

PLANNING REPORT

West Blue Lick Road Drainage Planning Study Shepherdsville, Kentucky

Prepared for:



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Date:

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Groundbreaking by Design.

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Attachments:

- WRIS Project Profile
- PAS Documentation
- USACE Survey
- Environmental Analysis Report
- Preliminary Plans/Profiles
- Detailed Planning Budget Cost Estimates
- Drainage Areas Exhibit
- Hydraflow Storm Sewer Report

Attachments to this report include a digital CD containing the following information:

- Digital Survey Files (ASCII & HEC files of the cross sections, Microstation and AutoCAD files of the base map)
- PDF of the Planning Report
- PDF of the Public Assistance to the States (PAS) Executed Agreement
- PDF of the Preliminary Plan and Profiles
- PDF of the Environmental Field Survey of the Effects Determination Report
- PDF of the Drainage Area Exhibit
- PDF of the Public Meeting Project Information Handout
- PDF of the Detailed Planning Budget Cost Estimates
- PDF of the Hydraflow Storm Sewer Report

1.0 Executive Summary

In an effort to clearly define alternatives to improve drainage along West Blue Lick Road and Highway 44 in Shepherdsville and potential impacts, the City of Shepherdsville (City), Qk4 and the United States Army Corps of Engineers, Louisville District (USACE) performed the following tasks:

- Topographic survey of critical intersections and cross sections. (USACE)
- Development of potential drainage alternatives. (Qk4)
- Environmental analysis of potential impacts. (USACE)
- Preliminary sizing, costing and layout for alternate solutions. (Qk4)
- Evaluation of potential permitting needs. (USACE/Qk4)
- Creation of a report detailing all findings. (USACE/Qk4)

1.1 Summary of Alignment Discussion

The four alternatives reviewed in this study all meet the core goals of improving drainage within the project corridor and improving water quality. Each alternative provides different levels of service with regard to drainage and water quality improvement. The alternatives were evaluated based on potential impacts, costs and benefits of the improvements in an effort to allow the City to make an informed decision on the best course of action.

The study has identified two primary alignment variations that are options for the project. Variations that are discussed involved the location of the outfall, and the impact on moving existing sanitary sewers out of the drainage ditches, and thereby reducing inflow during rain events. The City of Shepherdsville Park connects KY Highway 44 to the Salt River and is in close proximity to the public owned school properties that connect KY Highway 44 to Blue Lick Road. Utilization of these properties for the storm sewer interceptor is the most logical element to the project and is common to all project alternatives.

1.2 Cost Summary

Alternate	Cost
1 – River Outfall/No Sewer Relocation	\$3,650,075
2 – River Outfall with Sewer Relocation	\$4,397,250
3 – Wetlands Outfall / No Sewer Relocation	\$3,595,020
4 – Wetlands Outfall with Sewer Relocation	\$4,342,195

As can be seen above, Alternative 3 provides the lowest projected costs and sanitary sewer relocation costs will be similar for both Alternates 2 and 4. Alternative 4 provides the most environmental benefits for the project and Alternatives 1 and 2 allow for a higher level of service with the drainage improvements.

1.3 Potential Next Steps

Construction of the storm water interceptor can provide an outlet for areas that hold water adjacent to KY 44 and West Blue Lick Road. Currently, the City does not have any additional funds budgeted for the design and construction of any portion of these improvements. For this reason, the City may desire to pursue funding from all available sources. If it is determined funding outside of the City's normal budget will be available, the City could create a phasing plan to identify a timeline and budgeting that is attainable for the potential improvements.

While each alternative could effectively improve drainage and water quality, Alternative 4, a storm sewer interceptor with a wetlands outfall and sewer relocations, and a total estimated project cost of \$4,342,195 appears to be the most environmentally beneficial. And furthermore, while Alternative 3 provides the least estimated project cost, each alternative meets the goals of improved drainage and water quality.

Given the significant funding necessary to implement any alternative in this plan, it will likely take the City significant time to secure outside funding available. If the project were to secure funding and to proceed, a potential project schedule is shown below:

- | | | |
|----|-----------------------------------------------|----------------------------|
| 1. | Pursue funding sources | January 2015 |
| 2. | Start Plan Finalization of Construction Plans | June 2016 |
| 3. | Initiation of acquisitions | January 2017 |
| 4. | Bidding and Award | January 2018 |
| 5. | Construction | March 2018 thru March 2019 |

The City should meet with Kentuckiana Planning & Development Agency (KIPDA), Kentucky Rural Water Association (KRWA), Kentucky Stormwater Association (KSA), the Bullitt County Economic Development Cabinet, Community Development Block Grant Program (CDBG) and Kentucky Infrastructure Authority (KIA) to review potential funding sources.

