the proposed system with a controlled release from the stormwater detention system. This assumption, as well as all other assumptions, should be re-evaluated in preliminary design.

Proposed Storm Sewer Replacement on Existing Alignment

In areas with existing storm sewers with identified conveyance deficiencies, it is assumed that the proposed conveyance improvements will follow the existing alignment. A cursory review of cover over the proposed system was performed using limited data available (for example, rim elevations at the upstream and downstream end of the system based on decades-old design plans) and the proposed design was modified as necessary in an attempt to provide a minimum of 18-inches of cover over top of pipe. This must be re-addressed in preliminary design to insure appropriate cover on the system. In addition, utility clearance/crossings were not considered in this planning level study. It is assumed that stormwater detention will not be provided for these systems, as most existing storm sewer networks are located in subdivisions with curb-and-gutter roadways and existing stormwater detention. Assumptions regarding the downstream receiving system were made on a case-by-case basis and are discussed in Appendix A of Chapter 2.

5.2 Proposed Conditions Permitting, Cost, and Construction Schedule

Potential Wetland Impacts and Permitting Requirements

The DuPage County Wetland Maps and the National Wetland Inventories were reviewed to determine whether proposed projects are located in or near an identified wetland, such that wetland permitting and/or mitigation through DuPage County or the U.S. Army Corps of Engineers may be required. Wetland permitting through the ACOE is often delegated to

DuPage County which has then delegated permitting authority to the Village. In some special circumstances, permitting through DuPage or ACOE may be required.

Other stormwater-related permits that may be required for the proposed projects were also identified, such as:

- IDNR flood way permits (IDNR may delegate review authority to DuPage County);
- Village of Downers Grove stormwater permits for soil erosion and sediment control, stormwater detention, flood plain impacts, riparian area impacts, and/or wetland impacts (for compliance with Village Code and the DuPage County Countywide Stormwater and Flood Plain Ordinance);
- IEPA permits for water quality;
- Kane/DuPage Soil and Water Conservation District approval (typically needed if ACOE approval is required);
- Approvals/permits from IDOT or DuDOT for work in or adjacent to their right-of-ways;
- Conditional letter of map revision (CLOMR) and letter of map revision (LOMR) from FEMA.

Permits not related to stormwater or special management areas have not been identified.

Engineer's Estimated Opinion of Probable Construction Cost

A preliminary, conceptual engineer's estimated opinion of probable construction cost (EEOPCC) was developed for each proposed improvement. The estimate was based on unit costs for typical projects as developed by Clark Dietz, Inc in conjunction with the Consultant Team and the Village of Downers Grove. Typical unit costs developed by Clark Dietz are shown in the table below.

Conceptual Engineer's Estimated Opinion of Probable Construction Cost for Planning Purposes

ITEM	Unit	Unit Cost	Quantity	Cost
12-inch Storm Sewer	LF	$90		$0
15-inch Storm Sewer	LF	$100		$0
18-inch Storm Sewer	LF	$110		$0
24-inch Storm Sewer	LF	$120		$0
30-inch Storm Sewer, 6-10 ft deep	LF	$125		$0
30-inch Storm Sewer, 10-14 ft deep	LF	$130		$0
36-inch Storm Sewer, 6-10 ft deep	LF	$140		$0
36-inch Storm Sewer, 10-14 ft deep	LF	$145		$0
42-inch Storm Sewer, 6-10 ft deep	LF	$170		$0
42-inch Storm Sewer, 10-14 ft deep	LF	$175		$0
48-inch Storm Sewer, 6-10 ft deep	LF	$190		$0
48-inch Storm Sewer, 10-14 ft deep	LF	$195		$0
54-inch Storm Sewer, 6-10 ft deep	LF	$200		$0
54-inch Storm Sewer, 10-14 ft deep	LF	$210		$0
60-inch Storm Sewer, 6-10 ft deep	LF	$200		$0
60-inch Storm Sewer, 10-14 ft deep	LF	$210		$0
72-inch Storm Sewer, 6-10 ft deep	LF	$300		$0
72-inch Storm Sewer, 10-14 ft deep	LF	$320		$0
Precast Manhole, 4-ft diameter, 4-10 ft deep	EA	$2,850		$0
Precast Manhole, 4-ft diameter, 10-14 ft deep	EA	$3,100		$0
Precast Manhole, 6-ft diameter, 4-10 ft deep	EA	$4,000		$0
Precast Manhole, 6-ft diameter, 10-14 ft deep	EA	$4,950		$0
Structure Cleaning	EA	$150		$0
Outfall Repair or Replace	EA	$2,000		$0
Storm Sewer Inlet Repair or Replace	EA	$2,000		$0
Pavement Patching	SY	$45		$0
Road Resurfacing	LF	$220		$0
Road Replacement with Ditches	LF	$500		$0
Road Replacement with Curb and Gutter	LF	$1,000		$0
Seeding and Surface Restoration	AC	$3,000		$0
Driveway Culvert Replacement	EA	$2,000		$0
Above Ground Stormwater Storage Facility	AC-FT	$200,000		$0
Underground Stormwater Storage Facility	AC-FT	$500,000		$0
Stormwater Storage Facility Retrofit	EA	$12,000		$0
Tideflex Check Valve	EA	$10,000		$0
Wetland Mitigation	AC	$175,000		$0
Streambank Maintenance (Dredging)	LF	$100		$0
Streambank Maintenance (Brush Removal, Minor Reshaping)	LF	$5		$0
Major Streambank Maintenance/Stabilization	LF	$200		$0
SUBTOTAL CONSTRUCTION COST				**$0**
Contingency (mobilization, maintenance of traffic, etc.) (20%)				$0
Contingency for Water Quality BMP (10%)				$0
Design and Construction Engineering (15%)				$0
TOTAL ESTIMATED COST				**$0**

Project Schedule

A basic project schedule was developed to estimate length of time to implement a project from notice-to-proceed with design, through permitting and construction.

Typical design times are assumed as follows, estimated from Notice to Proceed:

Small Project: Survey, Preliminary and Final Engineering, Construction Documents	3 months
Large Project: Data Collection (incl. Survey) and Preliminary Engineering	6 months
Large Project: Final Engineering and Construction Documents, Permit Submittal Documents	6 months

Typical permitting times are assumed as follows:

Village of Downers Grove Stormwater Permit	12 months
IDNR Floodway Permit	9 months (concurrent with Stormwater Permit)
IEPA Water Quality Permits	9 months (concurrent with Stormwater Permit)
U.S. Army Corps of Engineers Permit	12 months (concurrent with Stormwater Permit, if not delegated to DG)
Kane/DuPage Soil and Water Conservation District	3 months (concurrent with Army Corps Permit)
IDOT/DuDOT Approvals	6 months (concurrent with Stormwater Permit)
FEMA CLOMR	12 months (after sign-off by Community).

Typical construction time estimates for larger projects are shown below, assuming an early spring start. 2 months are added to each project for bidding and contract award process.

Full Road Reconstruction	2 residential blocks per month
Streambank Stabilization (Major)	1000 linear feet per month
Detention Basin Construction	1 acre-foot per two weeks
Bridge Replacement (Cast-in-Place)	1 structure per two months
Bridge Replacement (Pre-Cast)	1 structure per month

5.3 Prioritization Method for Proposed Projects

Proposed projects have been assigned a high (Phase I), medium (Phase II) or low (Phase III) priority based on the severity of the problems. Problem severity was classified as described in Section 2.1 of this Chapter.

5.4 Proposed Projects in Lacey Creek Watershed

Proposed projects in the Lacey Creek watershed are as shown below in Table 5.1 of Chapter 2 and as described on the exhibits on the following pages.

