Draft Feasibility Report with Integrated Environmental Assessment and Finding of No Significant Impact (FONSI)

Continuing Authorities Program, Section 14
O'Fallon Wastewater Treatment Plant
O'Fallon, Illinois

October 2022

U.S. Army Corps of Engineers
St. Louis District
Regional Planning & Environmental Division North
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1 INTRODUCTION

1.1 STUDY SCOPE

The scope of the study includes consideration of potential measures to address streambank erosion adjacent to the City of O'Fallon, Illinois, sewage treatment lagoons, and identification of an action that best addresses the problem at the least cost and in consideration of potential impacts of the action to the environment and adjacent property owners. An Environmental Assessment is integrated with this report. Sections prepared in accordance with the National Environmental Policy Act (NEPA); the Council on Environmental Quality – Regulations for Implementing the Procedural Provisions for NEPA (40 CFR Parts 1500 – 1508); and the U.S. Army Corps of Engineers – Policy and Procedure for Implementing NEPA (33 CFR Part 230) are denoted with an asterisk. The non-Federal sponsor for this study is the City of O'Fallon, Illinois.

1.2 STUDY AUTHORITY

This study and any recommended project is authorized under the Continuing Authorities Program and Section 14 (Emergency Streambank Protection) of the Flood Control Act of 1946, as amended. The Continuing Authorities Program and Section 14 is designed to implement projects to protect public facilities and facilities that are used to provide public services that are open to all on equal terms. To qualify those facilities must have been properly maintained but be in imminent threat of damage or failure by natural erosion processes on stream banks and shorelines, and must be essential and important enough to merit Federal participation in their protection. (EP 1105-2-58, para. 29.a).

1.3 STUDY AREA

The study area is located approximately 16 miles east of St. Louis, Missouri, just east of O'Fallon, Illinois. It is located on Silver Creek, approximately 1000 feet upstream of where Silver Creek crosses Highway 50, immediately adjacent to the eastern edge of the City of O'Fallon's Wastewater Treatment Plant (WWTP; **Error! Reference source not found.** and Figure 2) in Lebanon, IL.

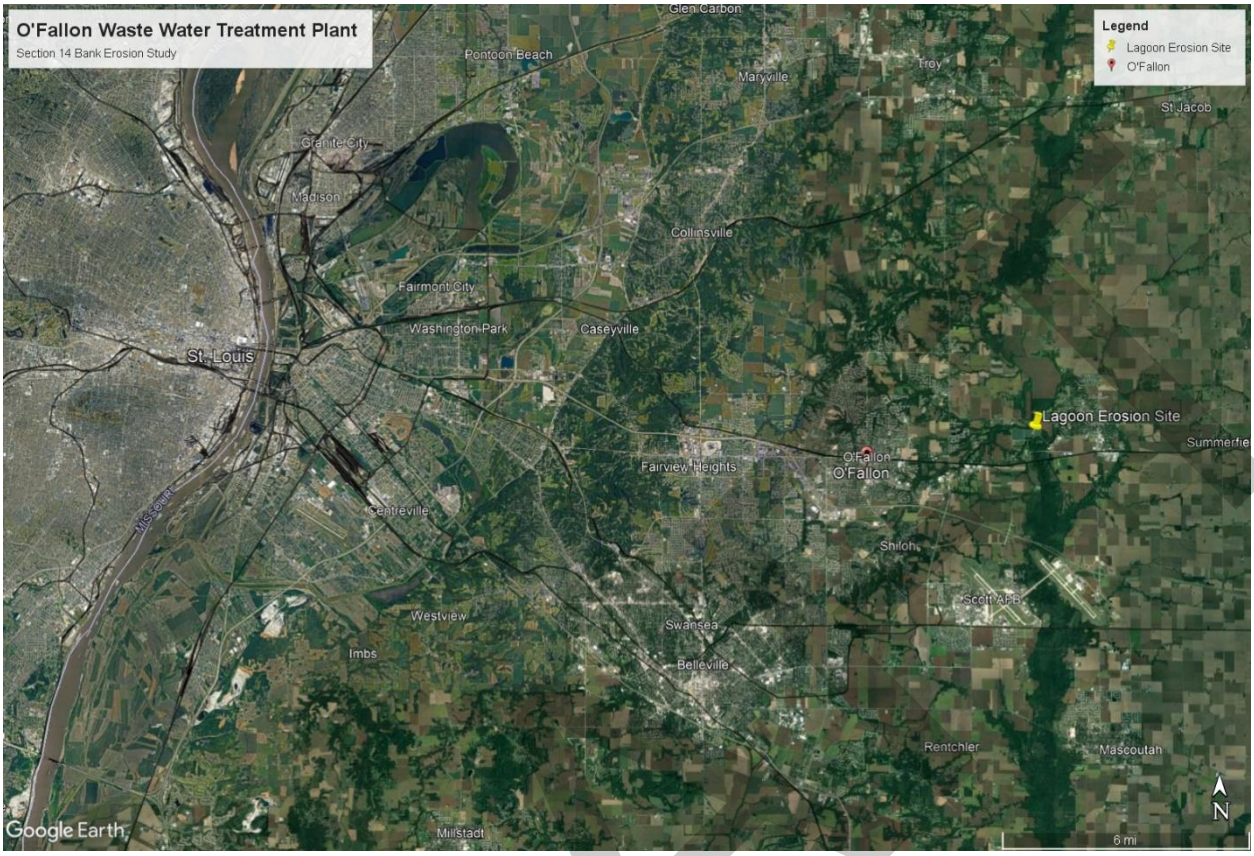

Figure 1. Location of the erosion site in relation to the cities of St. Louis, MO and O'Fallon, IL.

Figure 2. Site map displaying Silver Creek and the locations of the previous project and current problem.

1.4 Purpose and Need*

The wastewater treatment plant for the City of O'Fallon, IL is located on the right descending bank of Silver Creek. Silver Creek is incising, creating steep banks susceptible to erosion. In addition to regular flows eroding the banks, debris in the creek can deflect flows toward the banks causing focused areas of erosion. The erosion is threatening one of the City's sewage lagoons and, without proper intervention, continued erosion progression poses an imminent threat of failure of the lagoon berms. Berm failure will result in an interruption to treatment processes and the discharge of untreated or partially treated sewage into Silver Creek.

1.5 Problems, Opportunities, Objectives, & Constraints

The problem to be addressed by the study is the potential for failure of the sewage lagoon berms due to erosion caused by flows in Silver Creek. In addition to impacting the ability of the plant to treat sewage, berm failure could result in untreated or partially treated sewage to be discharged into Silver Creek. No additional opportunities were identified beyond addressing the problem.

The objective of a potential project is to reduce the risk of loss of treatment capacity and creek contamination. No planning constraints were identified.

1.6 Prior Report and Existing Water Project

A portion of the upstream berm and bank is armored with rock placed for a Section 14 project completed in 2002 (O'Fallon Sewage Lagoons, Silver Creek Ditch, IL). This project was preceded by a Project Fact Sheet and Environmental Assessment approved by the Mississippi Valley Division on July 19, 2002. At the time of construction, this action addressed an erosion threat to the upstream lagoon caused by flood events that had deposited a snag of trees in the creek, causing a sand bar to form and diverting flows toward the lagoon berm. The downstream berm was not threatened. The snag and sand bar were removed and have not re-formed. The 2002 project is performing as designed and is not causing the current erosion problem.

2 Plan Formulation

This section describes the current (existing) condition of the streambank adjacent to the sewage lagoon berm and the projected future conditions related to the erosion problem. It also discusses ways that the erosion problem may be addressed and generally describes the alternatives considered for implementation. Chapter 3 discusses the affected environment for existing and future conditions for all alternatives.

2.1 Existing Conditions

One source of the current problem appears to be additional development in the 327 sq. mi. watershed, which has impacted stream flows and steadily caused erosion in this reach. According to USGS Topographical Maps, this stretch of Silver Creek was channelized and straightened in the early 1900's, likely for flood routing and agricultural drainage purposes. That river planform is not consistent with the slope or sinuosity of natural rivers in the area. In its current state, the river is incised, which allows the river less relief into its floodplains during high flows. High energy flow is concentrated on the soils and vegetation within the channel, eroding them with ease. This cycle of erosion and incision can continue for many decades until the river has reached a new equilibrium. The existing channelized, straightened, and incised condition of this channel is a major driver of past and potential future channel incision and bank erosion.

Review of aerial imagery from 2002 to the present shows approximately a 6 square mile increase in urban area within the watershed, with most of that occurring within 6 miles of the treatment plant. The total watershed includes 327 square miles and Silver Creek extends approximately 40 miles upstream of the lagoons. The original channelization of the Creek, coupled with higher runoff associated with development in close proximity to the lagoons are considered drivers of the channel incision and bank erosion.

One area of localized erosion begins about 30 feet downstream of the existing revetment on the right descending bank and extends for another 20-30 feet (Figure 3). This eroded area is bounded by two mature trees near the toe of the bank and previous bank line is displayed as a white dashed line. The eroded face is concave in shape (red solid line) and is about 10 feet tall with a nearly vertical slope. On other portions of the same bank, the toe is eroded away and a ~4-5 foot vertical face exists. In these areas, stress cracks are present further up the bank where it appears that the bank is at risk of sliding (Figure 4). These conditions indicate a continued progression of erosion, resulting in unstable banks that pose an imminent threat to the lagoon berms.

Figure 3. Streambank erosion adjacent to lagoons

Figure 4. Stress cracks present on the bank slope

2.2 Future Without Project Condition

The erosion is threatening one of the City's sewage lagoons and, without proper intervention, continued erosion progression will affect the integrity of the lagoon berms and cause the berms to fail which would result in the discharge of untreated or partially treated sewage into Silver Creek and a temporary disruption to treatment capacity.

2.2.1 Inland Hydrology Climate Change

Appendix A contains the evaluation related to the assessment of potential impact of climate change on hydrology in the area. In summary, literature review provides a mixed prediction of future stream flows. However, the USACE Climate Hydrology Assessment Tool (CHAT) was used to analyze the flow in the Lower Kaskaskia watershed, which this study area lies within. When pre-2005 annual-maximum mean monthly flows were analyzed, they exhibited a slight increasing trend; and post-2005 projections out to 2100 show a stronger increasing trend. If increased streamflow is realized in this reach of Silver Creek, it would result in increased velocity and additional shear stress, which would likely lead to channel incision and continued bank instability.

2.2.2 Summary of Assumptions

For the purpose of this analysis, the study made the following assumptions about the future conditions if no project is implemented:

- The erosion will continue to progress and the berm(s) will fail.
- Lagoon berm failure will result in temporary reduction in treatment capacity and spillage of untreated or partially-treated sewage into Silver Creek.
- Increased flow due to climate change will likely result in some level of additional channel incision and continued bank instability.

2.3 MEASURE DEVELOPMENT

Measures are features that can be implemented or actions that can be taken to address the problem and achieve the objective. The study considered the following possible measures:

2.3.1 Structural

- Stone revetment – Stone placed on the creek bank to armor the bank against erosion
- Grade control structures – Stone structures placed across the creek bottom and tied into the creek banks to stabilize the creek bottom and adjacent banks.

2.3.2 Non-Structural

- Relocation of sewage lagoon – Moving the sewage lagoons sufficiently far from the creek bank as to be unaffected by any additional erosion.

2.3.3 Natural and Nature-Based

- No Natural and Nature Based (NNB) measures were identified. Creek velocities have already removed most vegetation from the bank below the lagoon berm so it is unlikely that vegetative options would be effective. No other options were identified.

2.4 ALTERNATIVE PLAN FORMULATION CONSIDERATIONS

The Section 14 program is limited to addressing imminent threats to public facilities from natural erosion processes. Per ER 1105-2-100, for eligible facilities, USACE Section 14 policy is to focus formulation and evaluation on the least-cost solution to the problem and the least-cost alternative is considered justified if its total cost is less than the cost to relocate the threatened facility. Therefore, for comparison purposes, relocation of the sewage lagoons is included as an alternative, even though it is not eligible for implementation as a Federal action.

Additionally, grade control structures were determined to be very costly and have greater environmental impacts than stone revetment alone. Adding grade control to the revetment did not increase the revetment effectiveness enough to offset the cost and impact concerns. Therefore, grade control structures were not carried forward into alternatives development.

2.5 ALTERNATIVES CONSIDERED*

This section describes the alternatives considered and summarizes the alternatives in terms of their environmental impacts and their achievement of objectives. The Action Alternatives were developed by identifying construction measures to stabilize and reduce erosion of Silver Creek adjacent to the O'Fallon WWTP. A No Action Alternative is also considered as required by NEPA and acts as a baseline against which the action alternative(s) are measured.