This planning study and the alternatives presented herein shall not be construed as the only available options for improvement to drainage or water quality in the area. These alternatives were developed and evaluated and appeared to be the optimal methods for achieving the project goals based on the information available at the time of the planning study. Additional detailed survey, design, review and permitting will be required in order to move the project to construction and minor changes to the alignment are likely during the design process. Additional information in the future may provide opportunities for other alternatives to be evaluated.

2.0 Background

In 2007, the City of Shepherdsville identified a potential corridor for installing a new storm water outfall within the City limits that would potentially relieve some of the localized flooding and standing water within the community. The outfall involved the creation of a primary storm water interceptor starting in the area of West Blue Lick Road and the Blue Lick Elementary School then flowing south towards KY 44 and the Shepherdsville City Park with an outfall at the Salt River within the limits of the City Park. The project area can be seen below in Exhibit 1.

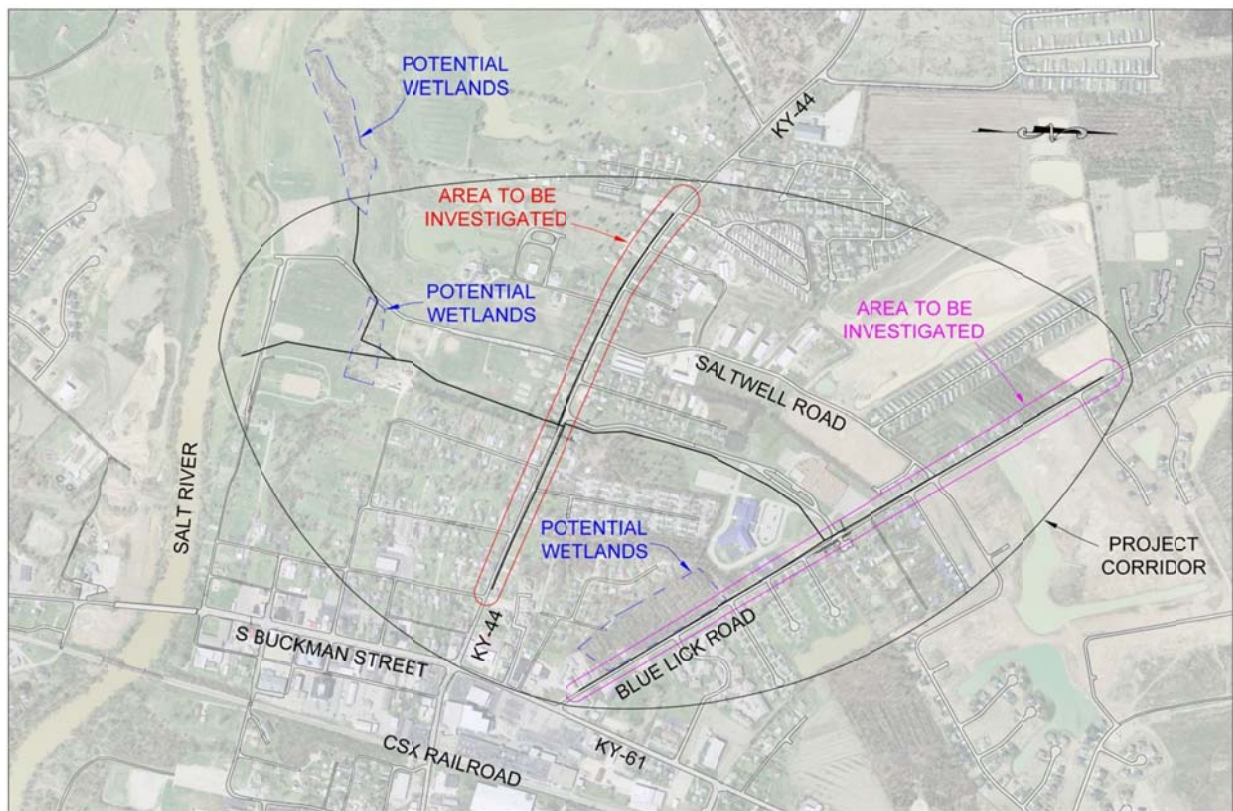


Exhibit 1 – Project Area

Since the initial identification and discussions of the project, the City has attempted to secure funding and support for a study to determine the effectiveness of alternatives for improvements in the area.

2.1 Purpose

The purpose of this planning study is to develop available alternatives that effectively improve drainage, reduce stagnant water in the corridor and improve water quality associated with recharging of existing wetlands. In order to complete that effort, identification of any project constraints, cost factors or environmental features that impact the feasibility of the project must be completed.