In addition to the specific projects presented in Table 5.1 of Chapter 2, there are several general projects recommended for the entire watershed as follows:

Lacey Creek Streambank Stabilization and Naturalization. Several reaches of Lacey Creek contain timber retaining walls in disrepair. The retaining walls are in need of maintenance or replacement, and as currently designed may pose a safety hazard to residents. It is recommended that the timber retaining walls be replaced and the streambank stabilized with a bioengineered solution to provide increased cross sectional area and conveyance capacity, reduce safety concerns, and provide best management practices for water quality. The project for Subbasin LA305 includes streambank stabilization along all of Lacey Creek as one component of a large flood control project. If the project for Subbasin LA305 is not selected for implementation, the streambank stabilization portion of the project is still recommended.

Ditch and Tributary Maintenance. Several ditches and unnamed tributaries to Lacey Creek are clogged with overgrown bushes, debris, and sediment. It is recommended that the Village establish a watershed-wide (or Village-wide) maintenance program. The initial phase of this program would require the largest effort and would consist of clearing bushes and scrubby trees, removing debris, and removing accumulated sediment. Subsequent phases would require lesser effort to maintain the first phase, and could be partially or wholly implemented through a volunteer Adopt-a-Stream program or other resident participation.

Type 1 Inlet Grate Replacement. Many of the identified drainage problems in the Lacey Creek watershed resulted from clogged inlets that did not accept stormwater runoff, rather than insufficient downstream capacity. Many of these problematic inlets were Type 1 inlet grates, which are susceptible to frequent debris clogging. It is recommended that the existing inlet grates be replaced with Type 11 grates or other grates that will allow the flow of storm water even if a buildup of debris is present. Specific locations for Type 1 inlet grate replacement are identified in Table 5.1 of Chapter 2 based on the flood complaint records. However, it is recommended that all Type 1 inlet grates be replaced

throughout the watershed, as all are susceptible to clogging. The cost to perform this inlet grate replacement is identified in each subwatershed in Table 5.1 of Chapter 2. The cost was determined by estimating the total storm sewer length in each subwatershed using the Village's storm sewer GIS layer, and assuming that two Type 1 inlet grates exist along every 300 feet of sewer.

Storm Sewer System Maintenance. Regular maintenance of catch basins and storm sewers, as well as inlet grates, gutter flow paths, and overland flow routes, is recommended to remove debris or obstructions and repair any problems. The Village may wish to consider development of an "Adopt an Inlet" program or other such program that incorporates homeowner awareness and community involvement in the upkeep of the storm sewer inlet grates, as well as overland flow routes and street gutters.

Private Drain Program. A review of flood complaints showed that many homeowners reported private property yard flooding not also associated with flood plain or street flooding. In most occurrences, this yard flooding was classified as a nuisance issue and was not studied in detail in this report, as private property drainage issues are beyond the scope of this report. However, private property yard flooding is a concern for residents in the Village. Upon implementation of all recommended projects, most residents will be within 200 feet of a public storm sewer, and could then connect a backyard drain tile to the public sewer to provide some relief to current drainage problems. It is recommended that the Village consider an expansion to the current cost-sharing program, to provide additional financial assistance to residents who experience significant private property drainage issues and wish to connect to the Village sewer.

Table 5.1 follows

Table 5.1: Alternatives in Lacey Creek Watershed

Prob. Area ID	Sub-water-shed	Sub-basin	Location	Problem Severity	Problem Source	Comments	Alt. No.	Alternative Description	EEOPC	Potential Wetland Impacts?	Permit Requirements	Easement Issues	Construction Schedule	Alternative Priority
Subwatershed A			**West of Tollways**	**N/A**	**No reported problems**									
Subwatershed B			**Generally south of Tollways, west of Downers**	**Nuisance - Critical**	**Depressional Areas, Restrictive Outlets, Unsewered Areas**									
LA314 & LA324	B	LA314	Woodward Avenue between Ogden Avenue and Grant Street	Chronic	Overland flow to low area in driveway and yard. Unsewered area.		1	New storm sewer system on Stonewall & Woodward to collect runoff and take to LA2. Allow homeowners to connect to pipe network. Provide detention in empty lot west of LA2 wetland.	$10,189,000	No	DG Stormwater, IDNR, ACOE, IEPA, Kane/Dupage Soil and Water Conservation District	Stormwater and maintenance easements should be acquired for storm sewers extending east of Woodward Ave. if they do not already exist.	28 months	Medium (Phase II)
							2	New storm sewer system on Stonewall & Woodward to collect runoff and take to LA2. Allow homeowners to connect to pipe network. Provide detention in oversized pipes.	$9,032,000	No				
LA321	B, C	LA321	Unsewered Area north of Ogden, east of Lacey and I-355, south of Herbert, west of Seeley	Nuisance	Unsewered area	Though Northcott Ave naturally drains to Subbasin LA6, it is recommended that it be included in Subbasin LA321. As project scheduling is undetermined, storm sewers on Northcott Ave are included in both LA321 and LA6.	1	New storm sewer system parallel to Lacey sewer and connect laterals along Janet, Carol, and Virginia Northcott. Provide above ground detention in empty lot west of Lacey.	$12,569,000	Yes	DG Stormwater, IDNR, ACOE, IEPA, Kane/Dupage Soil and Water Conservation District	Within Village ROW	33 months	Low (Phase III)
							2	New storm sewer system parallel to Lacey sewer and connect laterals along Janet, Carol, and Virginia Northcott. Provide above ground detention in oversized pipes.	$11,905,000	No				
Subtotal for Subwatershed B								$20,937,000	-	$22,758,000				
Subwatershed C			**Generally South of Herbert, east of Downers, west of Saratoga**	**Nuisance - Critical**	**Depressional Areas, Restrictive Sewers**									
Subwatershed C			Entire Subwatershed	Nuisance				Replace Type 1 inlets with Type 11 inlets or similar	$192,000	No	None	Within Village ROW	6 months	Low (Phase III)
LA6, 7, 8, 11, 13	C	LA6, 7, 8, 11, 13	Includes all area triburaty to Subbasin LA6 bound approximately by Herbert St. on the north, Ogden Ave. on the south, Saratoga Ave. on the east, and Morton Ave. on the west	Nuisance to Chronic	Depressional Area and restrictive downstream conveyance system	Though Northcott Ave naturally drains to Subbasin LA6, it is recommended that it be included in Subbasin LA321. As project scheduling is undetermined, storm sewers on Northcott Ave are included in both LA321 and LA6. Subbasin LA13 is an identified depressional area, which has no flooding associated with it, and is not recomended to be drained. Doing so will be at an additional cost and will require attenuation to prevent downstream flooding.	1	Replace undersized storm sewer and add addition al storm sewer as part of roadway improvement project. Clear and maintain unnamed tributary. Add above ground detention in Doerhoefer Park.	$14,016,000	Yes	DG Stormwater, IDNR, ACOE, IEPA, Kane/Dupage Soil and Water Conservation District	Stormwater and maintenance easements should be acquired for the unnamed triburaty and the storm sewers that extend north from Seeley Ave. and west from Drove Ave. if they do not already exist. Alternative 1 may require an easement for work on park district property.	42 months	Medium (Phase II)
							2	Replace undersized storm sewer and add addition al storm sewer as part of roadway improvement project. Clear and maintain unnamed tributary. Provide detention in oversized pipes.	$14,412,000					
							3	Replace undersized storm sewer and add addition al storm sewer as part of roadway improvement project. Clear and maintain unnamed tributary. Add above ground detention in lots purchased through V.B.P.	$18,554,000					
Subtotal for Subwatershed C								$14,208,000	-	$18,746,000				
Subwatershed D			**Generally South of Lacey Creek and Black Oak, north of Herbert, east of Tollway, west of Highland**	**Nuisance - Critical**	**Depressional Areas, Restrictive Sewers, Private Property Grading Issues, Debris/ Maintenance Issues**									