2.5.1 Alternative A – No Action Alternative

Under the No Action Alternative, the federal government would not alter Silver Creek's streambank nor streambed to protect WWTP facilities. It is possible that the WWTP would modify Silver Creek without federal assistance. However, due to the uncertainty of the WWTP modifications, the environmental impacts of allowing Silver Creek to remain in its current, unaltered state (future without project) are regarded as the No Action Alternative. This would perpetuate a state of reduced streambank stability and greater erosion susceptibility, increasing risk of WWTP berm failure and facility damage. Berm failure would result in interrupted treatment ability and lagoon contents being discharged into Silver Creek.

Various types and concentrations of contaminants associated with untreated wastewater have the potential to negatively impact ecosystem function and health. In addition to the cost of reconstructing the berms, the City would also be required to clean up the creek and may be fined by the EPA.

2.5.2 Alternative B – Streambank Revetment

Under this alternative (Figure 5), approximately 760 linear feet of the streambank would be re-graded and stabilized by placing stone revetment roughly 15 feet up the slope from the toe of the bank, on top of 6 inches of bedding material placed on top of non-woven geotextile fabric (Figure 6). Because the 2002 Section 14 project has performed well since it was constructed, this alternative would be designed similarly. The top of the proposed revetment would be defined primarily by the line of deposition that has occurred along the existing revetment from the 2002 repair, with the stone size for this design set to match the 2002 project. Willow stakes would be planted over the revetment key on the top side of the slope to provide additional stability. This alternative would include approximately 0.5 acres of selective vegetation and tree removal before re-grading the bank slope. Construction of this alternative would require approximately 4 acres of temporary easements for construction and access. In addition, approximately 0.85 acres of fee title is necessary where the revetment is placed.

This alternative considers the potential for future increased streamflow due to climate change and/or land use changes by incorporating a slightly deeper stone foundation section at the toe of the bank, which is designed to protect against future scour that will be deeper due to a further incised channel. This deeper section does not contribute significantly to the alternative's cost but does increase the alternative's ability to adapt to potential future conditions. Although this alternative terminates stone revetment at approximately the same elevation as deposition is observed on the 2002 project, it is resilient to future increases in streamflow at and above that deposition line. This is because at this elevation, the river opens up to a wide floodplain on the opposing bank, which drastically reduces both the rate of water level rise and the intensity of erosive forces at and above that elevation. Additionally, plantings above the stone revetment will provide flow roughness that will deter any remaining erosive forces from interfacing with the soils composing the slope above the stone revetment section.

2.5.3 Alternative C – Relocation of Lagoon

Under this alternative, the sewage lagoon berms would be relocated away from the Silver Creek bank. Simply moving the berms back from the creek would reduce the size of the sewage lagoons thereby reducing the lagoons' treatment capacity. To maintain treatment capacity, the lagoons would need to expand onto adjacent land (likely to the south) that is currently undeveloped. The City provided an estimate of $7 million to relocate the lagoons in such a way as to maintain treatment capacity. The Section 14 authority does not permit relocation of the threatened facility and, therefore, this alternative was developed solely for the purpose of establishing if other alternatives would be less costly, per the discussion in Section 2.4. Because this is not a viable alternative for implementation, this alternative is not included in the evaluation of the alternatives on the affected environment in Chapter 3.

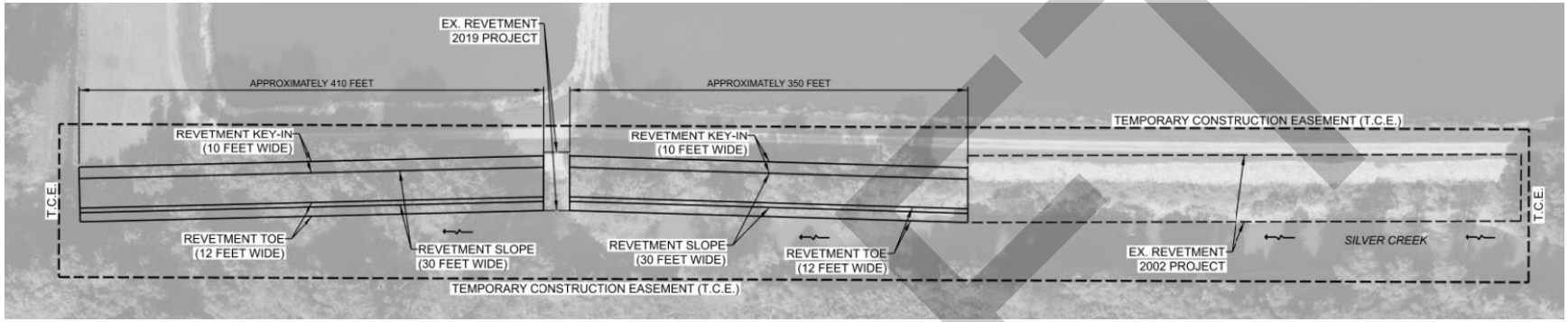

Figure 3. Streambank revetment plans and construction limits on Silver Creek, St. Clair County, IL.

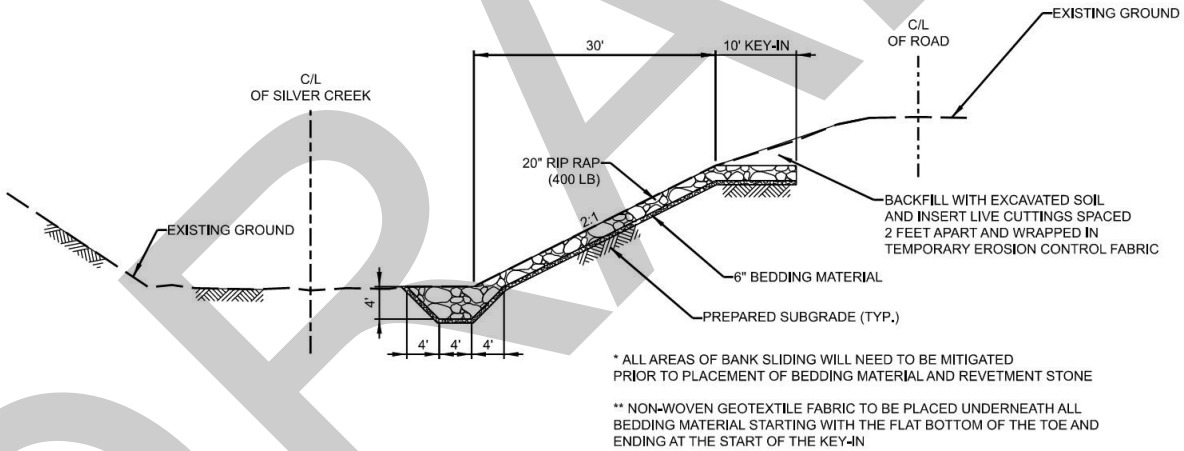

Figure 4. Typical plan section of Streambank revetment placement, not specific to this alternative, not to scale.

3 AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES*

This section describes existing conditions and potential environmental consequences in the potential project area, which are referred to under the NEPA process as the Affected Environment and Environmental Consequences, respectively. The resources described in this section are those recognized as significant by laws, executive orders, regulations, and other standards of national, state, or regional agencies and organizations; technical or scientific agencies, groups, or individuals; and the general public.

3.1 CLIMATE AND HYDROLOGY

3.1.1 Existing Conditions

The Lower Silver Creek watershed is the area of land which drains into Silver Creek in St. Clair County. The watershed is largely agricultural land with eight municipalities within the watershed boundaries. The total watershed includes 327 square miles, draining roughly 126,000 acres of land. Silver Creek extends approximately 25 miles downstream of the WWTP lagoons to the confluence with the Kaskaskia River.

According to USGS's StreamStats, the flows at this site range from about 7,000 cfs during the 50% Annual Exceedance Probability (AEP) flood, to 11,900 cfs during the 20% AEP flood, 26,800 cfs during the 1% AEP flood.

The USACE (2015) found a general consensus for a moderate to large upward trend in observed average temperature, minimum temperatures, average precipitation, extreme precipitation, and streamflow in the Upper Mississippi Region. There is a reasonable consensus that maximum air temperatures have decreased slightly in the recent past in the region. However, projected extreme precipitation is expected to have only a small increase with moderate consensus in the literature reviewed and forecasts of future hydrology and streamflow are anticipated to be variable, with low overall consensus in the literature reviewed. The strongest impact could be to the stability of the toe of the streambank bordering the treatment plant. With the projected increase in overall streamflow, this would naturally result in a further incised (deeper) channel and less stable banks.

3.1.2 Alternative A

By taking no action the Silver Creek streambank would remain susceptible to increasingly variable streamflows, resulting in additional streambank erosion and reduced stability. This would increase the risk of WWTP lagoon berm failure, resulting in lagoon contents being discharged into Silver Creek. Taking no action is not anticipated to influence global climate change.

3.1.3 Alternative B

Streambank revetment would protect the streambank from damaging flows. Extending the upstream revetment constructed in 2002 to the bank downstream and adjacent to the WWTP berms would be an effective way to prevent further bank erosion.

The revetment design includes a robust design for the toe section to increase resiliency to potential increase in runoff due to climate change or increases in urbanization within the watershed. The alternative is not anticipated to influence global climate change.

3.2 WATER QUALITY

3.2.1 Existing Conditions

The potential project area is within the Lower Kaskaskia watershed. The Illinois Environmental Protection Agency (IEPA) samples surface waters within HUC12 watersheds on a 4-year rotation to meet Section 305(b) requirements of the Clean Water Act (1976). IEPA reports the resource quality of its waters in terms of the degree to which the beneficial uses of those waters are supported and the reasons (i.e., causes and sources) beneficial uses may not be supported. According to the IEPA (2022), impaired uses and causes for impairment (listed within parentheses) for Silver Creek include aquatic life (total phosphorus) and primary contact (fecal coliforms). In order to protect groundwater quality in this area, the Southern Groundwater Protection Planning Region was established by the IEPA in Madison, Monroe, St. Clair, and Randolph Counties.

3.2.2 Alternative A

By taking no action the Silver Creek streambank would remain susceptible to additional streambank erosion and reduced stability, increasing risk of WWTP lagoon berm failure. Berm failure would result in lagoon contents being discharged into Silver Creek. In addition to the cost of reconstructing the berm, the City would be required to clean up the creek and may be fined by the EPA. Various types and concentrations of contaminants associated with untreated wastewater have the potential to negatively impact water quality of the receiving surface waters or groundwaters. The discharge of untreated wastewater could lead to increases in fecal coliform bacteria in Silver Creek and other nearby aquatic habitats downstream. A berm failure could also release nutrients which may cause algal blooms that may deplete dissolved oxygen in the receiving waters resulting in fish kills.

3.2.3 Alternative B

The rehabilitation of the Silver Creek via streambank revetment would reduce the volume of eroding streambank material entering Silver Creek, improving water quality and reducing the risk of WWTP lagoon berm failure. Alternative B would comply with General Permit 16 and the permit's associated 401 water quality certification and 404(b)(1) guidelines, therefore, no additional analysis is required.

3.3 WETLANDS AND VEGETATION

3.3.1 Existing Conditions

The potential project area falls within an area commonly referred to as the American Bottoms, an expansive floodplain of the Mississippi River extending from Alton, Illinois, south to the Kaskaskia River. Historically, this area was primarily used for agriculture due to its rich fertile soils. A variety of aquatic, wetland, and terrestrial natural communities are found in the vicinity of the potential project area. However, the potential project area has been historically disturbed by natural and industrial practices, which limits the existing biological resources. Within the project area, streambank vegetation is sparse with poor root structure (**Error! Reference source not found.**, left). A review of the National Wetlands Inventory Database was conducted, and wetlands were identified adjacent to, but not within, the potential project footprint (USFWS 2022).

3.3.2 Alternative A

By taking no action, the Silver Creek streambank would remain susceptible to additional streambank erosion and reduced stability, increasing the risk of WWTP lagoon berm failure and the erosion of wetlands immediately adjacent to the potential project area. Berm failure would result in lagoon contents

being discharged into Silver Creek. Various types and concentrations of contaminants associated with untreated wastewater have the potential to negatively impact habitat quality of nearby, downstream wetlands.

3.3.3 Alternative B

A USACE regulatory review and site visit was completed 16 March 2022. Based on the review of available resources and information gathered during the field visit, the potential project would not impact any wetland areas. Construction activities under this alternative comply with General Permit 16, concluding required analysis under Section 404 of the Clean Water Act. Willow (Salix spp.) stakes would be planted over the keyed-in section of revetment on the top side of the slope in order to provide additional protection against minor erosive forces. Revegetation via natural succession would be allowed across the rest of the revetment. This alternative would include approximately 0.5 acres of vegetation and tree removal to provide access to the stream during construction. In 2002 (the O'Fallon Sewage Lagoons, Silver Creek Ditch, IL project) the same stone revetment process was applied immediately adjacent to the potential project area and further improved streambank stability (Figure 7).

