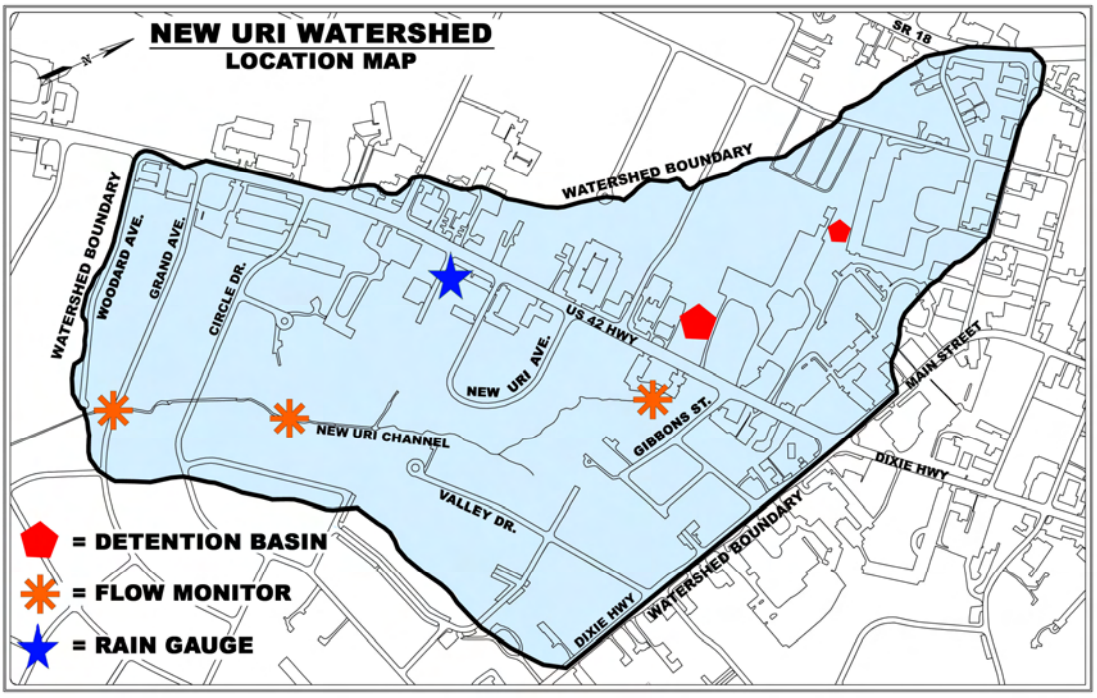
EXECUTIVE SUMMARY

Introduction

In 2006, the City of Florence directed Viox & Viox to conduct a study of the flooding and drainage issues in the New Uri Watershed. The study was conducted over an eight-month period and included four main phases: data collection, data analysis, preparation of findings, and recommendations. Viox & Viox prepared a detailed final report as well as this Executive Summary.

The New Uri Watershed consists of approximately 151.7 acres in the City of Florence, Boone County, Kentucky. The watershed is bounded to the east by U.S. 25 and Main Street, to the north by Kentucky SR 18 at Oblique Street, and to the south by Woodland Avenue. Residential and commercial development in this watershed began in approximately 1925 and continues today; however, very little undeveloped land remains in this area.