Table 5.1: Alternatives in Lacey Creek Watershed

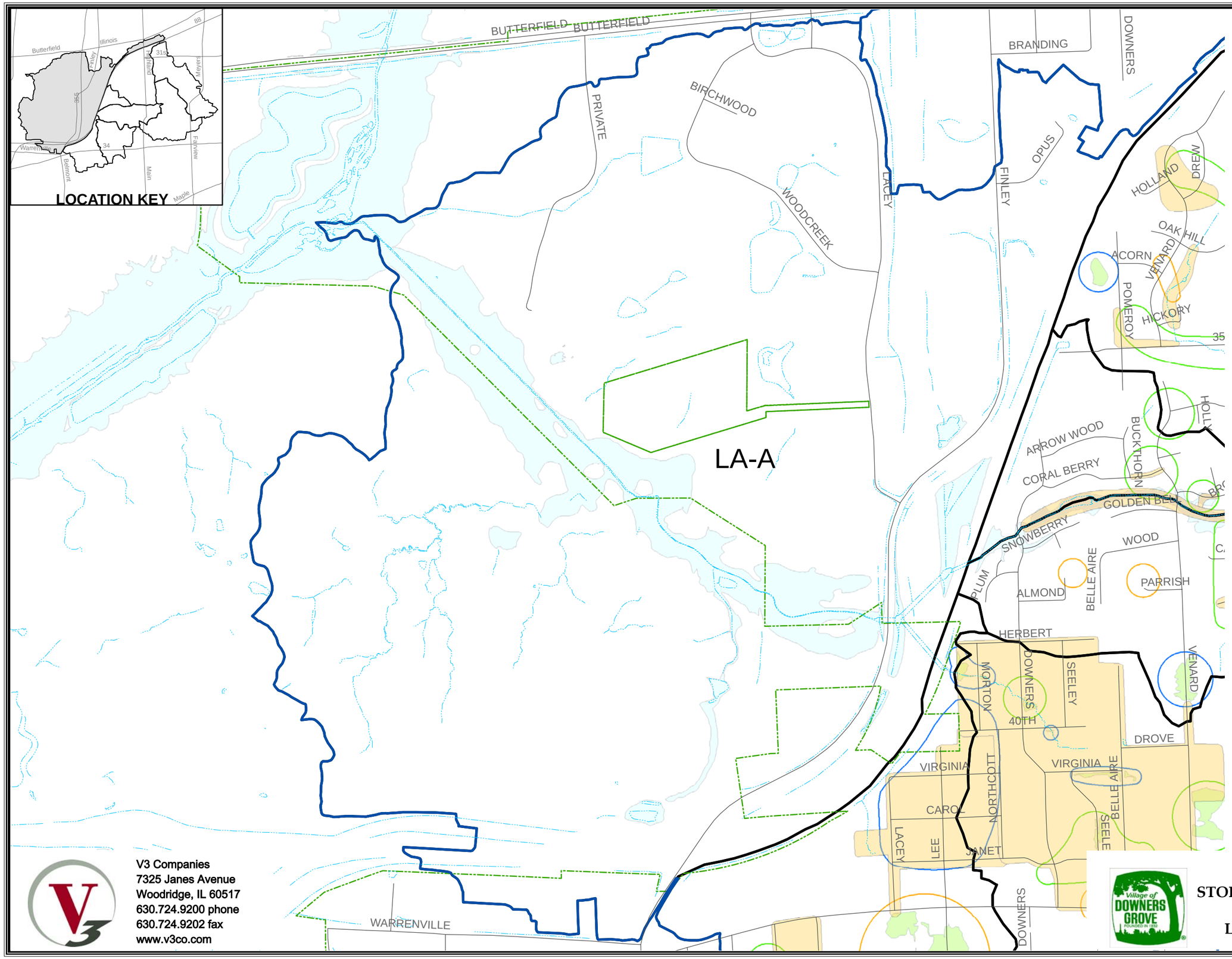
Prob. Area ID	Sub-water-shed	Sub-basin	Location	Problem Severity	Problem Source	Comments	Alt. No.	Alternative Description	EEOPC	Potential Wetland Impacts?	Permit Requirements	Easement Issues	Construction Schedule	Alternative Priority
Subwatershed D			Entire Subwatershed	Critical				Replace Type 1 inlets with Type 11 inlets or similar	$230,000	No	None	Within Village ROW	6 months	High (Phase I)
LA307	D	LA307	Cul de sac of Parrish Court	Critical	Reported problem possibly related to maintenance issues/debris-blocked inlets.		1	Replace Type 1 inlets with Type 11 inlets or similar, Maintenance	Maintenance and Inlet Replacement Program	No	None	Within Village ROW	Maintenance and Inlet Replacement Program	High (Phase I)
LA308	D	LA308	Cul de sac of 39th Street and cul de sac of Candlewood Court	Chronic	Floodplain, poor local drainage, maintenance issues.		1	Install inlet in parkway and re-establish private drain connection	$15,000	No	DG Stormwater	May require Temporary Construction Easement	17 months	Medium (Phase II)
LA309	D	LA309	East of the intersection of 39th Street and Saratoga Avenue	Chronic	Possible maintenance issues/debris blocked inlets		1	Replace Type 1 inlets with Type 11 inlets or similar, Maintenance	Maintenance and Inlet Replacement Program	No	None	Within Village ROW	Maintenance and Inlet Replacement Program	Medium (Phase II)
LA310	D	LA310	Candlewood Drive south of Black Oak Drive	Chronic	Possible maintenance issues/debris blocked inlets		1	Maintenance.	Maintenance and Inlet Replacement Program	No	None	Within Village ROW	Maintenance and Inlet Replacement Program	Medium (Phase II)
Subtotal for Subwatershed D									$245,000					
Subwatershed E			**Generally South of Lacey Creek, east of Highland, west of Fairview**	**Nuisance - Critical**	**Depressional Areas, Restrictive Sewers, Unsewered Areas, Private Property Grading Issues, Debris/ Maintenance Issues**									
Subwatershed E			Entire Subwatershed	Nuisance				Replace Type 1 inlets with Type 11 inlets or similar	$81,000	No	None	Within Village ROW	5 months	Low (Phase III)
LA14	E	LA14	North of intersection of Washington Street and 40th Street	Critical	Depressional Area and restrictive downstream conveyance system		1	Replace undersized storm sewer and add addition al storm sewer as part of roadway improvement project. Provide above ground detention in park area adjacent to wetland at the NE corner of 41st and Elm streets.	$8,818,000	Yes	DG Stormwater, IDNR, ACOE, IEPA, Kane/Dupage Soil and Water Conservation District	May require an easement for work on park district property.	32 months	High (Phase I)
							2	Replace undersized storm sewer and add addition al storm sewer as part of roadway improvement project. Provide above detention in oversized pipes.	$8,800,000	Yes		Within Village ROW		
							3	Replace undersized storm sewer and add addition al storm sewer as part of roadway improvement project. Provideabove ground detention in lots purchased through V.B.P.	$10,332,000	Yes		Within Village ROW		