The study has identified alignment variations that are options for the project. Variations that were reviewed involved the location of the outfall, and the impact on moving existing sanitary sewers out of the drainage ditches, and thereby reducing inflow during rain events. As a result of the study, the City will be able to make an informed decision on whether and how to move forward with detailed design and project budgeting. The study should provide an understanding of the financial needs and a potential timeline for the remainder of the project.

2.2 Scope

In order to complete the “Planning Level” Study of the project the following scope items were identified and distributed as shown. The study agreement between the City and the USACE is included as Appendix “B”. The study agreement includes a detailed scope along with the lump sum estimated fees for each scope item.

Scope Item	Responsible Party
Existing Data Review and Meeting	Qk4
Coordination with Kentucky Transportation Cabinet	Qk4
Field survey for topography	USACE
Documentation of habitats and resources	USACE
Preliminary Drainage Calculations	Qk4
Subsurface Utility locations	USACE
Wetland Identification	USACE
Preliminary Plan Production	Qk4
Alternative Cost Analysis	Qk4
Public Meeting	Qk4
Incorporation of USACE findings in final report	Qk4
Clarification of required Permits	Qk4
Coordination and Issuance of Final Report	Qk4
Review of Preliminary Report	USACE

2.3 Current Project Funding

In 2010, the City created a project profile for application into and use in the KIA Water Resource Information System (WRIS) in hopes of obtaining funding through the State of Kentucky or the KIA. In addition to creation of the project profile, the City continued to identify potential funding sources for the project.

In the fall of 2013, the US Army Corps of Engineers and the City of Shepherdsville identified this planning study as a project that could potentially utilize Planning Assistance to the States (PAS) funding (PAS information sheet has been included as Appendix “A” of this report).

As stated in the PAS fact sheet in the Appendix, funding requires a 50/50 cost share of planning expenditures. In this case, the City is spending \$50,000 via lump sum contract with Qk4 and the

USACE is spending \$50,000 on field surveying and environmental project area reviews. At this time, the City has not allocated additional funds for future detailed design or construction.

3.0 USACE Survey and Environmental Analysis

3.1 Survey

As a part of the planning team, the USACE provided preliminary surveying of the project corridor and environmental impact analysis of the project.

The scope of the preliminary survey provided by the USACE included the following:

1. General topography and surface utility and structure locations for areas within an approximate square of 300' by 300' around the intersections of Bullitt Lick Middle School Road with Highway 44 and Blue Lick Road
2. Cross Sections with an approximate width of 50' for the project corridor and are located as follows:
 - a. 12 cross sections evenly spaced along Highway 44
 - b. 14 cross sections evenly spaced along West Blue Lick Road
 - c. 9 cross sections evenly spaced along the main collector storm line
 - d. 3 cross sections evenly spaced along the alternate outfall alignment

The detailed survey with cross sections was utilized to create preliminary layouts and profiles of the alternative solutions and to determine the constructability of the alternatives. The preliminary survey and cross sections can be found attached to this report.

3.2 Environmental Analysis

The environmental analysis included the following scope:

1. Screening of baseline survey information
 - a. Biological and Ecological Survey
 - b. Threatened and Endangered Species Evaluation
 - c. Cultural and Historical Evaluation
 - d. Hazardous Materials Evaluation
2. Wetland Identification
 - a. This survey followed the 1987 manual for Wetland Delineation and applicable *Eastern Mountains and Piedmont Region (Ver. 2.0 –April 2012) LRR-N Regional Supplement* using the three (3) criteria: vegetation, hydrology, and soil characteristics. The survey documented and delineated any suspect areas that exhibit wetland characteristics likely to undergo impact with installation of the proposed stormwater collection and discharge system. The results of this survey are for informational purposes and do not constitute a preliminary or a formal Jurisdictional Wetland Determination.

3.3 Survey and Environmental Analysis Findings

The conclusions provided here are taken from the USACE Environmental Field Study, which can be found attached to this report and are made as best recommendations based on the previous field survey from June 20th, 2014 and subsequent literature researches supporting field observations:

1. The City of Shepherdsville, KY and/or its project contractor will have to file a Notice of Intent application for a storm water discharge permit with the Kentucky Department of Environmental Protection. Presuming the city has a National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer Systems (MS4) permit, a subsequent permit modification will have to be filed to address the installation of the storm water collection system and point-source discharge into the Salt River.
2. Whatever collection system route is decided upon there will have to be a formal delineation to determine the impact upon the effected wetlands. The formal processes to the delineation will encompass submittal of findings with the appropriate Kentucky regulatory agencies. (e.g. 401 Water Quality Certification)
3. An on-site environmental survey must be conducted for the woodland area along West Blue Lick Rd. just west of KY 61 to determine implications affecting 8.0 acres of potential isolated wooded lowland and subsequent impacts incurred via with the installation of a storm water collection system.
4. The project will require consultation and likely permit submittals with the Kentucky Department of Environmental Protection, Division of Water (Section 401 – Water Quality Certification); US Army Corps of Engineers – Louisville District – Regulatory Branch (Section 404) encompassing wetland encroachment where applicable for this report’s two cited wetland areas (Item 3. woodland potentially included). Wetland mitigation (compensation) may be required as part of the process within the permit application.
5. Construction within a designated floodplain for the point source discharge structure will require an application for permit to construct from the KY Department of Environmental Protection – Water Division – Floodplain Management Section.
6. Section 10 Clean Rivers and Harbors Notification with the US Army Corps of Engineers – Louisville District – Preconstruction Notice (PCN) filing with intent to discharge into a designated U.S. navigable waterway; e.g. creating a point source discharge into the Salt River that is considered a Section 10 waterway.
7. Pending decision of what piping route will be decided upon either the southern route or the western route through the city park it will be imperative that easement rights be negotiated between the effected private land owners and the city of Shepherdsville.

8. An archaeological survey of the effect areas is recommended involving a systematic shovel testing. A subsequent formal report of findings would need to be prepared for coordination with the Kentucky State Historic Preservation Officer and other concerned parties.
9. Consultation with the United States Fish & Wildlife Service (USFWS), Kentucky Division of Natural Resources (KYDNR), & Kentucky Nature Preservation Commission regarding current concerns with threatened & endangered species.
10. Due to the area's potential bat (*Myotis*) presence within the Shepherdsville area, tree clearing or removal of trees ≥ 5 inches Diameter Breast Height (DBH) shall only occur from October 15 to March 31.

4.0 Alternative Analysis

As part of the scope of services performed by Qk4, several alternatives for improvements were developed and evaluated. The alternatives all had the same core goals of improving drainage within the project corridor and improving water quality, however each alternative provides differing levels of improvement of the water quality and drainage. Each alternative was evaluated based on potential impacts, costs and benefit of the improvements in an effort to allow the City to make the final determination of which alternative may provide the greatest benefit to the City with an acceptable cost and negative impacts.

The project area is mostly developed with residential properties and has very little relief or vertical variation in any direction. The relative flatness of the project area makes it difficult for an improvement to follow any natural above ground drainage pattern and will require potential solutions to be deeper and more costly. This challenge also provides an opportunity for several alternatives, since there is no obvious path for the storm sewer improvements by following above ground gradation, more flexibility is provided in selection of the location of the improvements.

All project alternatives will require some improvements along KY Highway 44 and Blue Lick Road to capture the areas of standing water and a storm sewer interceptor line diverting these areas within the state right-of-way to an outfall near or at the Salt River. The areas along KY Highway 44 and Blue Lick Road were evaluated looking at all possible locations within the public right-of-way of these state highways including under existing pavement.

After a detailed review of the project area and discussions with the city on the critical areas, a core or base set of details was developed for the project. These base details are common to each of the various alternatives. Along with these common elements to each alternative, the discharge or outfall location of the storm improvements were evaluated, as well as, alternatives that included sanitary sewer improvements. These various alternatives are discussed in more detail in sections 4.1 to 4.3.

4.1 Alternative Commonalities

The City of Shepherdsville Park connects KY Highway 44 to the Salt River and is in close proximity to the Bullitt County Board of Education properties that connect KY Highway 44 to Blue Lick Road. These large publicly owned properties that extend from the Salt River through the center of the project corridor out to Blue Lick Road provide a spine for the project. Any other method for connecting the project corridor and Blue Lick Road to KY Highway 44 and to the Salt River would require a substantially greater impact to residential and commercial properties with an easily recognizable increase in project costs and timing to acquire numerous easements or difficult construction due to busy roadways. Therefore, utilization of other areas, like KY Highway 61 or residential subdivisions were dismissed early on in the planning period. The area through the schools and park requires the acquisition of a minimal amount of private easements and is already cleared open space. Utilization of these properties for the storm sewer interceptor is the most logical element to the project and is common in all project alternatives and can be seen on the following page in Exhibit 2.