Figure 5. Comparison of existing streambank conditions (left) to completed 2002 stone revetment project (right) immediately adjacent to potential project location on Silver Creek.

3.4 Fish and Wildlife

3.4.1 Existing Conditions

A variety of animal species adapted to human disturbance or tolerant of fragmented habitats or poor water quality use the urbanized project vicinity. Various species of catfish and bass are common in the Lower Kaskaskia watershed. Open water and herbaceous wetlands serve as resting and feeding areas for some migratory ducks and geese. Wading birds that typically feed in shallow, ponded areas or ditches include the great blue heron (*Ardea erodias*) and great egret (*Ardea alba*). Wild turkey (*Meleagris gallopavo*) may also be seen as well as red-winged blackbirds (*Agelaius phoeniceus*). Larger mammals in the area include raccoon (*Procyon lotor*), common opossum (*Didelphis marsupialis*), and white-tailed deer (*Odocoileus virginianus*).

Bald Eagles (*Haliaeetus leucocephalus*) winter along the major rivers of Illinois and Missouri and, at scattered locations, some remain throughout the year to breed. Perching and feeding occurs along the edge of open water, from which eagles obtain fish. The bald eagle was removed from the List of Endangered and Threatened Species in August 2007, but it continues to be protected under the Bald and Golden Eagle Protection Act and by the Migratory Bird Treaty Act. Recommendations to minimize potential project impacts to the bird and nests are provided by the U.S. Fish and Wildlife Service in the agency's National Bald Eagle Management Guidelines publication (USFWS 2010). The guidelines recommend: (1) maintaining a specified distance between the activity and the nest (buffer area); (2) maintaining natural areas (preferably forested) between the activity and nest trees (landscape buffers); and (3) avoiding certain activities during the breeding season. Specifically, construction activity is prohibited within 660 feet of an active nest during the nesting season, which in the Midwest is generally from late January through late July. There are no known nests in the vicinity of the O'Fallon WWTP and no nests were observed by USACE on site visits in April 2021 and March 2022.

The Illinois Department of Natural Resources (IDNR) was contacted via the Ecological Compliance Assessment Tool (EcoCAT) website on 3 August 2022, for a list of Illinois state threatened and endangered (T&E) species that could potentially be located in the potential project area (IDNR project number: 2302039). The EcoCAT report did not identify any Illinois state T&E species in the potential project area, and therefore terminated further consultation.

3.4.2 Alternative A

By taking no action the Silver Creek streambank would remain susceptible to additional streambank erosion and reduced stability, increasing the risk of WWTP lagoon berm failure. Berm failure would result in lagoon contents being discharged into Silver Creek. Various types and concentrations of contaminants associated with untreated wastewater have the potential to negatively impact water resources for aquatic and terrestrial organisms. A berm failure could also release nutrients which may cause algal blooms that may deplete dissolved oxygen in the receiving waters resulting in fish kills. Because there are no known bald eagle nests in the potential project area, no impacts to bald eagles or their nests are anticipated.

3.4.3 Alternative B

The rehabilitation of the Silver Creek streambank via stone revetment would reduce the volume of eroding streambank material entering Silver Creek, improving water quality for aquatic and terrestrial species. Native vegetation with dense roots would be planted above the new revetment line in order to provide additional protection against minor erosive forces. This alternative would include approximately 0.5 acres of tree and vegetation removal to provide access to the stream during construction. In 2002 (the O'Fallon Sewage Lagoons, Silver Creek Ditch, IL project), the same stone revetment and revegetation process was applied immediately adjacent to the potential project area and further improved streambank stability. Construction activities could temporarily disturb fish and wildlife species within the potential project area, but overall would improve the quality of available habitat. Because there are no known bald eagle nests in the potential project area, no impacts to bald eagles or their nests are anticipated.

3.5 BIOLOGICAL ASSESSMENT

In accordance with Section 7(a)(2) of the Endangered Species Act (ESA) of 1973 (as amended), federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed and proposed threatened or endangered species.

3.5.1 Existing Conditions

The U.S. Fish and Wildlife Service (USFWS) was contacted via the USFWS Information for Planning and Consultation (IPaC) website on 19 July 2022 for a list of Federal threatened, endangered and candidate species that could potentially be located in the potential project area (Table 1; Project Code: 2022-0027902).

Table 1. List of Federally listed threatened and endangered species potentially occurring within the potential project area.

Common Name	Scientific Name	Listing Status	Habitat
Indiana Bat	*Myotis sodalis*	Endangered	Caves and mines (hibernacula); small stream corridors with well-developed riparian woods, upland forests (foraging)
Northern Long-eared Bat	*Myotis septentrionalis*	Threatened	Caves and mines (hibernacula); small stream corridors with well-developed riparian woods, upland forests (foraging)
Monarch Butterfly	*Danaus plexippus*	Candidate	North America
Decurrent False Aster	*Boltonia decurrens*	Threatened	Disturbed alluvial soils

Indiana Bat. Indiana bats hibernate in caves or mines during the winter months. Hibernation season is from 1 October to 31 March. During the active season (1 April to 30 September), they roost in a wide variety of suitable habitats, such as forested/wooded areas, emergent wetlands, adjacent edges of agricultural fields, old fields, and pastures. Roosting habitats for this species include live trees and/or snags with at least 5 inches diameter at breast height (dbh) that have exfoliating bark, cracks, crevices, and/or hollows. Tree species used as roosts often include, but are not limited to, shagbark hickory, white oak, cottonwood, and maple trees.

Northern Long-eared Bat. Northern long-eared bats hibernate in caves or mines during the winter months. In Illinois, hibernation season is from 1 August to 31 May. During the active season (1 June to 31 July), they roost in a wide variety of suitable habitats, such as forested/wooded areas, emergent wetlands, adjacent edges of agricultural fields, old fields, and pastures. Roosting habitats for this species include live trees and/or snags at least 3 inches dbh and have exfoliating bark, cracks, crevices, and/or hollows. Tree species used as roosts often include, but are not limited to, shagbark hickory, white oak, cottonwood, and maple trees. Northern long-eared bats have also been observed roosting in human-made structures such as buildings, barns, bridges, and bat houses.

Monarch Butterfly. Much of the monarch butterfly's life is spent migrating between Canada, Mexico, and the United States. Grasslands of central North America and areas vegetated by milkweed (*Asclepias syriaca L.*) comprise the majority of summer breeding areas. During the breeding season, monarchs require milkweed to rear larvae and provide nectar sources to sustain adults during reproduction. Nectar sources are also required by the butterflies to fuel fall migration and spring flights northward. Monarch populations of eastern North America have declined 90%. Causes of decline include deforestation, illegal logging, increased development, agricultural expansion, livestock raising, forest fires, and other threats to their migratory paths and summer and overwintering habitats. Chemical-intensive agriculture, increasing acreage converted to row crops, and mowing/herbicide treatment of roadsides have contributed to a decline of milkweed, the only plant eaten by monarch caterpillars.

Decurrent False Aster. The decurrent false aster is a perennial floodplain plant of open, wetland habitats, and its distribution includes Madison and St. Clair Counties, Illinois. Historically it occurred in wet prairies, shallow marshes, and shores of rivers, creeks, and lakes on the floodplain of the Illinois and Mississippi Rivers. Currently it is found most often in old agricultural fields and along roadsides and lake shores where alluvial soils have been disturbed. This plant is an early successional species that requires either natural or human disturbance to create and maintain suitable habitat. In the past, the annual flood/drought cycle of the Illinois and Mississippi rivers provided the natural disturbance required by this species. Annual spring flooding created open, high-light habitat and reduced competition by killing other less flood-tolerant, early successional species. Field observations indicate that in "weedy" areas without disturbance, the species is eliminated by competition within 3 to 5 years (USFWS 2001). Decurrent False Aster has high light requirements for growth and seed germination and shading from other vegetation is thought to contribute to its decline in undisturbed areas. Seeds of this plant can be dispersed by flooding or carried by wind and animals.

3.5.2 Alternative A

Federally listed T&E species may be found within the project vicinity, but it is unlikely they are present within the highly disturbed potential project area. Taking no action to address streambank erosion may reduce available bat habitat within the project vicinity.

3.5.3 Alternative B

Federally listed T&E species may be found within the project vicinity, but it is unlikely they are present within the highly disturbed potential project area. Construction activities may create temporary noise and ground disturbances in the project vicinity. This alternative would include approximately 0.5 acres of tree and vegetation removal to provide access to the stream during construction. Tree removal would be restricted to only take place 1 October - 31 March. Therefore, the St. Louis District has determined that taking action to address Silver Creek streambank stability and erosion *"may affect, but is not likely to adversely affect"* the Northern Long-eared and Indiana bats, Decurrent False Aster, and Monarch Butterfly.

3.6 RECREATION AND AESTHETICS

3.6.1 Existing Conditions

Silver Creek Preserve is located approximately 10 miles downstream of the potential project area and provides public walking trails, informative placards, and picnic areas. Other nearby recreational resources include city and residential parks, recreational sports complexes, and sportsmen's clubs. Some portions of Silver Creek outside of the potential project area may be accessible for fishing.

Aesthetic resources are represented by those aspects of the natural and human environment that are pleasant or pleasing to people. For many people aesthetic resources include the natural streams and rivers, undeveloped open spaces such as agricultural lands, natural habitats, and some development, such as residential areas. Due to the project area's industrial nature, it is inaccessible to the public and expected to be aesthetically attractive to relatively few people.

3.6.2 Alternative A

By taking no action the Silver Creek streambank would remain susceptible to additional streambank erosion and reduced stability, increasing the risk of WWTP lagoon berm failure. Berm failure would result in lagoon contents being discharged into Silver Creek. Various types and concentrations of contaminants

associated with untreated wastewater have the potential to negatively impact the health of outdoor recreationalists and aesthetic factors such as smell downstream of the potential project area.

3.6.3 Alternative B

Implementing the potential project would have a positive impact on Silver Creek water quality and allow for streambank revegetation via natural succession, which could produce minor benefits to recreation resources and aesthetics within the project vicinity.

3.7 Air Quality and Noise

The Clean Air Act of 1963 requires the U.S. Environmental Protection Agency (EPA) to designate National Ambient Air Quality Standards (NAAQS). The EPA has identified standards for 6 primary pollutants: lead, sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone, particulate matter (less than 10 microns and less than 2.5 microns in diameter), along with some heavy metals, nitrates, sulfates, and volatile organic and toxic compounds (Table 2).

Table 2. Six pollutants and their standard criteria designated by the U.S. EPA.

Pollutant	Averaging time	Criteria	Form
Carbon monoxide	8 hours	9 ppm	Not to be exceeded more than once per year
	1 hour	35 ppm	
Lead	Rolling 3 month	0.15 µg/m^3	Not to be exceeded
Nitrogen dioxide	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	1 year	53 ppb	Annual Mean
Ozone	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution ($PM_{2.5}$)	1 year	12.0 µg/m^3	Primary; Annual mean, averaged over 3 years
	1 year	15.0 µg/m^3	Secondary; Annual mean, averaged over 3 years
	24 hours	35 µg/m^3	Primary and Secondary; 98th percentile, averaged over 3 years
Particle Pollution (PM_{10})	24 hours	150 µg/m^3	Primary and Secondary; Not to be exceeded more than once per year on average over 3 years
Sulfur dioxide	1 hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years

3.7.1 Existing Conditions

The potential project area is located within the Metropolitan St. Louis Interstate Air Quality Control Region (AQCR). This AQCR covers the following counties in Missouri: Franklin, Jefferson, St. Charles, St. Louis, and St. Louis City; and the following counties in Illinois: Madison, Monroe, and St. Clair. Areas within the AQCR are further defined according to the attainment status of criteria pollutants. The Metropolitan St. Louis AQCR is in attainment for most of the criteria pollutants, including particle pollution ($PM_{2.5}$), sulfur dioxide, carbon monoxide, nitrogen dioxide, and lead (US EPA 2022). The Metro-East area is only in nonattainment

area for ozone (8-hr; US EPA 2022). Ozone is not emitted directly into the air by specific sources. Ozone is created by sunlight acting on nitrogen oxides (NOx) and volatile organic compounds (VOC's) in the air. There are many sources of these gases, including gasoline vapors, chemical solvents, fuel combustion products, and some consumer products (USACE 2003). Because the St. Louis Metropolitan area is a nonattainment area for ozone, control strategies resulting in reduced emissions have been implemented across the region. Control measures targeted at transportation include physical improvements in regional transportations systems and management strategies to reduce hydrocarbons and carbon monoxide emissions from motor vehicles.