Table 5.1: Alternatives in Lacey Creek Watershed

Prob. Area ID	Sub-water-shed	Sub-basin	Location	Problem Severity	Problem Source	Comments	Alt. No.	Alternative Description	EEOPC	Potential Wetland Impacts?	Permit Requirements	Easement Issues	Construction Schedule	Alternative Priority
LA16	E	LA16	Intersection of 40th Street and Glendenning Road	Critical	Depressional Area drained by a very restrictive sewer.	The depressional area is a Wetland Bank complex. The neighborhood in the vicinity of the wetland complex is one of the larger unsewered areas in the Village and is undergoing significant redevelopment.	1	Project 1: Instal relief sewer to bring 100-yr high water level down to 5-yr lhigh water level. Raise road profile at the corner of Glendenning and 40th.	$12,339,000	Yes	DG Stormwater, IDNR, ACOE, IEPA, Kane/Dupage Soil and Water Conservation District	Easement or land purchase required for downstream storage basin.	37 months	High (Phase I)
							2.1	Installation of new stormsewer system and road improvement project. Detention provided in above ground storage facility.	$31,120,000	Yes		Within Village ROW	38 months	
							2.2	Installation of new stormsewer system and road improvement project. Detention provided in oversized pipes.	$26,839,000	Yes		Within Village ROW		
Subtotal for Subwatershed E									$21,220,000	-	$41,533,000			
Subwatershed F			**Generally North of Lacey Creek, East of Tollway, east of Saratoga and Holly Ct**	**Chronic**	**Maintenance Issues, Poor Local Drainage**									
Subwatershed F			Entire Subwatershed	Chronic				Replace Type 1 inlets with Type 11 inlets or similar	$87,000	No	None	Within Village ROW	5 months	Medium (Phase II)
LA303	F	LA303	Intersection of Venard Road and Barneswood Drive	Chronic	Reported problem possibly related to maintenance issues/debris-blocked inlets. Unable to duplicate problem through modeling		1	Maintenance	Maintenance and Inlet Replacement Program	No	None	Within Village ROW	Maintenance and Inlet Replacement Program	Medium (Phase II)
LA306	F	LA306	Brookside Lane near intersection with Duchess Court	Chronic	Floodplain	Alternative 1 includes raising the road profile which necessitates significant cost for compensatory storage and is not recommended here.	2	Install backflow preventer	$13,000	Possibly at outfall	DG Stormwater	Within Village ROW, may require temporary construction easement	17 months	Medium (Phase II)
LA323	F	LA323	Residential Property on Coral Berry	Chronic	Poor local drainage.		1	Re-establish curb and gutter capacity	$177,000	No	DG Stormwater	Within Village ROW	18 months	Medium (Phase II)
Subtotal for Subwatershed F									$277,000					
Subwatershed G			**Generally north of Lacey Creek, south and west of Tollway, east of Lyman Woods**	**Nuisance - Critical**	**Floodplain, Depressional Areas, Restrictive Sewers, Unsewered Areas, Private Property Grading Issues, Debris/ Maintenance Issues**									
Subwatershed G			Entire Subwatershed	Nuisance				Replace Type 1 inlets with Type 11 inlets or similar	$310,000	No	None	Within Village ROW	7 months	Low (Phase III)
LA300	G	LA300	Intersection of Venard Road and Drew Street	Chronic	Undersized storm sewer		1	Replace undersized storm sewer in conjuction with road reconstruction project	$748,000	No	DG Stormwater	Within Village ROW, may require temporary construction easement	27 months	Medium (Phase II)
LA301	G	LA301	Intersection of Venard Road and Acorn Avenue	Critical	Undersized storm sewer		1	Replace undersized storm sewer.	$405,000	No	DG Stormwater	Within Village ROW, may require temporary construction easement	27 months	High (Phase I)
LA302	G	LA302	35th Street between Venard Road and Saratoga Avenue	Chronic	Undersized storm sewer		1	Replace undersized storm sewer in conjuction with road reconstruction project	$522,000	No	DG Stormwater	Within Village ROW	27 months	Medium (Phase II)
LA304	G	LA304	Barneswood Drive between Saratoga Avenue and Highland Avenue	Critical	Floodplain, incorrectly installed/undersized storm sewers, poor roadway drainage	Barneswood reconstruction costs included in EEOPC for LA305.	1	Replace undersized storm sewer.	$78,000	Possibly at outfall	DG Stormwater	Within Village ROW	17 months	High (Phase I)

Table 5.1: Alternatives in Lacey Creek Watershed

Prob. Area ID	Sub-water-shed	Sub-basin	Location	Problem Severity	Problem Source	Comments	Alt. No.	Alternative Description	EEOPC	Potential Wetland Impacts?	Permit Requirements	Easement Issues	Construction Schedule	Alternative Priority
LA305	G	LA305	Highland Avenue between Barneswood Drive and Oak Hill Road	Critical	Floodplain, restrictive culverts		A	Regrade streambanks and wetland area; remove timber retaining walls where present; replace structures at Barneswood, Venard and Saratoga; and raise profiles of Highland and Barneswood.	$15,158,000	Yes	DG Stormwater, IDNR, ACOE, Kane/Dupage Soil and Water Conservation District, FEMA	May require temporary construction easement, drainage easements and maintenance easements	52 months	High (Phase I)
							B	Regrade streambanks and voluntary buyout lots; remove timber retaining walls where present; replace structures at Barneswood, Venard and Saratoga; and raise profiles of Highland and Barneswood.	$30,008,000	Yes	DG Stormwater, IDNR, ACOE, Kane/Dupage Soil and Water Conservation District, FEMA	May require temporary construction easement, drainage easements and maintenance easements		
LA322	G	LA322	Unsewered area west of Highland and north of 35th Street.	Nuisance	Unsewered area		1	Installation of new stormsewer system and road improvement project. Detention provided in oversized pipes.	$5,097,000	No	DG Stormwater	Within Village ROW, may require temporary construction easement	28 months	Low (Phase III)
							2	Installation of new stormsewer system and road improvement project. Detention provided in above ground storage facility.	$5,736,000	No	DG Stormwater	Within Village ROW, may require temporary construction easement		
Subtotal for Subwatershed G									$22,318,000	-	$37,807,000			
Subwatershed H			**East of Lyman Woods and East of Fairview**	**N/A**	**No reported problems**									
TOTAL FOR LACEY CREEK WATERSHED									**$79,205,000**	**-**	**$121,366,000**			



SUBWATERSHED LA-A PROBLEMS AND ALTERNATIVES

PROBLEMS:
- No reported problems

ALTERNATIVES:
- N/A

TOTAL COST:
N/A

Legend

- Lacey Creek Watershed Boundary
- Village Boundary
- Subwatershed Boundary
- 100-Year Floodplain
- Depressional Storage Area
- Proposed Alternatives

Problem Areas

- Critical
- Chronic
- Nuisance

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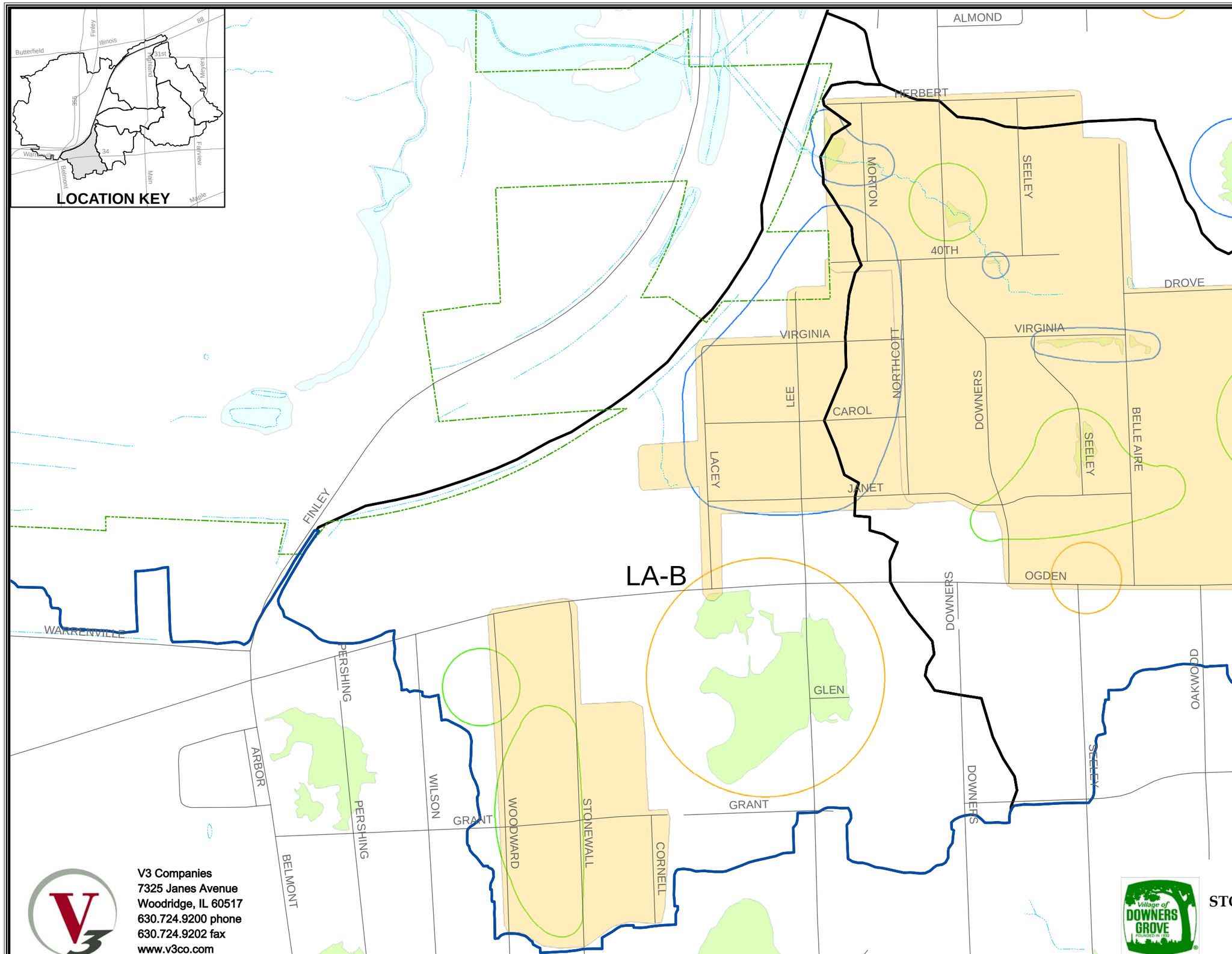
Village of DOWNERS GROVE FOUNDED IN 1832