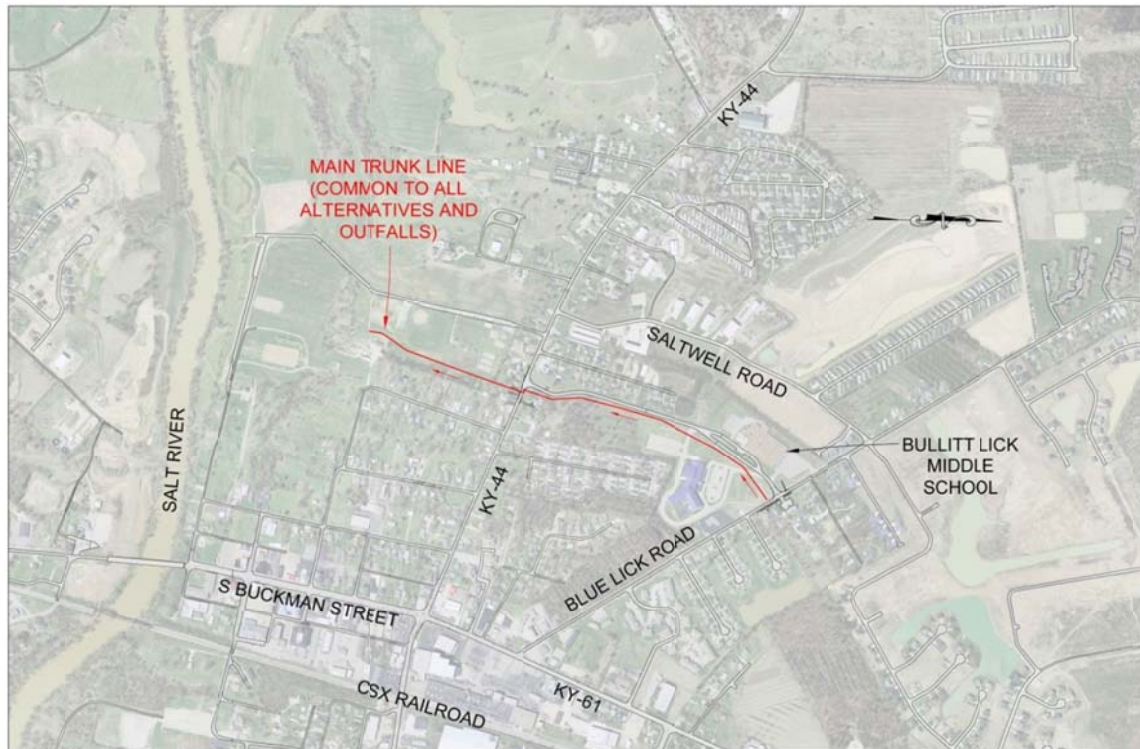


Exhibit 2 – Storm Sewer Interceptor

4.2 Discharge Location Alternatives

The location of the discharge of the storm system or the outfall was evaluated at various locations near the City of Shepherdsville Park. One alternative evaluated is for the outfall to be directly tied in to the Salt River bank. Another alternative is for the outfall to be located within an existing wetland area on the west side of the park near the Salt River. Outfall location alternatives can be seen on the following page in Exhibit 3

Discharging to the Salt River allows for more vertical relief in the storm sewer system since the elevation of the Salt River in this area is at least 10' deeper than the wetland area. See preliminary plans attached to this report for profiles of the alternatives. This allows for the storm system to utilize larger diameter pipes, which will allow the system to convey a larger design storm or capacity. The outfall for the system to the Salt River provided an alternative that was preliminarily designed for the 10 year design storm. However, discharging directly to the Salt River does not provide any water quality benefits for the Salt River and would provide the reduction of stagnant water in corridor as the only environmental benefit.

Discharging to the wetland area would require the storm sewer system to be shallower or utilize smaller diameter pipes and would require larger storm events to back-up into the system prior to the outfall. This outfall would allow for water quality improvements with a recharge of increased flow to the wetlands which would be filtered and utilized in the wetland ecosystem

prior to introduction into the groundwater system and the Salt River. This option would provide a solution considered to be the most “green” of the alternatives for the discharge location.

The costs for the varying alternatives for the discharge locations and plans and profiles of the alternative outfalls can be found attached to this report.