The O'Fallon area includes industrial, transportation, recreational, residential, retail and agricultural zones. These areas are dispersed in pockets of varying sizes and density, and each makes its own contribution to the noise characteristics of the region. Agricultural and open space areas typically have noise levels in the range of 34-70 decibels (dB) depending on their proximity to transportation arteries. Noise associated with transportation arteries such as highways, railroads, etc., would be greater than those in rural areas. Other sources of noise include operations of commercial and industrial facilities, and operation of construction and landscaping equipment. In general, urban noise emissions do not typically exceed about 60 dB but may reach 90 dB or greater in busier urban areas or near high volume transportation arteries.

3.7.2 Alternative A

Industrial, commercial, and residential development in the floodplain of the Mississippi River is expected to increase within the project vicinity. The St. Clair Comprehensive Plan (2011) projects increasing development, which is also expected to increase noise levels associated with land use type.

Under the no action alternative, air quality and noise are expected to remain similar to the existing condition.

3.7.3 Alternative B

During construction, there may be a temporary and localized reduction in air quality due to emissions from heavy machinery operating. However, once the potential project is complete, no effects to air quality would occur. Diesel emissions from project construction may pose a human health risk for construction workers and exposure to emissions should be minimized. Special management techniques would be implemented to control air pollution produced by the construction activities. Airborne particulates, including dust particles, from construction activities and processing and preparation of materials would be controlled at all times, including weekend, holidays, and hours when work is not in progress. The contractor would be required to maintain all work areas free from airborne dust. In addition, hydrocarbon and carbon monoxide emissions from equipment would be controlled to Federal and State allowable limits at all times. Therefore, effects of construction on air quality would be insignificant.

Construction of the potential project may cause a temporary increase in noise in the project vicinity. This effect would only occur during the construction period, and so is anticipated to be temporary and minor. Effects of the increased noise would be comparable to an increase in industrial traffic and therefore is not anticipated to impact the quality of life in the surrounding area. Once the potential project is complete, no increased effects due to noise would occur.

3.8 HAZARDOUS, TOXIC, AND RADIOACTIVE MATERIALS

3.8.1 Existing Conditions

The U.S. Army Corps of Engineers Regulations (ER 1165-2-132 and ER 200-2-3) and St. Louis District policy require procedures be established to facilitate early identification and appropriate consideration of potential hazardous, toxic, or radioactive waste (HTRW) in reconnaissance, feasibility, preconstruction engineering and design, land acquisition, construction, operations and maintenance, repairs, replacement, and rehabilitation phases of water resources studies or projects by conducting HTRW Initial Hazard Assessments (IHA). USACE specifies that these assessments follow the process/standard practices for conducting Phase I Environmental Site Assessments (ESA) published by the American Society for Testing and Materials (ASTM). This assessment was prepared using the following ASTM Standards:

- E1527-21: Standard Practice for Environmental Site Assessments – Phase I Environmental Site Assessment process
- E1528-14: Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (interview questionnaires)
- E2247-16: Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process for Forestland or Rural Property

The purpose of a Phase I Environmental Site Assessment (ESA) is to identify, to the extent feasible in the absence of sampling and analysis, the recognized environmental conditions (RECs) in connection with a given property(s), within the scope of EPA Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and petroleum products. Though a preliminary review of available imagery and environmental databases was performed, a Phase I Environmental Site Assessment has not been completed. An ESA will be completed prior to completion of the feasibility study to identify any possible RECs.

3.8.2 No Action Alternative

By taking no action, the Silver Creek streambank would remain susceptible to additional streambank erosion and reduced stability, increasing the risk of WWTP lagoon berm failure and erosion immediately adjacent to the potential project area. Berm failure would result in lagoon contents being discharged into Silver Creek which would in turn increase bacteria and virus exposure risk to humans. A berm failure could also release nutrients which may cause algal blooms that may deplete dissolved oxygen in the receiving waters resulting in fish kills.

3.8.3 Action Alternative B

The rehabilitation of the Silver Creek streambank via stone revetment would stabilize the lagoon berm and reduce the chances of wastewater from entering the creek. As this project would require soil and vegetation removal during construction, there is a chance of encountering HTRW; therefore, an ESA will be completed.

3.9 CULTURAL RESOURCES

3.9.1 Existing Conditions

Cultural resources are locations of past human activity, occupation, or use and typically include archaeological sites such as prehistoric lithic scatters, villages, procurement area, rock art, shell middens, and historic era sites such as refuse scatters, homesteads, railroads, ranches, logging camps, and any structures or buildings that are over 50 years old.

The study area is located on the eastern edge of the American Bottoms and the northeast corner of the Southern Illinois regional area. The American Bottoms is an area of Mississippi River floodplain extending from Alton on the north, south to the mouth of the Kaskaskia River, near the city of Chester. This area is known for its abundant and significant prehistoric, colonial, and historic cultural resources. Cahokia Mounds, a World Heritage site, lies twenty miles northeast of the potential project area.

The Southern Illinois regional area is topographically and environmentally diverse, extending south to the Ohio River. This area is seen as a transitional zone between the midwestern and southeastern culture areas.

A 2022 literature review was conducted by a USACE St. Louis District Archaeologist. Two surveys overlap the west end of the wastewater treatment plant. No sites have been found at the WWTP and no previous surveys have been conducted within the current study area.

The District Archaeologist attended a 2021 site visit and performed a visual inspection of the study area. The western side of Silver Creek has been altered by construction of the existing lagoons and associated structures, access roads, outfall structures, and streambank revetments. The eastern side of Silver Creek included treed areas and open grassy fields. This area has remained undeveloped over time.

3.9.2 Alternative A

Cultural resources that may exist would remain consistent with the existing conditions. A finding of "No Historic Properties Affected" would be expected as a result of taking no action.

3.9.3 Alternative B

Action Alternative B, streambank revetement, would have ground-disturbing impacts to the western end of Silver Creek. The western side of Silver Creek has been altered by construction of the existing wastewater treatment plant and is considered disturbed. It is highly unlikely intact archaeological deposits exist on the west side of Silver Creek. Given that Action Alternative B is entirely within disturbed areas, a finding of "No Historic Properties Affected" would be expected if Action Alternative B is chosen.

A finding of "No Historic Properties Affected" has been found for both the No Action Alternative A and No Action Alternative B. A letter, dated August 24, 2022, was sent to the Illinois SHPO. Should any archaeological remains be uncovered incidentally during construction, all construction-related excavations within the immediate vicinity of the find would cease pending a professional archaeological determination of the significance of such remains.

3.10 TRIBAL RESOURCES

3.10.1 Existing Conditions

In addition to the consultation with IL State Historic Preservation Office (SHPO), consultation with Indian Tribes would also be required to ensure compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. The USACE St. Louis District has previously established consultation agreements with 25 tribal nations that have ties to, or an interest in, this portion of the District's area of responsibility.

3.10.2 Alternative A

Taking no action would mean no undertaking under Section 106 of NHPA. Consultation with tribal nations would not be pursued under Alternative A.

3.10.3 Alternative B

Due to previous ground disturbance in the project area and the finding of "No Historic Properties Affected" under Section 106 of NHPA, tribal consultation would not be pursued. In the event that earthmoving activities associated with the potential work impacted archaeological or human remains, all construction activities and earthmoving actions in the immediate vicinity of the remains would be held in abeyance and tribal nations would be consulted.

3.11 Environmental Justice

Executive Order 12898 directs federal agencies to take the appropriate steps to identify and address any disproportionately high and adverse human health or environmental effects of federal programs, policies, and activities on minority and low-income populations. Minority populations are those persons who identify themselves as Black, Hispanic, Asian American, American Indian/Alaskan Native, and Pacific Islander. A minority population exists where the percentage of minorities in an affected area either exceeds 50 percent or is meaningfully greater than in the general population.

The population of O'Fallon, IL is approximately 16.4% African-American, 0.2% American Indian or Alaskan Native, 2.7% Asian, 0.1% Native Hawaiian or Pacific Islander, and 8.6% more than one race (US Census 2020; Table 3). The population is 5.1% Hispanic or Latino (US Census 2020). There are approximately 7.5% of households in the City of O'Fallon area whose income in the past 12 months falls below the national poverty level and median income is $90,432 (ACS 2020). Therefore, no disproportionate adverse impacts to low-income or minority populations are anticipated.

Table 3. Census block and Illinois population demographics (US Census, 2020).

	O'Fallon		Illinois	
	Population	**%**	**Population**	**%**
White	22,792	70.6	7,868,227	61.4
Black or African American	5,288	16.4	1,808,271	14.1
American Indian and Alaska Native	72	0.2	96,496	0.8
Asian	887	2.7	754,878	5.8
Native Hawaiian and Other Pacific Islander	32	0.1	4,501	0.1
Other	466	1.4	1,135,149	8.9
Two or more races	2,752	8.6	1,144,984	8.9
Total	**32,289**	**100.0**	**12,812,508**	**100.0**

3.12 Cumulative and Adverse Impacts

The discussion of cumulative impacts considers the effects on the resource that result from the incremental impact of the action being considered when added to other past, present, and reasonably foreseeable future actions regardless of what agency, Federal or non-Federal, or person undertakes such other actions. This section identifies possible cumulative effects of the considered alternatives when combined with past trends and other ongoing or expected future plans and projects.

The City of O'Fallon WWTP has previously rehabilitated sections of Silver Creek via stone revetment. This potential project would complete streambank stabilization rehabilitation efforts along the WWTP lagoon berms.

4 EVALUATE & COMPARE ALTERNATIVE PLANS

The effects of each plan on the affected environment are described in detail in Chapter 3. This chapter evaluates and compares other aspects of each alternative.

4.1 ALTERNATIVE ECONOMIC COSTS & BENEFITS

4.1.1 Costs

Table 4 displays the estimated total project first cost for each alternative. Project costs include design, construction, and construction management.

Table 4. Alternative First Costs

Alternative	Project First Cost
Alternative A – No Action	$0
Alternative B – Revetment	$612,500
Alternative C – Relocate Lagoon	$7,000,000

Because there is no Federal project associated with the No Action plan, there is no project cost. However, there is an estimated cost of $2 million to the City if no action is taken and the berms were to fail. If both sewage lagoon berms failed, it is estimated that it would cost the city $1.4 million to reconstruct and armor them in their current location. In addition to the reconstruction costs, the city of O'Fallon would be fined $15,000 by the EPA for each day that it took to clean up the creek, which is estimated to take at least one month, or approximately $450,000. In addition, there would be the labor costs of four people in the cleanup effort during that month (this cost has not been calculated, as it would be minimal in comparison to the amount of the fine). There would also be some incalculable cost of damage to the environment when the lagoon contents spilled into the creek.

EP 1105-2-58, para. 29(d) states: "The least cost alternative plan is considered to be justified if the total cost of the proposed alternative is less than the costs to relocate the threatened facility." The cost of Alternative B is $612,500, which is less than the cost of relocating the lagoons ($7 million). Therefore, Alternative B is considered economically justified.

4.1.2 Benefits

In addition to identifying the least cost alternative, the positive and negative benefits of each alternative were considered in each of the four Principals and Guidelines accounts: National Economic Development (NED), Regional Economic Development (RED), Environmental Quality (EQ) and Other Social Effects (OSE). Table 5 summarizes the benefits analysis and allows comparison between the plans. Although Alternative C is not an implementable plan under the Section 14 authority, it is still included for comparison purposes.

NED benefits are typically reported as net benefits, which are the economic benefits that are in excess of the economic costs. However, because the study used the least-cost method for plan selection, NED benefits were not calculated. Instead, Table 5 reports the cost differences between the plans because the benefits are likely to be the same or similar for the two action plans.

RED benefits can be related to regional jobs associated with project construction or could be regional effects of avoiding the negative outcomes associated with the no action plan. Instead of comparing jobs associated with construction costs, which generally rise with increased costs and are not always useful for

plan comparison, the study considered what the potential impacts are to the population or businesses in the area if no action were to be taken. There would likely be a temporary reduction in treatment capability at the plant until the berms can be re-established. However, if it is a one-time temporary disruption, it is unlikely that this would cause local residents or businesses to relocate or have significant economic disruption. Due to this anticipated small impact, the action alternatives would likely have no positive or negative RED benefits outside of jobs associated with construction costs. RED benefits resulting from construction of the tentatively selected plan are described in Section 5.3.

For EQ and OSE, both Alt B and Alt C greatly reduced the likelihood of the negative impacts of the no action plan (creek contamination with effluent, treatment loss) and therefore have similar benefits.

In summary, the only relevant difference in benefits between the plans is in the NED category. Because Alternative B is significantly less costly, Alternative B has been identified as the plan that maximizes benefits across the accounts.