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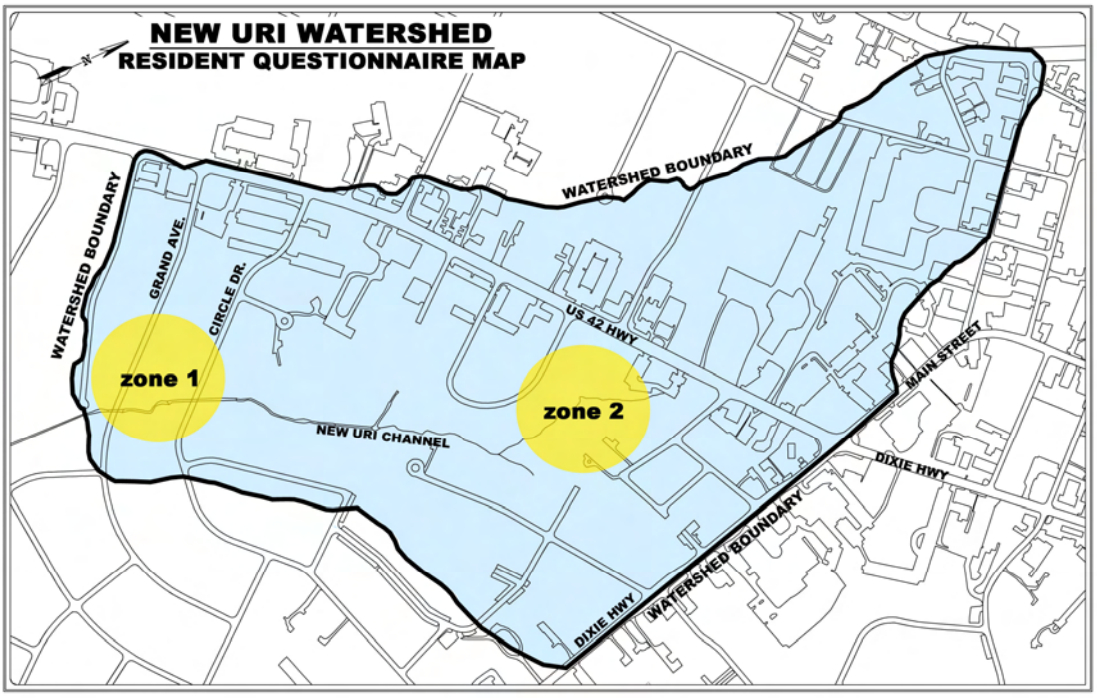
Data Collection

In order to provide the most accurate analysis possible, data was obtained through various sources. Viox & Viox, through its sub-consultant XCG Consultants, Inc., located and monitored three flow measuring devices and one rain gauge for approximately 3 months.

The analysis was also aided by residents' comments. In June 2006, Viox & Viox sent a survey to 41 residents in the New Uri area; 18 were returned with comments. Also, several personal and telephone interviews were conducted to obtain additional information. Furthermore, this study had the benefit of previous residents' surveys conducted by the Florence Water and Sewer Commission. The majority of the resident comments can be grouped into two areas. First, residents located in the area of Grand Avenue and Circle Drive (Zone 1) and second, residents located in the New Uri Avenue and Gibbons Street area (Zone 2).



For further information, see Figure 4 of full "New Uri Watershed Report"

Comments received from the residents were reasonably consistent. During the spring and early summer, the creek exceeds its banks on 2-3 occasions. These instances usually occur in conjunction with short intense storms as opposed to longer slower ones and the water recedes within an hour or two. Several residents also provided pictures or testimony with regard to property damage. The damage ranged from rutting in yards and damage to trees to basement flooding.

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The residents were questioned as to what type of solutions they preferred. The Zone 1 residents generally did not want to lose trees and therefore opposed a piping solution. The residents in Zone 2 suggested a wide range of options. Many preferred a pipe or channel liner, some preferred a "green" solution to protect their trees and other vegetation, while others stated that the area should be left alone.

Data Analysis

For the purpose of design and analysis, storms are typically classified by their likelihood of occurrence (one every X number of years). During the monitoring period, there were several storms of varying intensity. The most significant storm occurred on May 25, 2006. After careful analysis, it was determined that this storm roughly approximated a 1-year storm (likely to happen once every year). Storm water piping is generally designed to convey a 10-year storm, and storm water detention facilities are usually designed to accommodate storms ranging from 2 to 100-years.

The analysis was performed using the EPA's Storm Water Management Model software (SWMM). This computer model allowed the hydrologic data from the May 25th storm to be projected forward to simulate the larger design storms. For comparison purposes, partial simulations were also performed using Haestad PondPack Version 10.0. A full narrative of the analysis is available in the "Data Analysis" section of the full report.

Grand Avenue Flow Monitor Location

In general, the residents' comments agreed with the analysis of the data which indicated that the flooding was the result of short intense storms, and the condition was short lived. Of the three residents that experienced basement flooding, two were not directly linked to the main New Uri channel and will be addressed in "Recommendation 1" in this document.