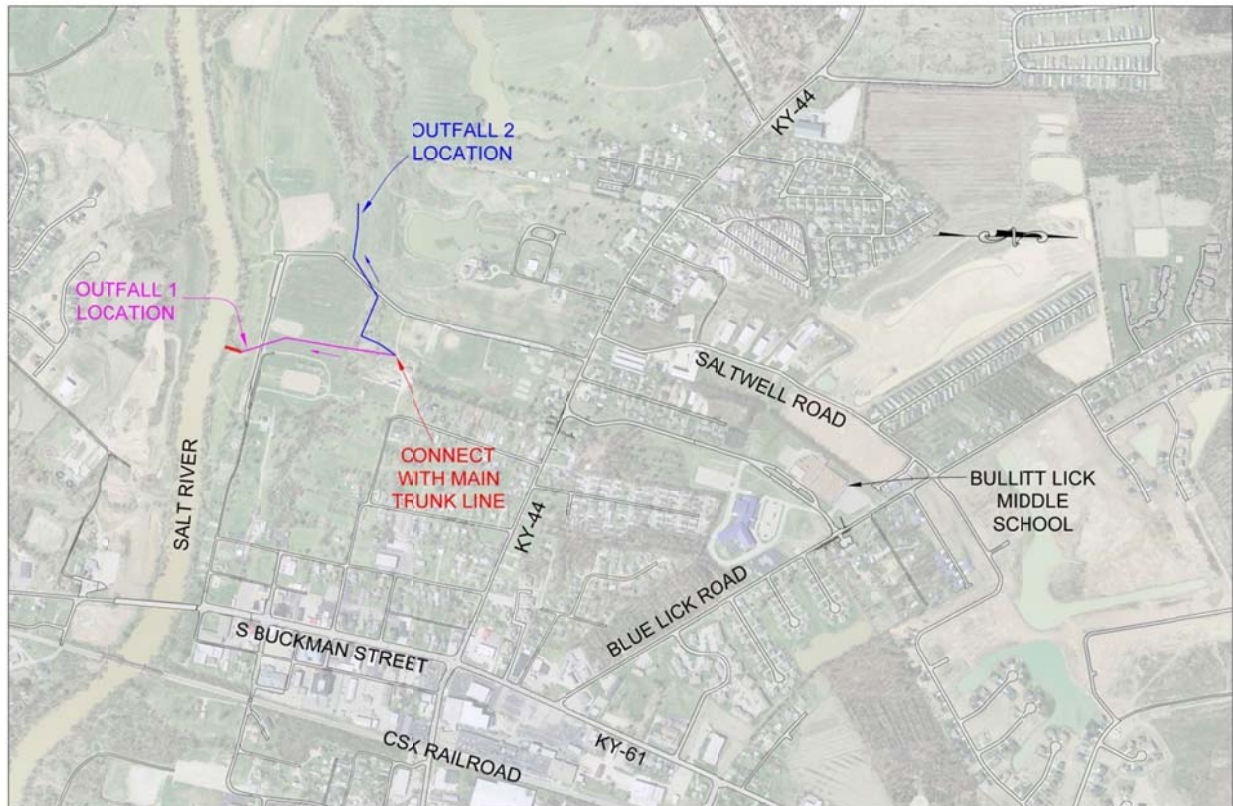


Exhibit 3 – Storm Sewer Interceptor

4.3 Sewer Improvements Alternatives

Along KY Highway 44 and Blue Lick Road there are several areas where the sanitary sewer system is running parallel with the existing roadway. These sewers are located in the roadside ditches along the roadway. There are also water, electric, gas and telephone lines running along the roadways making it difficult for installation of a new utility line. The entire right-of-way for each state highway was evaluated for potential locations of proposed storm improvements.

A sanitary sewer system located within the roadside ditches provides several issues for the city, including an increase in storm runoff being infiltrated into the sanitary sewer system and inflowing into the manholes. This increase in water in the sanitary sewer system depletes capacity of the system during rain events and can cause sanitary sewer overflows which have a negative impact on public health and the environment. This inflow and infiltration also requires additional water that flows to the wastewater treatment plant to be treated which is an added cost to the city. The sanitary manholes that sit above ground in the roadside ditches are also a

potential obstruction to traffic and on several occasions have been damaged by vehicles that have crashed off the roadway.

Due to all of these factors an alternative was developed and evaluated for proposing the storm improvements within the roadside ditches and relocating the sanitary sewer system to areas within the pavement. This would provide sanitary sewer improvements as well as storm sewer improvements. The relocated sanitary sewer would make maintenance easier to perform. The alternatives for the relocation of the sanitary sewer can be found in Exhibit 4, below.