Table 5. Summary of Benefits

Comprehensive Benefits				
	National Economic Development	**Regional Economic Development**	**Environmental Quality**	**Other Social Effects**
Alt A - No Action	Rebuild and cleanup costs to the City: $2M	Minimal regional impacts – temporary loss of treatment ability unlikely to cause significant shifts in population or employment.	Potential for untreated or partially-treated sewage lagoon contents being discharged into Silver Creek, potentially impacting local wildlife and aquatic species.	Potential for short-term loss of sewage treatment capacity. Potential for public exposure to contaminated creek flows.
Alt B - Revetment	Costs saved over: Alt A: $1.4M Alt C: $6.4M	No significant positive or negative benefits compared to No Action.	Significantly reduced potential for No Action impacts but no significant difference from Alt C.	Significantly reduced potential for No Action impacts but no significant difference from Alt C.
Alt C - Relocation	Costs saved over: Alt A: ($5M) Alt B: ($6.4M)	No significant positive or negative benefits compared to No Action.	Significantly reduced potential for No Action impacts but no significant difference from Alt B.	Significantly reduced potential for No Action impacts but no significant difference from Alt B.

4.2 COMPLETENESS, EFFECTIVENESS, EFFICIENCY, & ACCEPTABILITY

USACE guidance requires that each alternative plan be evaluated in each of four evaluation criteria identified in the economic and environmental Principles and Guidelines: completeness, efficiency, effectiveness, and acceptability. Completeness is the extent to which the alternative plans provide and account for all necessary investments or other actions to ensure the realization of the planning objectives, including actions by other Federal and non-Federal entities. Effectiveness is the extent to which the alternative plans contribute to achieve the planning objectives. Efficiency is the extent to which an alternative plan is the most cost-effective means of achieving the objectives. Acceptability is the extent to which the alternative plans are acceptable in terms of applicable laws, regulations and public policies. Table 6 summarizes this evaluation for each alternative. Although Alternative C is not implementable under the Section 14 authority, it is still included for comparison purposes.

The No Action Alternative was found to be an acceptable, but not complete, effective or efficient, as it does not address planning objective. Alternatives B and C were found to be equally acceptable, complete, and effective, but Alternative B is more efficient than Alternative C.

Table 6. Summary of Evaluation

Principals and Guidelines Criteria				
	Completeness	**Effectiveness**	**Efficiency**	**Acceptability**
Alt A - No Action	No. This alternative does not address the objective.	No. This alternative does not address the objective. .	No. This alternative does not address the objective.	Yes. The alternative is acceptable and in accordance with state and local entities and compatible with existing laws.
Alt B - Revetment	Yes. The alternative includes all features needed to produce the stated effects.	Yes, this alternative addresses the objective.	This alternative addresses the objective in a more cost-efficient alternative than Alternative C.	Yes. The alternative is acceptable and in accordance with state and local entities and compatible with existing laws.
Alt C - Relocation	Yes. The alternative includes all features needed to produce the stated effects.	Yes, this alternative addresses the objective.	This alternative addresses the objective in a less cost-efficient alternative than Alternative B.	Yes. The alternative is acceptable and in accordance with state and local entities and compatible with existing laws.

In summary, because Alternative B is more efficient than Alternative C and has also been identified as the plan that maximizes net benefits across the four P&G accounts, it has been identified as the Tentatively Selected Plan.

5 TENTATIVELY SELECTED PLAN

5.1 DESCRIPTION

The tentatively selected plan is Alternative B (**Error! Reference source not found.**) which involves re-grading and stabilizing approximately 760 feet of the bank by placing stone revetment roughly 15 feet up the existing 2:1 slope from the toe of the bank. The top of the new revetment is defined primarily by the line of deposition that has occurred along the existing revetment from the 2002 repair, with the R90 stone size for this design set to match the 2002 project. This line of deposition indicates that erosive forces are minimal at and above that elevation. Native vegetation with dense roots would be planted above the new revetment line in order to provide additional protection against minor erosive forces that occur above the new revetment line. Construction of this alternative would require approximately 4 acres of temporary easements for construction and access. In addition, approximately 0.85 acres of fee title is necessary where the revetment is placed.

5.2 PROJECT FIRST COSTS

The total project first cost of the tentatively selected plan is estimated to be $612,500. This cost includes design, construction, and construction management costs. There are no real estate or environmental mitigation costs. 7 breaks down the total cost by feature.

Table 7. Total Project First Cost Summary by Feature (October 2021 price level)

Feature Code	Feature Name	First Cost
16	Bank Stabilization	$490,000
01	Lands and Damages	$0
30	Planning, Engineering and Design	$73,500
31	Construction Management	$49,000
	Total	**$612,500**

5.3 BENEFITS

As discussed in Section 4.1.2, National Economic Development benefits were not estimated for the tentatively selected plan. Environmental benefits include avoidance of negative impacts to Silver Creek resulting from sewage lagoon contents discharge. Benefits under the Other Social Effects category include avoidance of short-term loss of sewage treatment capacity and potential for public exposure to contaminated creek flows.

There will be some Regional Economic Development benefits associated with construction of the project. Of the $612,500 total project expenditures, $461,613 will be captured within the local impact area. The remainder of the expenditures will be captured within the state impact area and the nation. These direct expenditures generate additional economic activity, often called secondary or multiplier effects. The direct and secondary impacts are measured in output, jobs, labor income, and gross regional product (value added). In summary, the expenditures $612,500 support a total of 7.4 full-time equivalent jobs, $464,846 in labor income, $523,883 in the gross regional product, and $810,029 in economic output in the local impact area. More broadly, these expenditures support 11.5 full-time equivalent jobs, $786,577 in labor income, $1,022,084 in the gross regional product, and $1,723,765 in economic output in the nation.

5.4 RISK & UNCERTAINTY

The study team made the following choices during development of the alternatives, which results in some uncertainty in the study's conclusions. The potential risks associated with these choices are described in this section, as well as the team's risk management choices.

Scoping Choice: Exclude grade control structures from recommended alternative.

- Risk and Cause: The project could experience reduced stability due to toe scour if/when channel incision continues to progress.
- Potential Consequence: Reduced stability could create vulnerabilities in the revetment, leading to isolated or widespread bank erosion or failure.
- Likelihood of Consequences: Moderate. Incision is likely to continue. Incision threatens and damages bank stabilization projects.
- Risk Management: Construct a deeper revetment section at the toe of the new revetment section. This additional rock protects against additional scour down to the depth to which it is constructed.

Scoping Choice: There was no Hydrologic or Hydraulic modeling performed to estimate creek flows and velocities.

- Risk and Cause: The project could be under-designed if velocities are higher than expected.
- Potential Consequences: An under-designed project has a higher risk of damage or failure.
- Likelihood of Consequences: Low. A previous CAP project constructed immediately upstream of the site is performing well. The current project is a continuation of the existing project and is designed similarly.
- Risk Management: No additional actions needed.

Scoping Choice: The required Phase I Hazardous Toxic and Radioactive Waste investigation was not completed prior to identification of the tentatively selected plan.

- Risk and Cause: The Phase I report could reveal contamination in the project area.
- Consequences: Contamination would need to be addressed by the sponsor prior to construction, resulting in delays and additional sponsor costs.
- Likelihood: Low. Previous work at the site revealed no concerns.
- Risk Management: The Phase I investigation will be completed before final report completion.

5.5 SPONSOR SUPPORT

The City of O'Fallon is supportive of the tentatively selected plan, has identified no other locally-preferred plan, and will provide a sponsor self-certification of financial capability and letter of support as part of the final report submittal.

6 PROJECT IMPLEMENTATION

6.1 REAL ESTATE CONSIDERATIONS

The construction of the project will require a temporary construction area (easement) of approximately 4 acres and access to the construction area. The non-Federal sponsor needs to confirm ownership of the temporary construction area as well as access to the project site via an unnamed access road adjacent to the lagoons that runs west to east across the parcels owned by the City of O'Fallon. The road adjacent to the lagoons is accessible from Rieder Road as depicted in Figure 8. The revetment will encompass two areas of fee title, one being approximately 0.45 acres and the other being approximately 0.40 acres. At this time, it appears that the construction and access areas are owned by the City of O'Fallon. USACE policy states that no project credit shall be given for a Section 14 project in which lands, easements, or rights-of-way are part of the tract of land that includes the facility or structure to be protected. Since the purpose of this project is to protect the City of O'Fallon's sewage lagoon and the City owned this property prior to the implementation of the cost share agreement no project credit will be allowed for provision of real estate requirements in this situation. Any real estate required for the project that are determined to be privately owned will be acquired by the Sponsor. Additional information about real estate requirements can be found in the Real Estate Plan in Appendix C.

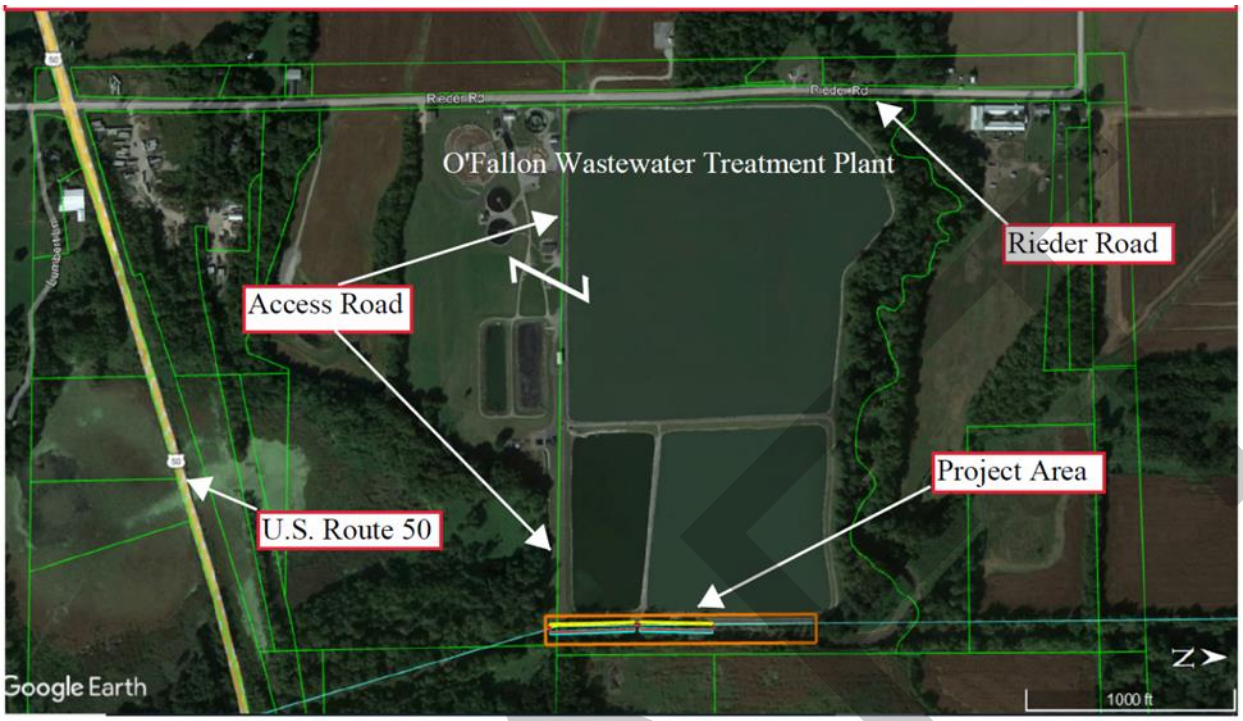

Figure 8. Access to the project area.

6.2 Design Considerations

The design of the project closely followed the 2002 revetment project just upstream. The design was modified to reduce the height of the revetment after observing the silt deposition at roughly 15 feet up the bank, indicating that the need for stone revetment ends at roughly that elevation. Another difference between this project and the 2002 project is the inclusion of a key-in to the bank and the use of non-woven geotextile fabric underneath the bedding material for the stability of the revetment system as a whole.

As noted in Figure , one or more stress cracks exist along the bankline adjacent to the WWTP. In areas where these are observed, locations should be inspected further to determine if a slide exists. If a slide exists, the slide material should be excavated, removed, and replaced rather than just regraded. This is to prevent the slide from re-mobilizing and damaging or creating a flaw within the slope protection. Slope stability will be considered in PED and may require soil testing to obtain strength parameters.

6.3 Construction Considerations

Due to the soft-bottom channel of Silver Creek, the construction of the project would require long-reach construction equipment to complete the excavation and stone placement for the toe of the revetment. Access down to the channel should be done in a way as to remove as much of the invasive vegetation with poor root structure, while also preserving the existing vegetation that provides stability for the banks above the revetment line. The design also assumes the haul road route used for the 2002 revetment project is still acceptable to the sponsor for use on this project.