STORMWATER INFRASTRUCTURE IMPROVEMENT PLAN
LACEY CREEK WATERSHED



SUBWATERSHED LA-B PROBLEMS AND ALTERNATIVES

PROBLEMS:
- Depressional Areas
- Restrictive Outlets
- Unsewered Areas

ALTERNATIVES:
- New storm sewer system with road reconstruction
- Add storage within subwatershed
- Increase size of storm sewers

TOTAL COST:
$20,940,000 - $22,760,000
Depending on storage location.

Note: See exhibits in Appendix A of Chapter 2 for additional details.

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Legend

- Lacey Creek Watershed Boundary
- Village Boundary
- Subwatershed Boundary
- 100-Year Floodplain
- Depressional Storage Area
- Proposed Alternatives

Problem Areas

- Critical
- Chronic
- Nuisance

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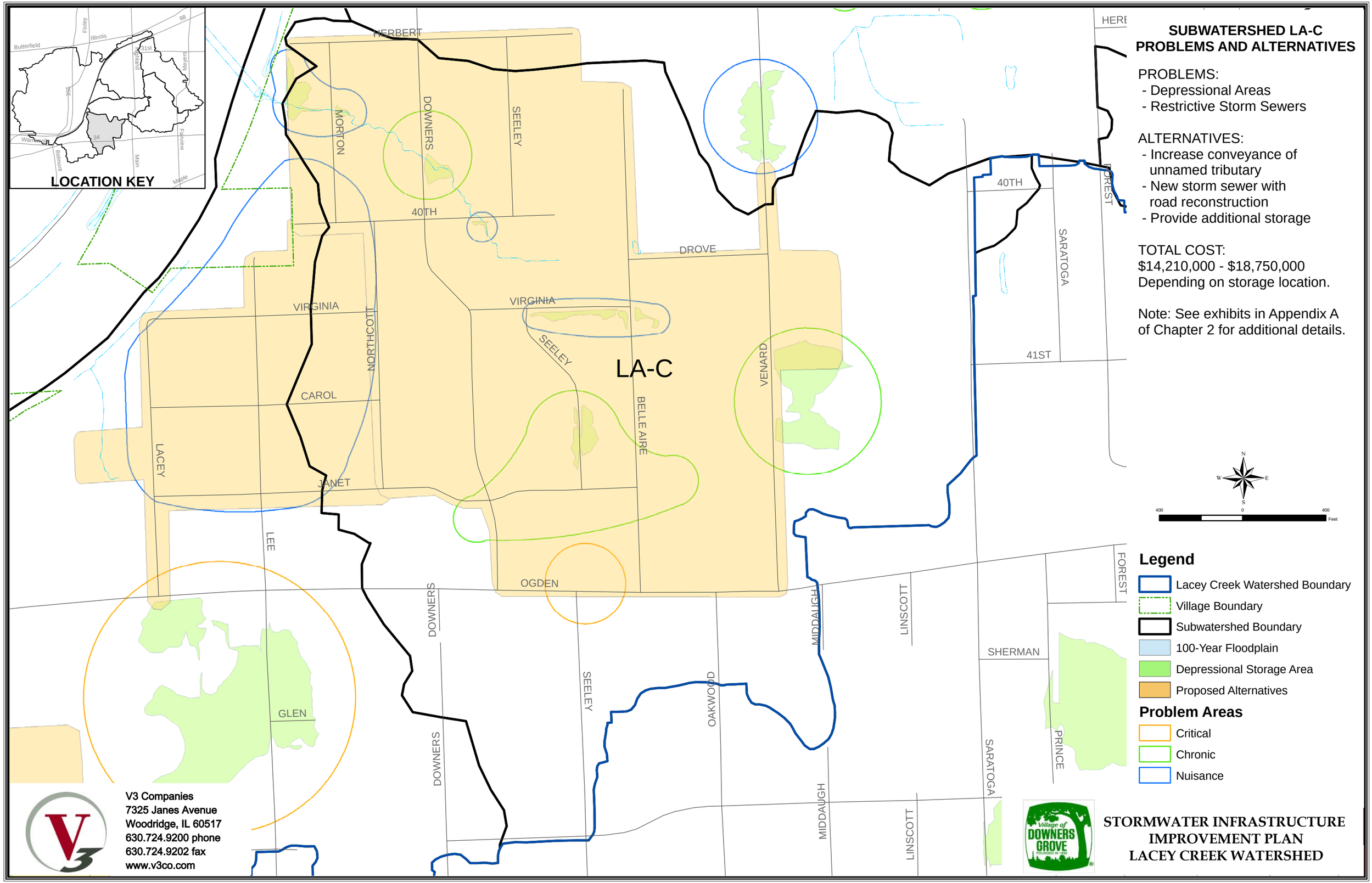
LACEY CREEK WATERSHED