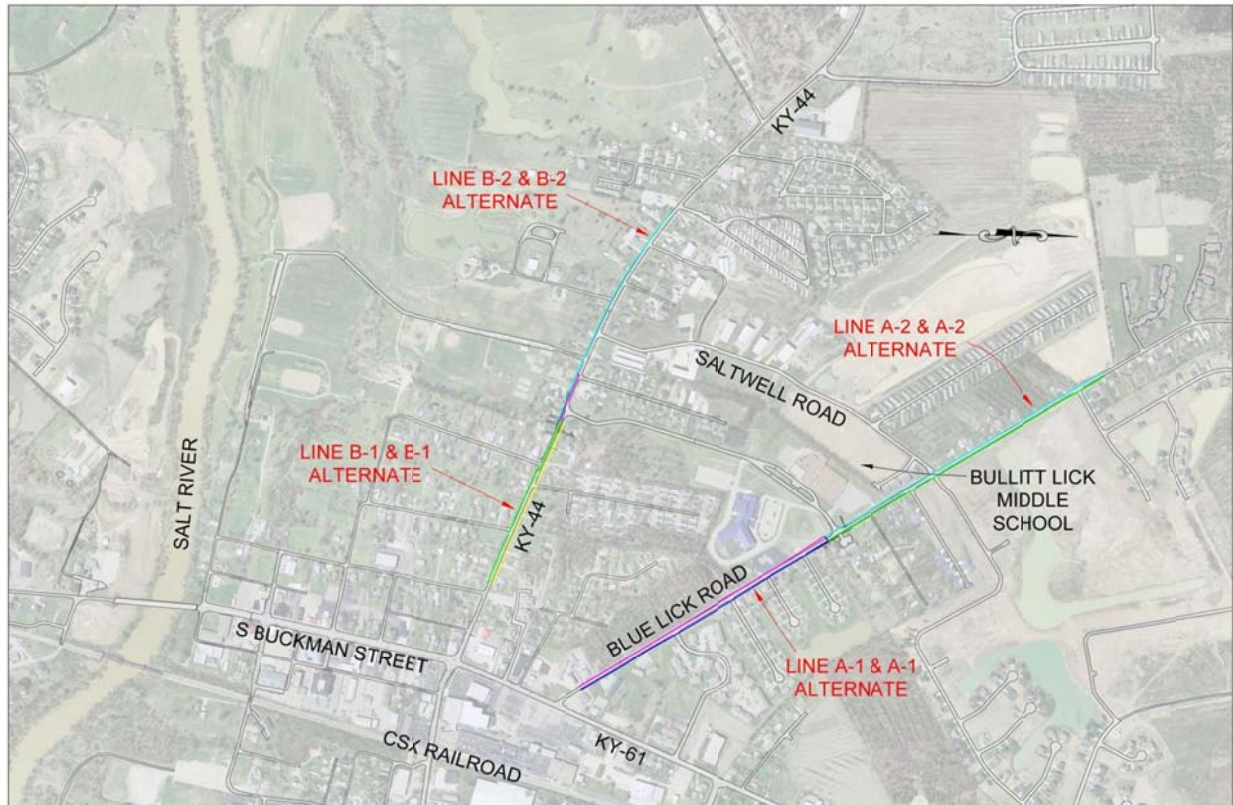


Exhibit 4 – Sewer Alternatives

4.4 Alternative Summary and Cost Comparison

As discussed in sections 4.1 thru 4.3, there is a primary storm sewer interceptor with two outlet options, and an option to improve the sewers with the storm sewer construction. The following is a summary of each of those alternates, the resultant cost, benefits, and challenges for each option.

Alternate 1 – Direct River outfall, storm sewer interceptor with no sewer relocation

Estimated Cost: \$3,650,075

Benefits: A direct outfall to the Salt River allows for the most flexibility in the depth and sizing of the storm water interceptor. As the project moves forward, utilities crossings and design depth requirements will be more exactly identified. These design constraints may require an adjustment to the design depth of the proposed outfall; this alternative can easily accommodate those types of changes during design.

Challenges: Additional storm sewer interceptor length will be required for this alignment, thereby increasing project cost. In addition to the added length, this alignment requires the acquisition of an additional property or at a minimum a significantly large easement across the same private property.

Alternate 2 – Direct River outfall, storm sewer interceptor with sewer relocation

Estimated Cost: \$4,397,250

Benefits: Same as Alternate 1 with the added benefit of moving the sanitary sewers out of the way of the proposed storm sewer and reducing the risk for inflow into the sewers and improving sanitary sewer operation and maintenance.

Challenges: In order to move the sewers, the cost of the work will be added to the project and the sewers will likely have to be constructed in a newly acquired easement or within the pavement of KY 44 or Blue Lick Road. Acquisitions will be costly, and construction in the roadway would require full width repaving and additional disturbance and duration of disturbance to KY 44 and West Blue Lick Road.

Alternate 3 – Wetlands outfall, storm sewer interceptor with no sewer relocation

Estimated Cost: \$3,595,020

Benefits: This option utilizes the existing Wetlands on City property as an outfall for the storm sewer interceptor. This option improves water quality with the discharge to the wetlands where natural filtration of silt and pollutants can occur. It also provides a better opportunity for recharge of the wetlands and maintenance of the water levels necessary to sustain the wetland ecosystem.

This option will also require a shorter length of storm sewer, creating cost savings for this alternate.

Challenges: The wetlands / lake area that would receive the storm water interceptor flow is at a higher elevation than the Salt River outfall and will therefore require a more difficult vertical design than Alternate 1. Definition of design constraints during the detail design phase will be critical for the success of this option.

Alternate 4 – Wetlands outfall, storm sewer interceptor with sewer relocation

Estimated Cost: \$4,342,195

Benefits: This option provides the City the greatest environmental benefit for improved water quality of the storm discharge by sending the discharge to the wetlands where natural filtration of silt and pollutants can occur. This option has the added benefit of moving the sanitary sewers out of the way of the proposed storm sewer and reducing the risk for inflow into the sewers.