Construction would have to be done during a period of relatively low flow to ensure the best conditions for a successful project and this could potentially impact the construction and project schedules.

6.4 Operations, Maintenance, Repair, Replacement, & Rehabilitation (OMRR&R) Requirements

The periodic operation and maintenance requirements for this project are expected to include regular inspections; mowing of turf; application of herbicides for weeds and brush (especially Johnson Grass and Willows) as well as potential sprouts from tree stumps; and removal of woody growth and rodents and burrowing animals (and their dens). The sponsor should also periodically (every 5 to 10 years) monitor the channel for significant incision that could negatively impact the performance of the project (see Section 5.4 for discussion of potential channel incision risk). These regular actions are anticipated to cost approximately $1,300 per year.

In addition to the above activities, the sponsor will be required to repair any damage that may occur to the stone protection (due to subsidence, displacement, washouts, channel incision, etc.) and remove any debris that accumulates on the project and snags that may form in the creek adjacent to the project. Additionally, any loss of project plantings will need to be replaced. These costs are not in the above OMRR&R estimate because it is not known if or when they may occur.

Additionally, while the project as designed is not anticipated to require replacement or rehabilitation actions, if project performance become threatened by significant channel changes, the sponsor may consider the addition of grade control structures in order to prevent further damage and increase the resilience of the project.

6.5 Implementation Schedule

The schedule estimate for Design is 8 months. The estimate for Contract Award is 3 months. The estimate for Construction is 6 months, weather permitting. However, if construction timing were projected to occur in summer start (April to September), adjustments would need to be made due to bat tree habitat removal restrictions.

6.6 Sponsor Requirements

The sponsor is required to provide 35% of the total project cost in cash, provide the required real estate access and easements, and perform the OMRR&R requirements for the constructed project in perpetuity.

6.7 Cost Sharing Requirements

The cost sharing for a Section 14 project is 65% Federal and 35% non-Federal. 8Table 8. Cost Sharing displays the cost-sharing requirements for the Federal government and the Local Sponsor.

Table 8. Cost Sharing

O'Fallon Wastewater Treatment Plant Section 14 Cost Sharing (October 2021 Price Level)			
	Federal Cost	**Non-Federal Cost**	**Total**
Design and Construction	$398,000	$215,000	$613,000
LERRD	$0	$0	$0
Total	**$398,000**	**$215,000**	**$613,000**
*All numbers are rounded to nearest thousand.			

In addition to the cost-sharing required for project implementation, the Local Sponsor is required to maintain the project in perpetuity at an estimated annual cost of $1,300.

6.8 FINANCIAL ANALYSIS

The City of O'Fallon has the financial capability to cost-share the estimated implementation costs and are willing to sign the Project Partnership Agreement at the appropriate time. Sponsor self-certification of financial capability will be provided as part of the final report.

7 ENVIRONMENTAL COMPLIANCE & COORDINATION*

A USACE regulatory review and site visit was completed 16 March 2022. Based on the review of available resources and from information gathered during the field visit, the proposed action alternative would qualify under a General Permit 16 and its associated 401 water quality certification. Additionally, 404(b)(1) guidelines are covered during the review and issuance of the general permit itself; therefore, no additional analysis is required.

Notification of the Draft Environmental Assessment and unsigned Finding of No Significant Impact was sent to officials, agencies, organizations, and individuals for public review and comment. Additionally, an electronic copy was available during the public review period (18 October – 18 November 2022) on the USACE St. Louis District's website at:

https://www.mvs.usace.army.mil/Portals/54/docs/pm/PPA/CAP14OFallonWWTPDraftReport.pdf

Please note that the Finding of No Significant Impact is unsigned in the draft version of the EA and will only be signed into effect after careful consideration of the comments received as a result of the public review. In addition, to ensure compliance with the National Environmental Policy Act, Endangered Species Act, and other applicable environmental laws and regulations, coordination with these entities and individuals will continue, as required, throughout the execution of the proposed project.

Table 9. Compliance status for federal statues and executive orders applicable to this study.

Guidance	Compliance
Federal Statutes	
Archaeological and Historic Preservation Act, as Amended, 16 U.S.C. 469, et seq.	PC[1]
Bald and Golden Eagle Protection Act, 16 USC 668-668d	FC
Clean Air Act, as Amended, 42 U.S.C. 7401-7542	FC
Clean Water Act, as Amended 33 U.S.C. 1251-1375	PC[2]
Comprehensive Environmental Response, Compensation, and Liability Act, 42 USC 9601-9675	FC
Endangered Species Act, as Amended, 16 U.S.C. 1531-1544	PC[2]
Federal Water Project Recreation Act, as Amended. 16 U.S.C. 4601, et seq.	FC
Fish and Wildlife Coordination Act, as Amended, 16 U.S.C. 661-666c	PC[2]
Land and Water Conservation Fund Act, as Amended, 16 U.S.C. 4601, et seq.	FC
National Environmental Policy Act, as Amended, 42 U.S.C. 4321- 4347	PC[3]
National Historic Preservation Act, as Amended, 54 U.S.C 300101, et seq.	PC[1]
Noise Control Act, 42 USC 4901, et seq.	FC
Migratory Bird Treaty Act of 1918, 16 USC 703-712	FC
Resource Conservation and Recovery Act, 42 USC 6901-6987	FC
Executive Orders	
Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898)	FC
Floodplain Management, E.O. 11988 as amended by E.O. 12148	FC
Protection of Wetlands, E.O 11990 as amended by E.O. 12608	FC
Protection and Enhancement of the Cultural Environment, E.O. 11593	PC[1]
Consultation and Coordination with Indian Tribal Governments E.O. 13175	PC[1]
Protection of Migratory Birds E.O. 13186	FC

FC = Full Compliance, PC = Partial Compliance.

1. FC attained after completion of all required archaeological investigations, reports, and coordination.
2. FC attained upon completion of any permitting requirements or coordination with other agencies.
3. FC attained upon signing of the NEPA decision document.

8 RECOMMENDATION

I have considered all significant aspects of this project, including environmental, social, and economic effects and engineering feasibility. I recommend the tentatively selected plan, as generally described in this report, for implementation as a federal project, with such modifications thereof as in the discretion of the Commander, USACE may be advisable. The estimated total project first cost of the tentatively selected plan is approximately $613,000 at the October 2021 (FY22) price level. OMRR&R expenses are estimated to be approximately $1,300 per year. The federal portion of the estimated total project first cost is approximately $398,000. The non-federal sponsor's portion of the estimated total project first costs is approximately $215,000.

_____

Kevin Golinghorst
Colonel, Corps of Engineers
District Commander

9 LIST OF PREPARERS

- Michelle Kniep, Plan Formulation
- Rachel Steiger, Environmental Coordinator
- Kamren Metzger, Regulatory
- Ben Greeling, Environmental Quality
- Kristen Fuld, Cultural Resources
- Meredith Trautt, Tribal Coordination
- Joe Collum, Hydrology and Hydraulics
- Matt Hartman, Civil Engineering
- Nick Jacobs, Real Estate
- Paige Scott, Costs

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Continuing Authorities Program, Section 14
O'Fallon Wastewater Treatment Plant
O'Fallon, Illinois

FINDING OF NO SIGNIFICANT IMPACT

1. In accordance with the National Environmental Policy Act, I have reviewed and evaluated the documents relevant to the protection of Silver Creek streambank and the City of O'Fallon's Wastewater Treatment Plant (WWTP) facilities. The work involves stabilizing the streambank to prevent damage to adjacent WWTP facilities.

2. As part of this evaluation, I have considered the following project alternatives:

    a. No Action Alternative- Under this alternative, no federal action would take place and the streambank would continue to erode.

    b. Streambank Revetment Alternative - The St. Louis District, U.S. Army Corps of Engineers (USACE) would re-grade and stabilize 760 linear feet of streambank by placing stone revetment. Willow stakes would be planted over the revetment key on the top side of the slope to provide additional stability. This alternative would include approximately 0.5 acres of vegetation and tree removal to provide access to the stream during construction.

3. The possible consequences of the two alternatives have been studied for physical, environmental, and social effects. Significant factors evaluated as part of my review include:

    a. Water quality, vegetation, fish and wildlife, and recreation and aesthetic resources may improve as a result of the project.

    b. No adverse impacts to federally threatened or endangered species are anticipated.

    c. The proposed project is not anticipated to have an adverse impact upon archaeological remains or historic properties.

    d. No significant impacts to natural resources are anticipated. The proposed repairs would have no adverse impacts to the physical environment (e.g., noise, air and water quality).

    e. The project would not adversely impact low-income or minority populations.

    f. The "No Action" alternative was evaluated and would be unacceptable to recommend as this streambank would continue to erode, increasing risk of damage to WWTP facilities.

4. Compliance with Clean Water Act Section 404 is achieved under Illinois General Permit 16. Compliance with Section 106 of the National Historic Preservation Act (NHPA) was achieved through coordination with the Illinois State Historic Preservation Office. The Fish and Wildlife Service reviewed the document during public review to ensure compliance with the Endangered Species Act and Fish and Wildlife Coordination Act. Compliance with the National Environmental Policy Act will be achieved with the signing of this document. The project is in compliance with all other applicable laws and regulations as documented in the Environmental Assessment.

5. Based on my analysis and evaluation of the alternative courses of action presented in the Environmental Assessment, I have determined that the implementation of the Silver Creek Streambank Revetment Alternative would not have significant effects on the quality of the environment. Therefore, an Environmental Impact Statement will not be prepared prior to proceeding with this action.

_____ _____

(Date)

Kevin Golinghorst
Colonel, U.S. Army
District Commander

Appendix A – Climate Change

Continuing Authorities Program, Section 14
O'Fallon Wastewater Treatment Plant
O'Fallon, Illinois

October 2022

U.S. Army Corps of Engineers
St. Louis District
Regional Planning & Environmental Division North
1222 Spruce Street

ECB-2018-14 Analysis of Potential Climate Vulnerability

This is an evaluation of potential climate vulnerabilities facing the banks of Silver Creek, a tributary to Kaskaskia River in the St. Louis District within the state of Illinois. Silver Creek faces the potential for significant contamination with the erosion of its banks, which would result in the failure of the sewage lagoons of O'Fallon Wastewater Treatment Plant. Discharge of such contaminants would pose a notable health risk to Silver Creek. This assessment was performed to highlight existing and future challenges facing the project's ability to continue operation of the O'Fallon Wastewater Treatment Plant without compromising Silver Creek in response to past and future climatic changes, in accordance with the guidance in Engineering Construction Bulletin (ECB) 2018-14, revised 10 Sep 2020. Background information on the project can be found in the main report, and background information on climate-affected risks to projects and assessments thereof can be found in the ECB.

Literature Review

The CAP 14 O'Fallon Wastewater Treatment Plan, IL project is located in Water Resource Region (i.e., HUC-2 watershed) number 07, the Upper Mississippi Region. A January 2015 report conducted by the USACE Institute for Water Resources (USACE 2015b) summarizes the available climate change literature for this region, covering both observed and projected changes. The *Fourth National Climate Assessment* (NCA4) considers climate change research and the impacts of climate change at both a national and regional scale (USGCRP 2018). Findings in both the 2015 USACE Institute for Water Resources report and NCA4 are noted below

Temperature: Observed trends in temperature of the last century indicate a moderate increase although statistically significant trends were not entirely conclusive amongst sources. A study conducted by Pryor et al. (2014) found a 1.5°F increase in the annual average temperature between 1895 and 2012. Similar studies referencing the 20th century showed a minimum temperature increase alongside a maximum temperature decrease (Millett et al., 2009). Seasonally, a study under Wang et al. (2009) observed a positive statistically-significant trend of increasing temperatures throughout the winter, spring, and summer months but a slight cooling in the fall. On another note, it is projected that the Midwest will experience an increase in the seasonally-warmer temperatures as compared to any other region in the United States (Vose et al., 2017). Utilizing the baseline of 1971 to 2000 and worst-case greenhouse gas emissions, a study by Liu et al. (2013) estimates an increase in the maximum temperature of 2.7°F to 8.1°F in the Upper Mississippi Valley Region along with a trending rise in soil moisture deficit. Projections in temperature differ in outcome and intensity for this region, wherein the north trends to a drier state and warming in the south (Elguindi and Grundstein, 2013) along with an increase in heat severity, frequency, and duration in the east (Gao et al., 2012). Moreover, in central Illinois, Cai et al. (2009) quantified average monthly temperature increases of 2.7°F to 4.5°F by 2055.