SUBWATERSHED LA-C PROBLEMS AND ALTERNATIVES

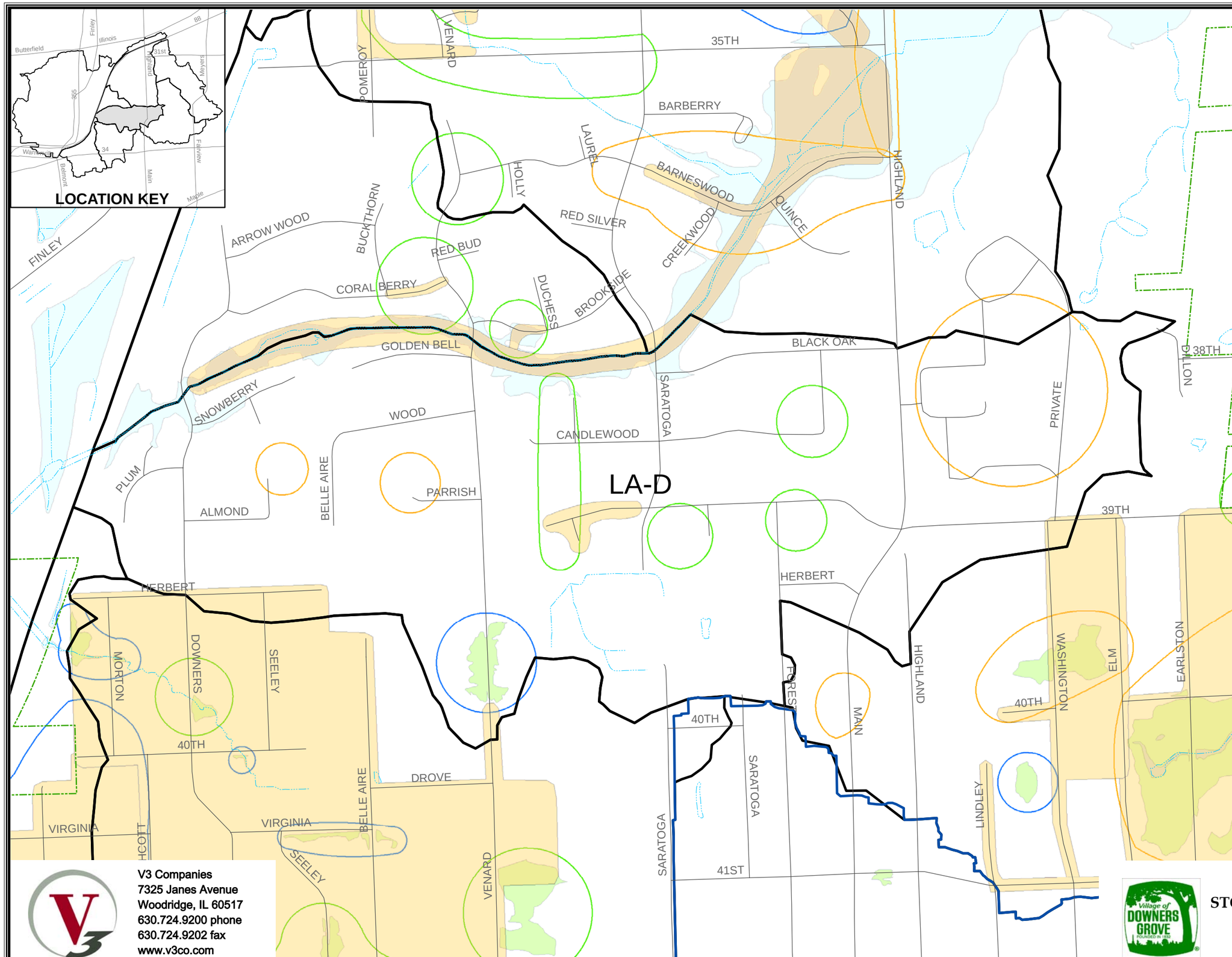
PROBLEMS:
- Depressional Areas
- Restrictive Storm Sewers

ALTERNATIVES:
- Increase conveyance of unnamed tributary
- New storm sewer with road reconstruction
- Provide additional storage

TOTAL COST:
$14,210,000 - $18,750,000
Depending on storage location.

Note: See exhibits in Appendix A of Chapter 2 for additional details.

STORMWATER INFRASTRUCTURE IMPROVEMENT PLAN
LACEY CREEK WATERSHED



SUBWATERSHED LA-D PROBLEMS AND ALTERNATIVES

PROBLEMS:
- Depressional Areas
- Restrictive Storm Sewers
- Private Property Grading Issues
- Debris/Maintenance Issues

ALTERNATIVES:
- Maintenance
- "Adopt an Inlet" or similar program
- Replace Type 1 inlets
- Add inlets to parkway
- Re-establish private drain connections

TOTAL COST:
$250,000

Note: See exhibits in Appendix A of Chapter 2 for additional details.

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Legend

- Lacey Creek Watershed Boundary
- Village Boundary
- Subwatershed Boundary
- 100-Year Floodplain
- Depressional Storage Area
- Proposed Alternatives

Problem Areas

- Critical
- Chronic
- Nuisance

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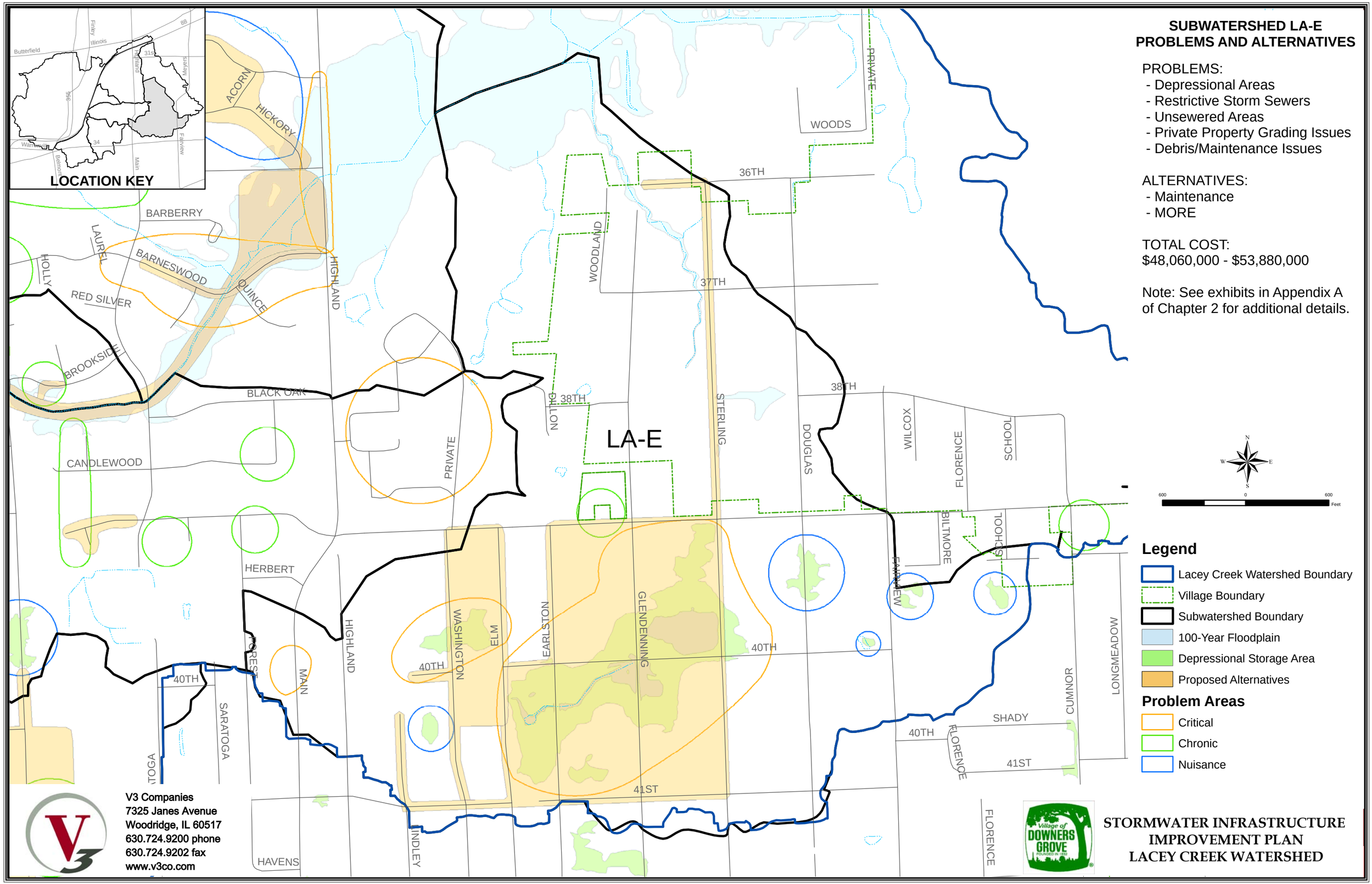
Village of DOWNERS GROVE