The remaining resident has a basement walkout in close proximity to the channel and below road grade. Thus, there is no emergency storm water overflow route in the event that the road culvert becomes clogged or overwhelmed during a large rain event.

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Bank Erosion on New Uri Creek Channel

Many of the residents' comments were concerned with erosion of the channel and surrounding areas. While erosion is a difficult phenomenon to quantify, development in the drainage basin has certainly increased flow rates in the channel and thus contributed to additional erosion. Another contributing factor in erosion is the quality and amount of vegetation on stream banks. Through the questionnaires and visual inspections, it is apparent that many residents have mowed or cleared their yards up to and including the stream banks. This lack of vegetation will result in significant erosion even under natural (undeveloped) flows.

Recommendations and Conclusions

Upon the conclusion of the analysis, Viox & Viox prepared six recommendations designed to improve the conditions of the New Uri Watershed. Furthermore, the recommendations have been grouped based on priority and ease of implementation. The recommendations are as follows:

Recommendation 1

- Fix various off-channel drainage issues that were identified through resident interviews.

These "off channel drainage issues" are the contributing factor for the basement flooding at 101 Valley Drive and 73 Circle Drive. These issues have been brought to the attention of the City of Florence Public Services Department and further investigation is underway. These improvements may require design and construction of additional storm sewer. The completion of this recommendation does not affect the implementation of the remaining recommendations.

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Recommendation 2

- Adjustment to an existing City-owned detention facility located adjacent to U.S. 42.

Florence Elementary Detention Basin

This recommendation represents the only feasible option the City has available to actually reduce the peak storm water flow in the New Uri Watershed. This modification can be completed at a relatively minimal cost. The modification should be similar to the previously installed throttling gate at the Florence Elementary detention basin. Upon completion of this recommendation, the subsequent recommendations can be pursued.

Recommendation 3

- Additional channel protection to prevent soil losses in selected locations.

This recommendation is dependent upon easement dedication from residents. The main areas of concern are the areas at the outlet from the various culverts. These areas experience significantly high flow velocities due to the proximity of the storm sewer pipes. The completion of this recommendation does not affect the implementation of the remaining recommendations.

Outlet behind Doctor's office at U.S. 42

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Recommendations 4 & 5

- Construction of a series of retaining structures and channel lining between Circle Drive and Grand Avenue.

- Improve inlet conditions and improved hydraulics on Woodland Avenue, by construction of a stabilized channel bottom between Grand Avenue and Woodland Avenue.

S-turn between Circle Drive and Grand Avenue

These recommendations are both designed to alleviate erosion and storm water back up at what has come to be known as the S-turn. This area of the channel was rerouted as part of the residential construction of Circle Drive and Grand Avenue. This reroute has created an unnaturally shaped S-turn that experiences heavy erosion and disrupts flow. Permits from regulatory agencies will be required for both Recommendations 4 and 5. Upon completion of these recommendations, the final recommendation can be pursued.

Recommendation 6

- Replacement of an existing culvert at the future Niblack Park site with an open bottom arch type structure.

This final recommendation will reduce storm water back up experienced by the residents on New Uri Avenue and Valley Drive (Zone 2). This structure will require careful design such that small storms (up to 10-year) can be passed quickly while larger storms can be controlled. The careful design and timing of this replacement are critical so as not to negatively affect downstream areas. The replacement of

Outlet of Niblack Park Culvert

this culvert also has a significant environmental benefit, since the natural creek bottom would be restored.

All proposed solutions will require detailed engineering design and construction. Before any stream improvements are implemented, individual property owners must grant easements. Any costs associated with easement acquisition will become part of the overall expense of the improvement.

The implementation of these recommendations will improve the functionality of the watershed, particularly during the most common smaller storm events. However, it is unrealistic to expect to eliminate all problems in a watershed that is densely populated and was largely developed before the advent of storm water control regulations.

Detailed explanations of all aspects of this study are available in the full “New Uri Watershed Study.