Precipitation: Several sources observed a positive statistically-significant trend upon increasing annual precipitation for the Upper Mississippi Valley Region (McRoberts and Nielsen, 2011; Small et al., 2006; Wang and Zhang, 2008), where authors McRoberts and Nielsen observed an increasing trend of 5-20% per century referencing 1895 to 2009. However, seasonally, Wang et al. (2009) found a small decreasing trend in the winter and spring. Using Global Climate Models (GCMs) to focus on changes in extreme precipitation comparing periods 1977 to 1999 and 1949 to 1976, Wang and Zhang (2008) reported a 33% increase in the 20-year storm event frequency. Studies have shown a

decrease in drought frequency as well as an increase in the soil moisture index (Grundstein, 2009), but in the future, sources also estimate extreme temperatures will outpace precipitation trends (Easterling et al., 2017; Liu et al., 2013). As for this coming century, the frequency and intensity of precipitation events as well as annual precipitation are predicted to increase. Annual and daily extreme storm events (in the 95th percentile) are also anticipated to become more recurrent (Gao et al., 2012). Additionally, there is a wide consensus on projected trends of drier summer months and wetter winter months (Easterling et al., 2017; Liu et al., 2013; Wilson and Weng, 2011).

Streamflow: There is notable evidence that flow and flood frequency and extremity have increased, but labeling these trends a result of climate change is not so simple as Döll and Zhang (2010) describe its effects as 'mild' on average flows. However, it is evident that increased precipitation in the Upper Mississippi Valley Region has a stronger impact than land use on river flow (Frans et al., 2013). A study compiled by Small et al. (2006) quantified an increasing statistically significant trend in the annual seven-day flow and annual mean flow. Moving into the latter half of the century, Hagemann et al. (2013) predict an increase in runoff by as much as 100 mm per year by 2071 to 2100. However, there is a much greater inconsistency amongst sources projecting streamflow. Considering both the lower and higher scenarios (representative concentration pathways, RCP, 4.5 and 8.5), there is an estimated increased risk of inland flooding (Easterling et al., 2017). On the contrary, other studies received data predicting both increasing and decreasing trends (Thomson et al., 2005) with Jha et al. (2006) finding a deviation of +50% or -50% projected flow for the Mississippi River.

Summary: Some reports (though not completely conclusive) with statistically-significant data were found on observations of increasing mean and minimum air temperature. Based upon the greenhouse gas emission scenario, baseline and Global Climate Model, projected temperatures vary; however, there is a strong consensus that average monthly and maximum temperatures will increase over the next century. Studies on precipitation produced a very similar consensus of an overall increase in the past leading to wetter months outside of the summer. Additionally, there is consensus in projected increases in precipitation frequency and duration, especially with extreme storm events. Nonetheless, this is paired with estimates of a rising soil moisture deficit and increasing drought frequency. Many sources agree there is a rising, increasing trend in low and peak flow for the Upper Mississippi Valley Region. However, there is a great deviation in results for streamflow projections for both increasing and decreasing trends reported within the same two studies. Therefore, such analysis are noted as inconclusive. These findings are summarized in Figure 1.

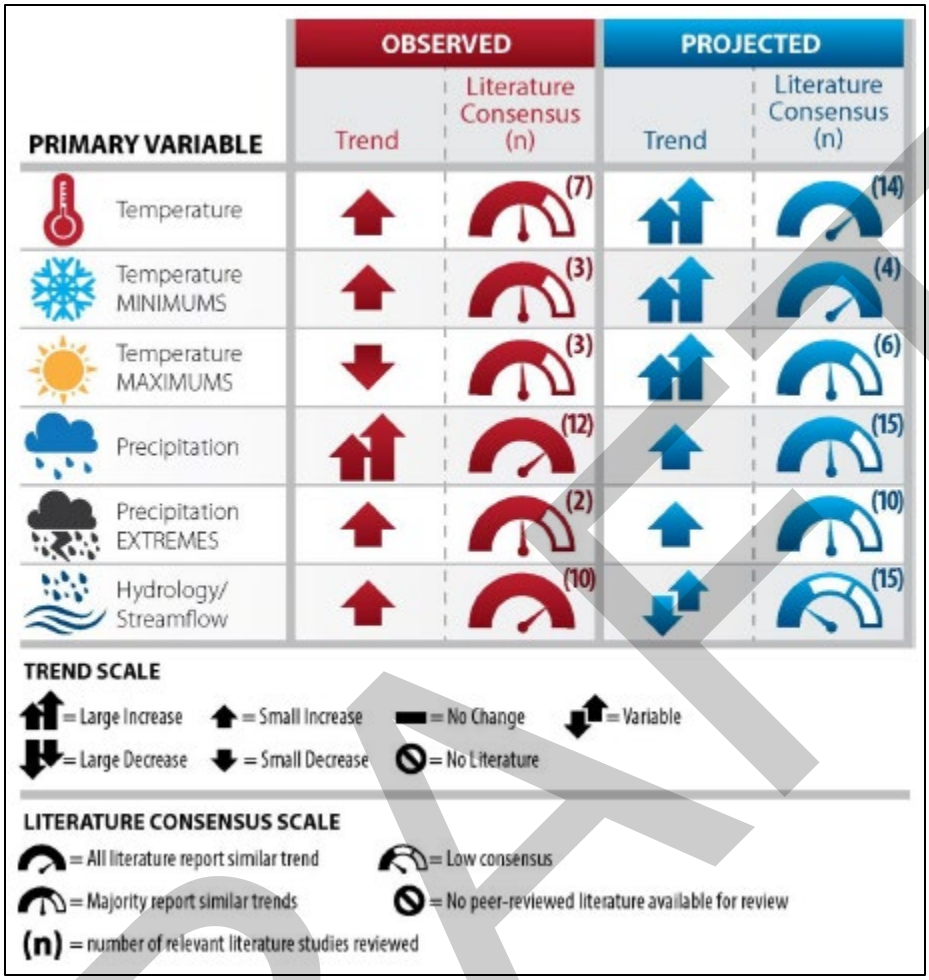

Figure 1. Summary matrix of observed and projected climate trends (USACE 2015)

Nonstationarity Detection

The assumption that discharge datasets are stationary (their statistical characteristics are unchanging) in time underlies many traditional hydrologic analyses. Statistical tests can be used to test this assumption using techniques outlined in Engineering Technical Letter (ETL) 1100-2-3. The Nonstationarity Detection (NSD) tool is a web-based tool to perform these tests on datasets of annual peak streamflow at U.S. Geological Survey (USGS) stream gages. The O'Fallon Wastewater Treatment Plant in Illinois operates over three sewage lagoons, two of which are less than one hundred feet from Silver Creek. The primary objective of this study is to evaluate flood levels that are eroding the berms to failure, thereby threatening contamination from sewage lagoons into Silver Creek, so the focus of this investigation is the high flow regime that is best represented by annual instantaneous peak flows.

For this project, the NSD tool was applied using annual peak streamflow data from USGS gage 05594450, Silver Creek near Troy, IL. The gage captures 154 square miles of drainage area and is located near the intersection of Silver Creek and Highway 40, 8.85 miles upstream of the O'Fallon Wastewater Treatment Plant site. Natural flow of the creek was originally altered through channelization of the tributary, which has resulted in significant channel incision. Additionally, following a similar concern for bank erosion directly adjacent to the uppermost lagoon, revetments were installed for a Section 14 project in 2002. This is the closest gage as the following gage records data 17.18 miles downstream of

the site. Annual peak data has been collected since 1967. The NSD tool applies analysis to the period of record from 1967 to 2021.

As shown in Figure 2 referencing USGS gage 05594450 of Silver Creek near Troy, IL, no strong nonstationarities were detected in this record. None of the tests determining statistical significance identified anything conclusive between 1967 and 2021. Additionally, no monotonic trends are detected in the peak streamflow dataset between 1967 and 2021 using the t-Test (p-value = 0.59>0.05), Mann-Kendall (p-value = 0.88>0.05), and Spearman Rank Order (p-value = 0.92>0.05) tests applied using a 0.05 level of significance.

Figure 2. Output of the Nonstationarity Detection Tool for USGS gage 05594450 on Silver Creek near Troy, IL

Climate Hydrology Assessment Tool

The USACE Climate Hydrology Assessment Tool (CHAT) can be used to assess projected, future changes to streamflow in the watershed. Projections are at the spatial scale of a HUC-8 watershed, with flows generated using the Variable Infiltration Capacity (VIC) model from temperature and precipitation data statistically downscaled from GCMs using the Bias Corrected, Spatially Disaggregated (BCSD) method. The VIC model is setup to simulate unregulated basin conditions. The O'Fallon Wastewater Treatment Plant project is in HUC 07140204 (Upper Mississippi-Kaskaskia-Meramec, Lower Kaskaskia). Figure 3 shows the range of output presented in the CHAT using 64 combinations of GCMs and representative concentration pathways (RCPs) of greenhouse gas emissions applied to generate climate-changed hydrology using the VIC model. The range of data is indicative of the uncertainty associated with projected, climate-changed hydrology.

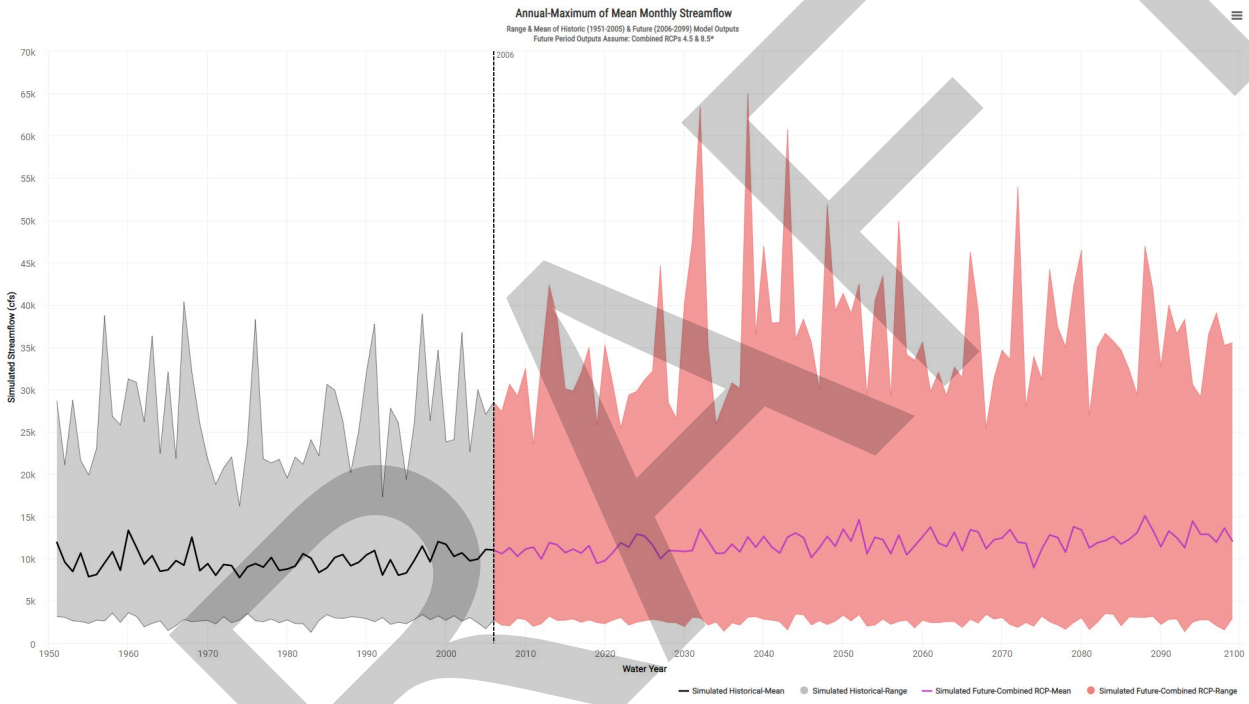

Figure 3. Range of 64 Climate-Changed Hydrology Model Output for Lower Kaskaskia watershed (HUC 07140204)

Figure 4 shows the average of 64 combinations of GCM and emissions scenarios used to generate annual maxima of monthly average discharge for the Lower Kaskaskia watershed (HUC 07140204). The gray line in the "earlier" period refers to simulations using observed levels of atmospheric carbon pre-2005 (hindcast period), while the blue line (the "later" period) refers to simulations using projected carbon emissions according to the RCPs. The "earlier" trend line reports p-values of 0.377 for the t-Test, 0.147 for Mann-Kendall, and 0.161 for Spearman Rank-Order, which are all greater than the level of significance, p=0.05, and therefore provide little evidence for a statistically-significant trend. The "later" trend line found p-values of 1.02e-6 for the t-Test, 2.50e-6 for Mann-Kendall, and 4.44e-7 for Spearman Rank-Order, which meet the threshold for statistical significance at the p<0.05 level.