STORMWATER INFRASTRUCTURE IMPROVEMENT PLAN
LACEY CREEK WATERSHED



SUBWATERSHED LA-E
PROBLEMS AND ALTERNATIVES

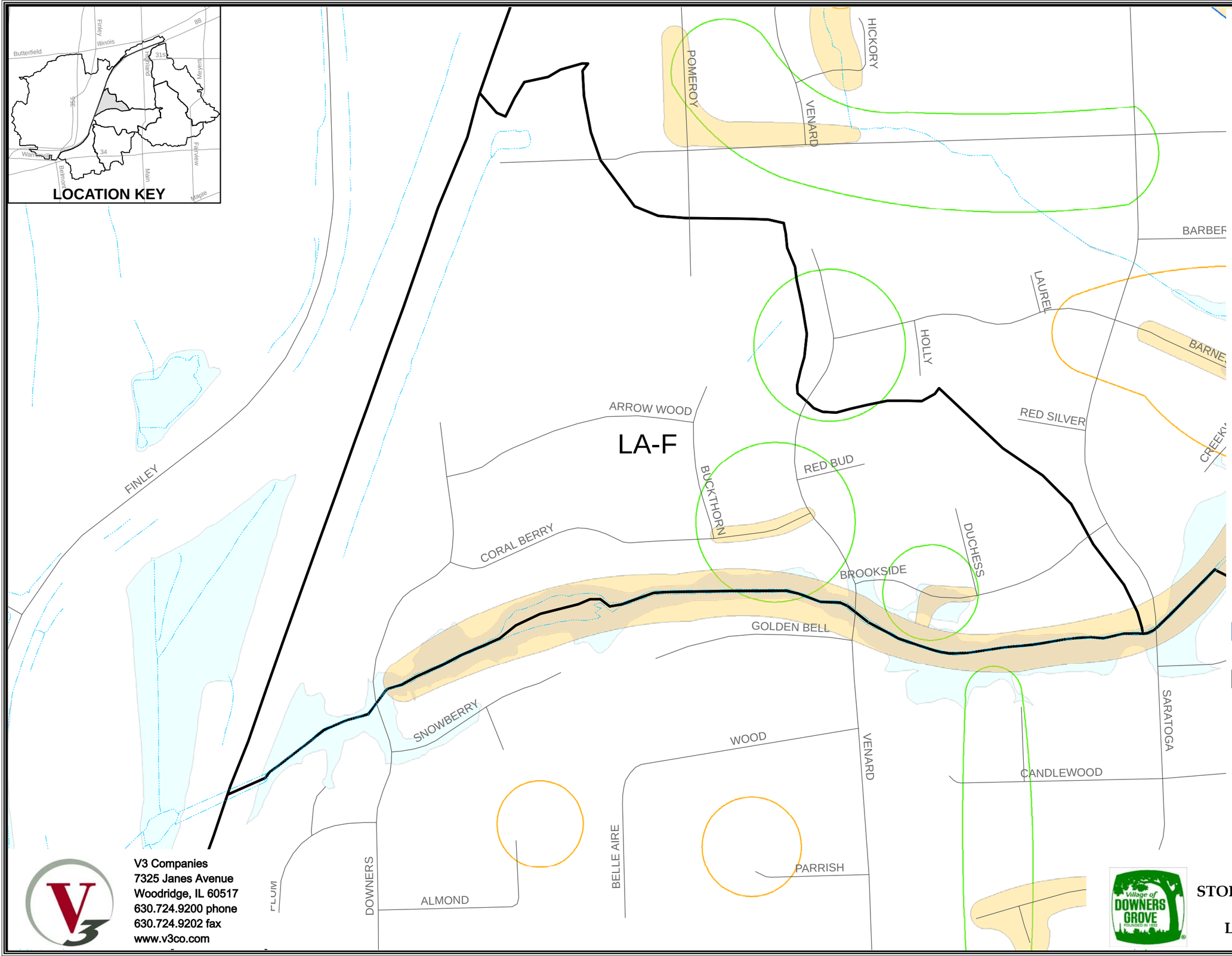
PROBLEMS:
- Depressional Areas
- Restrictive Storm Sewers
- Unsewered Areas
- Private Property Grading Issues
- Debris/Maintenance Issues

ALTERNATIVES:
- Maintenance
- MORE

TOTAL COST:
$48,060,000 - $53,880,000

Note: See exhibits in Appendix A of Chapter 2 for additional details.

STORMWATER INFRASTRUCTURE IMPROVEMENT PLAN
LACEY CREEK WATERSHED



SUBWATERSHED LA-F PROBLEMS AND ALTERNATIVES

PROBLEMS:
- Debris/Maintenance Issues
- Poor Local Drainage

ALTERNATIVES:
- Maintenance
- "Adopt an Inlet" or similar program
- Replace Type 1 inlets
- Install backflow preventer
- Re-establish curb and gutter capacity

TOTAL COST:
$280,000

Note: See exhibits in Appendix A of Chapter 2 for additional details.

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Legend

- Lacey Creek Watershed Boundary
- Village Boundary
- Subwatershed Boundary
- 100-Year Floodplain
- Depressional Storage Area
- Proposed Alternatives

Problem Areas

- Critical
- Chronic
- Nuisance

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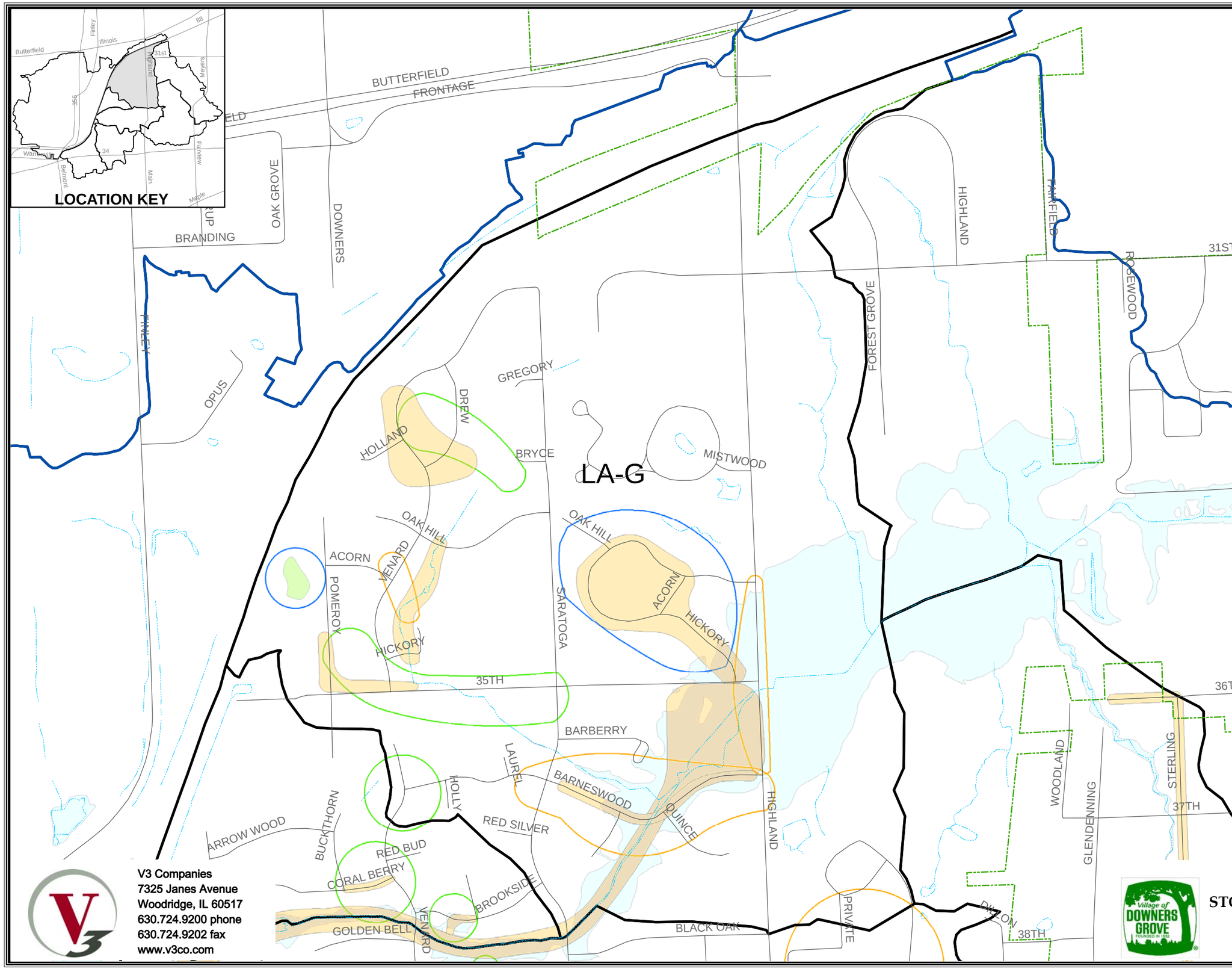
LACEY CREEK WATERSHED