This option will also require a shorter length of storm sewer, creating cost savings for this alternate.

Challenges: In order to move the sewers, the cost of the work will be added to the project and the sewers will likely have to be constructed in a newly acquired easement or within the pavement of KY 44 or Blue Lick Road. Acquisitions will be costly, and construction in the roadway would require full width repaving.

Alternate	Cost
1 – River Outfall/No Sewer Relocation	\$3,650,075
2 – River Outfall with Sewer Relocation	\$4,397,250
3 – Wetlands Outfall / No Sewer Relocation	\$3,595,020
4 – Wetlands Outfall with Sewer Relocation	\$4,342,195

As can be seen above, Alternative 3 provides the lowest projected costs and sanitary sewer relocation costs will be similar for both Alternates 2 and 4. Alternative 4 provides the most environmental benefits for the project and Alternatives 1 and 2 allow for a higher level of service with the drainage improvements.

5.0 Permitting/Approval/Acquisition Requirements

The project will require the following permits:

- Kentucky Division of Water (KDOW) Notice of Intent (NOI)
- KDOW construction within a floodplain permit
- KDOW construction permit for sewer construction
- KYTC encroachment permits
- USACE Nationwide Permit
- Wetlands Relocation

In order to finalize project planning, concurrence that the project site is cleared by the State Historic Preservation Office (SHPO) will be required. At this time it is believed that the site does not have any historical or archaeological issues, however, concurrence from SHPO will need to be acquired in the future detailed design phase.

The City plans to donate a significant amount of property to this project. In addition to the donated property, the City will have to acquire at least one property in fee simply and possibly two in order to construct the project. The remaining property needs for the project include easements and “consent and release” form individuals who properties will be disturbed and restored but do not require a permanent easement. The majority of the project will be on City property, Bullitt County Board of Education property, or within roadway rights of way. Acquisitions should begin as soon as the project funding methods are confirmed.

6.0 Potential Future Funding Sources

The potential funding sources that have been identified for future design and construction of improvements for this project area as follows:

- Bullitt County Economic Development
- Community Development Block Grant Program (CDBG) with the US Department of Housing and Urban Development (HUD)
- Kentucky Infrastructure Authority (KIA)
- Kentuckiana Regional Planning & Development Agency (KIPDA) Hazard Mitigation Grant Program (HMGP)
- Kentucky Rural Water Association (KRWA)
- Kentucky Stormwater Association (KSA)
- Kentucky Transportation Cabinet (KYTC)

At this point, application for any potential funding sources has not been developed or fully investigated. The city will need to review the funding availability and schedules compared with this project's goals for future assistance with implementation.

7.0 Public Meeting Findings

The public meeting was held Wednesday, December 17th, 2014 at 6 PM at the Shepherdsville City Hall. Public notification of the meeting was made two weeks prior through a newspaper posting in the Pioneer News. Attached with this report are copies of the letter that was delivered to property owners in the project area, and a copy of the advertisement from the Pioneer News. The public meeting was lightly attended, with 5 individuals present. Two attendees were City Council members, two others were individuals who were very well informed about the project. One other individual attended who was not directly impacted by the project but was interested in hearing about the results of the study.

An information sheet and map were prepared as a handout for the meeting (included in the appendix) along with full sets of preliminary plans and project display boards. All of this information was left with the City for their use and distribution with any individuals who are seeking additional information regarding the study.

There was no opposition to the project or reasoning of why the project would not be possible found at the public meeting. There were also not any new alternatives of potential ideas introduced at the public meeting.

8.0 Potential Next Steps

As a result of this planning study, it has been verified that this project and various alternatives of this project can be effective with regards to improving drainage, reducing stagnant water in the corridor and improving water quality associated with recharging of existing wetlands.

Construction of the storm water interceptor will create an outlet for areas that hold water adjacent to KY 44 and West Blue Lick Road.

Currently there are not available funds within the City's budget allocated for the construction of any portion of these improvements. For this reason, the City may choose to pursue funding from all available sources. Once it is determined if funding outside of the City's normal budget will be available, the City could create a phasing plan to identify a timeline and budgeting that is attainable for the potential improvement.

While each alternative could effectively improve drainage and water quality, Alternate 4, a storm sewer interceptor with a wetlands outfall and sewer relocations, and a total projected project cost is \$4,342,195 appears to be the most environmentally beneficial. This alternative also meets the goals of improved drainage and water quality.

If the project were to secure funding and to proceed, a potential project schedule is shown below:

- | | | |
|----|-----------------------------------------------|----------------------------|
| 1. | Pursue funding sources | January 2015 |
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