SUBWATERSHED LA-G PROBLEMS AND ALTERNATIVES

PROBLEMS:
- Depressional Areas
- Restrictive Storm Sewers
- Private Property Grading Issues
- Debris/Maintenance Issues
- Unsewered Areas
- Floodplain, Restrictive Culverts, Insufficient Channel Capacity

ALTERNATIVES:
- Maintenance
- "Adopt an Inlet" or similar program
- Replace Type 1 inlets
- Increase storm sewer conveyance
- New storm sewer with road reconstruction
- Re-grade streambanks to increase conveyance and storage
- Raise road profiles
- Replace constrictive bridge structures

TOTAL COST:
$22,320,000 - $37,810,000

Note:
1. See exhibits in Appendix A of Chapter 2 for additional details.
2. Cost estimate range based on alternatives in detention and voluntary buyout program participation.

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Legend

- Lacey Creek Watershed Boundary
- Village Boundary
- Subwatershed Boundary
- 100-Year Floodplain
- Depressional Storage Area
- Proposed Alternatives

Problem Areas

- Critical
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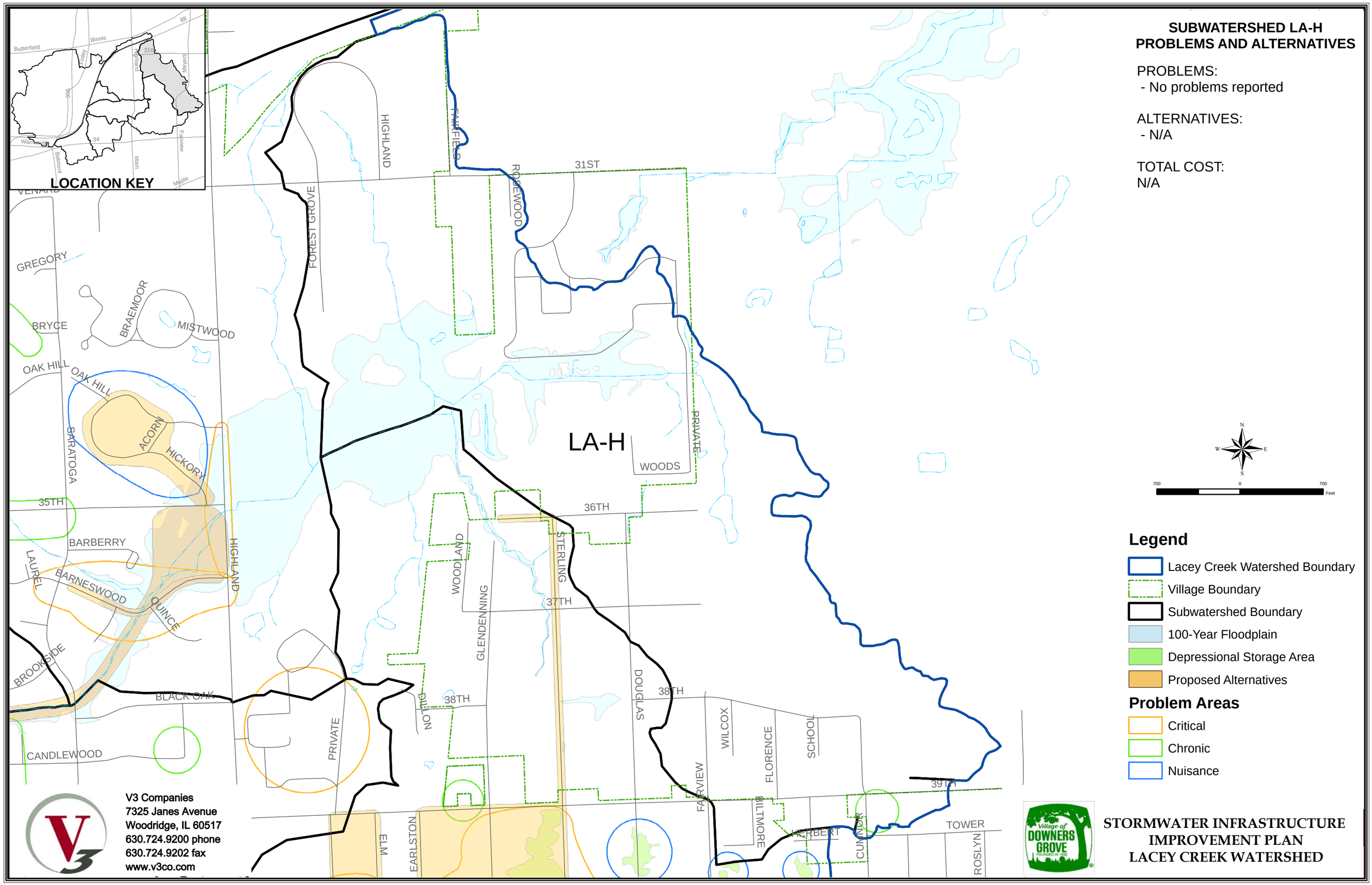

SUBWATERSHED LA-H
PROBLEMS AND ALTERNATIVES

PROBLEMS:
- No problems reported

ALTERNATIVES:
- N/A

TOTAL COST:
N/A

Legend

- Lacey Creek Watershed Boundary
- Village Boundary
- Subwatershed Boundary
- 100-Year Floodplain
- Depressional Storage Area
- Proposed Alternatives

Problem Areas

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LACEY CREEK WATERSHED

6.0 Additional Issues

6.1 Easements/Easement Priority List

Easements that may be required to implement the recommended alternatives are identified in Table 5.1 of Chapter 2.

6.2 Typical Roadway Cross Section for Future Projects (by Clark Dietz)

A toolbox of possible roadway cross sections is presented by Chapter 1 of this report. For cost estimating and stormwater detention storage computation purposes, the Village's standard roadway cross section with curb and gutter was assumed for each project. However, the actual roadway cross section to be implemented at each project location should be selected based on a review of existing neighborhood character, Village needs, resident preferences, existing geometric or right-of-way limitations, and other such factors.

6.3 Water Quality Issues

DuPage County ("County") is in the process of revising the DuPage County Stormwater and Flood Plain Ordinance ("Ordinance") to require best management practices (BMPs) to improve water quality on new development projects. These Ordinance requirements would also apply to new projects constructed in the Village of Downers Grove. In conjunction with the revised Ordinance language, the County is also developing a Manual which will contain a toolbox of water quality best management practices for consideration on various types of projects. The BMP Manual is fairly comprehensive and includes best management practices for a variety of applications. As such, this report does not suggest specific BMPs for each proposed project. It is recommended that the BMP Manual and revised Ordinance language be considered when designing and constructing the stormwater improvement projects. The Engineer's Estimated Opinion of Probable Construction Cost for each project alternative includes a 10% contingency for water quality BMPs.