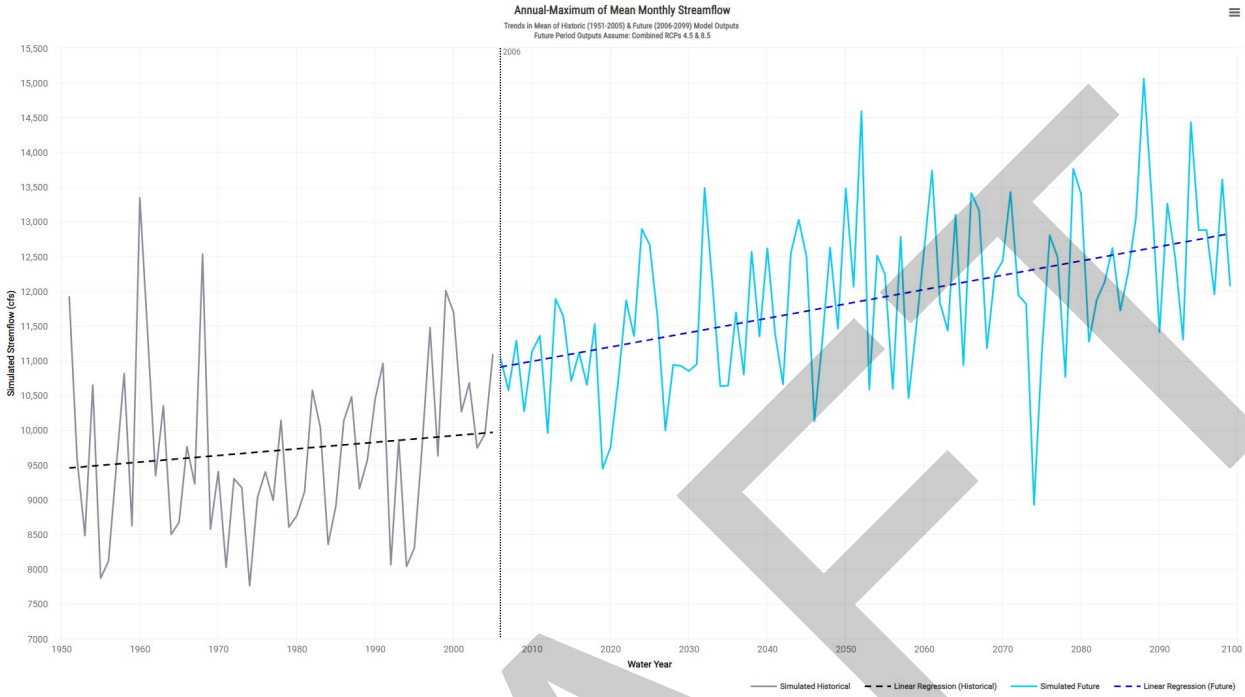

Figure 4. Projected mean annual maximum monthly flows for the Lower Kaskaskia watershed (HUC 07140204)

Vulnerability Assessment

The USACE Watershed Climate Vulnerability Assessment (VA) Tool facilitates a screening-level, comparative assessment of the vulnerability of a given business line and HUC-4 watershed to the impacts of climate change, relative to the other HUC-4 watersheds within the continental United States (CONUS). It uses the Coupled Model Intercomparison Project (CMIP5) GCM-BCSD-VIC dataset (2014) to define projected hydrometeorological inputs, combined with other data types, to define a series of indicator variables to define a vulnerability score.

Vulnerabilities are represented by a weighted-order, weighted-average (WOWA) score generated for two subsets of simulations (wet—top 50% of cumulative runoff projections; and dry—bottom 50% cumulative runoff projections). Data are available for three epochs. The epochs include the current time period ("Base") and two 30-year, future epochs (centered on 2050 and 2085). The Base epoch is not based on projections and so it is not split into different scenarios. For this application, the tool was applied using its default, National Standards Settings. In the context of the VA Tool, there is some uncertainty in all of the inputs to the vulnerability assessments. Some of this uncertainty is already accounted for in that the tool presents separate results for each of the scenario-epoch combinations rather than presenting a single aggregate result.

As shown in Figure 4, the Upper Mississippi-Kaskaskia-Meramec (HUC 0714) watershed is not considered relatively vulnerable to climate change impacts for the flood risk reduction business line, since it is not among the 20% most vulnerable watersheds for this business line in the CONUS (202 HUC04s). This is true for both the wet and dry scenarios and both the 2050 and 2085 epochs. In this climate risk analysis, WOWA values are determined by several factors: the acres of urban area within the 500-year floodplain, the coefficient of variation in cumulative annual flow, runoff elasticity (ratio of streamflow runoff change to precipitation change), and two indicators of flood magnification (indicator of how much high flows are projected to change over time), one of which includes contributions from

upstream watersheds and the other focused only on the change in flood frequency within the watershed of interest. The primary driver of this flood risk vulnerability for all scenarios and epochs, contributing 43%-44% in the dry season and 47%-48% in the wet season, is indicator 568C Flood Magnification, which includes flow from upstream watersheds along with the local watershed that exceed monthly runoff 10% of the time. The other noteworthy contributor at this location is 590 Urban Development, holding 27% in the dry season and 15%-24% in the wet season.

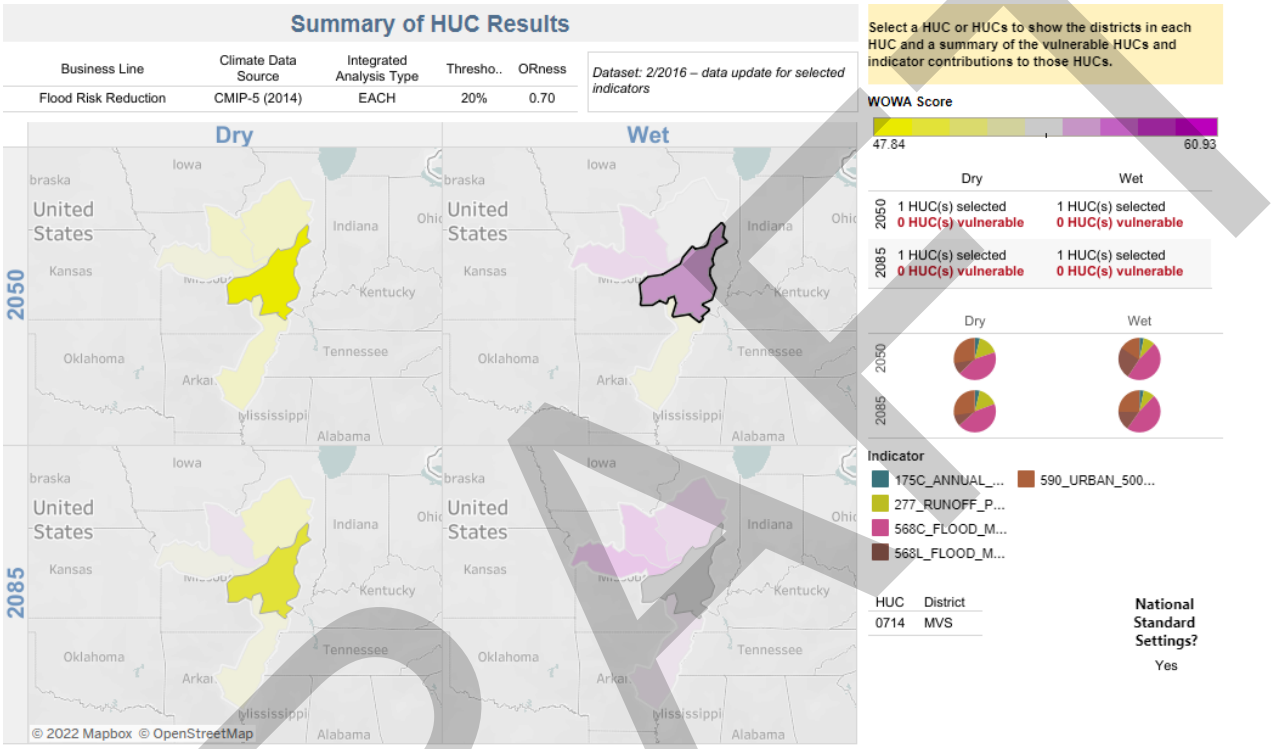

Figure 5. Output of the VA Tool indicates the Upper Mississippi-Kaskaskia, Meramec watershed is not among the 20% most vulnerable CONUS watersheds for the Flood Risk Reduction business line

Conclusion

Recent climate science literature is equivocal on observed trends in mean and extreme temperatures in this region but provides reasonable consensus that projected increases in extreme temperature events, including more frequent, longer, and more intense summer heat waves, can be expected in the long-term future compared to the recent past. Increases in precipitation have been both observed and projected for this region, though increased drought severity is also projected. As a result, projections of future streamflows are mixed and depend on the climate model and its assumptions. Observed trends in streamflow vary by season and source but remain a significant vulnerability to the watershed in question as noted in Figure 5.

No strong nonstationarities or monotonic trends were detected at the closest gage upstream of the project. Projections of streamflow in the pre-2005 period show no significant trend, while projections post-2005 show an increasing trend in the annual-maximum mean monthly streamflow (Figure 4). This watershed is not relatively vulnerable in the flood risk management business line compared to other CONUS watersheds.

As indicated in Table 1, climate change has the potential to result in greater runoff and streamflow that could further incise and erode the vulnerable banks. However, the residual risk due to climate change to the project is classified as low-moderate. The risk is low-moderate for future risk as there is a greater lack of evidence for a verifiably significant rise in streamflow and average flow rates. However, the risk raises moderate questions, as there are projected increases in precipitation intensity and frequency as well as a general consensus on and statistically-significant trends of mildly rising flow that would contribute to erosion of the bank.

Table 1. Residual Risk Due to Climate Change to Silver Creek

Feature	Trigger	Climactic Hazard	Harm	Qualitative Likelihood
Bank Riprap	More shear stress and higher velocity along bank	Net increase in runoff volume and increasing precipitation frequency and intensity; increased flow	Channel incision leading to compromised bank toe protection	**Low-moderate; sources vary dramatically with regards to streamflow, and precipitation is coupled with a projected rise in drought frequency**

Although the risks to this project are identified as low-moderate, potential adaptation actions for climate-affected hydrology still exist. Potential adaptation actions to address project vulnerabilities include continuing the 2002 revetment project downstream of the first sewage lagoon to then provide protection to both lagoons. This would reduce the risk of incising the bank and berms to failure. Another alternative under consideration is relocating the sewage lagoons to avoid contamination of the creek if no bank stabilization is to be undertaken.

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Appendix B - Costs

Continuing Authorities Program, Section 14
O'Fallon Wastewater Treatment Plant
O'Fallon, Illinois

October 2022

U.S. Army Corps of Engineers
St. Louis District
Regional Planning & Environmental Division North
1222 Spruce Street

Current cost estimates are preliminary and cannot be released until they have been reviewed and approved per ER 1110-1-1300 (Cost Engineering Policy and General Requirements). Therefore, the contents of Appendix B have been intentionally omitted.

Appendix C - Real Estate Plan

Continuing Authorities Program, Section 14
O'Fallon Wastewater Treatment Plant
O'Fallon, Illinois

October 2022

U.S. Army Corps of Engineers
St. Louis District
Regional Planning & Environmental Division North
1222 Spruce Street

TABLE OF CONTENTS

1. PURPOSE

a. This Real Estate Plan (REP) is in support of the Feasibility Study for the Continuing Authorities Program, Section 14 (CAP 14), O'Fallon Wastewater Treatment Plant, IL. The Non-Federal Sponsor (NFS) for this project is the City of O'Fallon in St. Clair County, Illinois. This project is authorized under the Continuing Authorities Program and Section 14 (Emergency Streambank Protection) of the Flood Control Act of 1946, as amended. The CAP 14 program is designed to implement projects to protect public or non-profit public facilities and/or services which are open to all on equal terms, have been properly maintained but threatened by natural processes on streambanks and shorelines, and are essential and important enough to merit Federal participation in their protection (EP 1105-2-58, para. 29.a).

b. The purpose of this project to protect the lagoons utilized by the O'Fallon Wastewater Treatment Plant, IL from erosion occurring on the right descending bank of Silver Creek. The project would include work to re-grade and stabilize the western bank of Silver Creek by placing stone revetment roughly 15 feet up the slope from the toe of the bank in two locations, being 410 feet long and 350 feet long separated by approximately 23 feet as depicted in Figure 1 below and on Exhibit A. The top of the new revetment is defined primarily by the line of deposition that has occurred along the existing revetment from a repair that was completed by another CAP Section 14 in 2002. This line of deposition indicates that erosive forces are minimal at and above that elevation. Native vegetation with dense roots will be planted above the new revetment line in order to provide additional protection against minor erosive forces that may occur.

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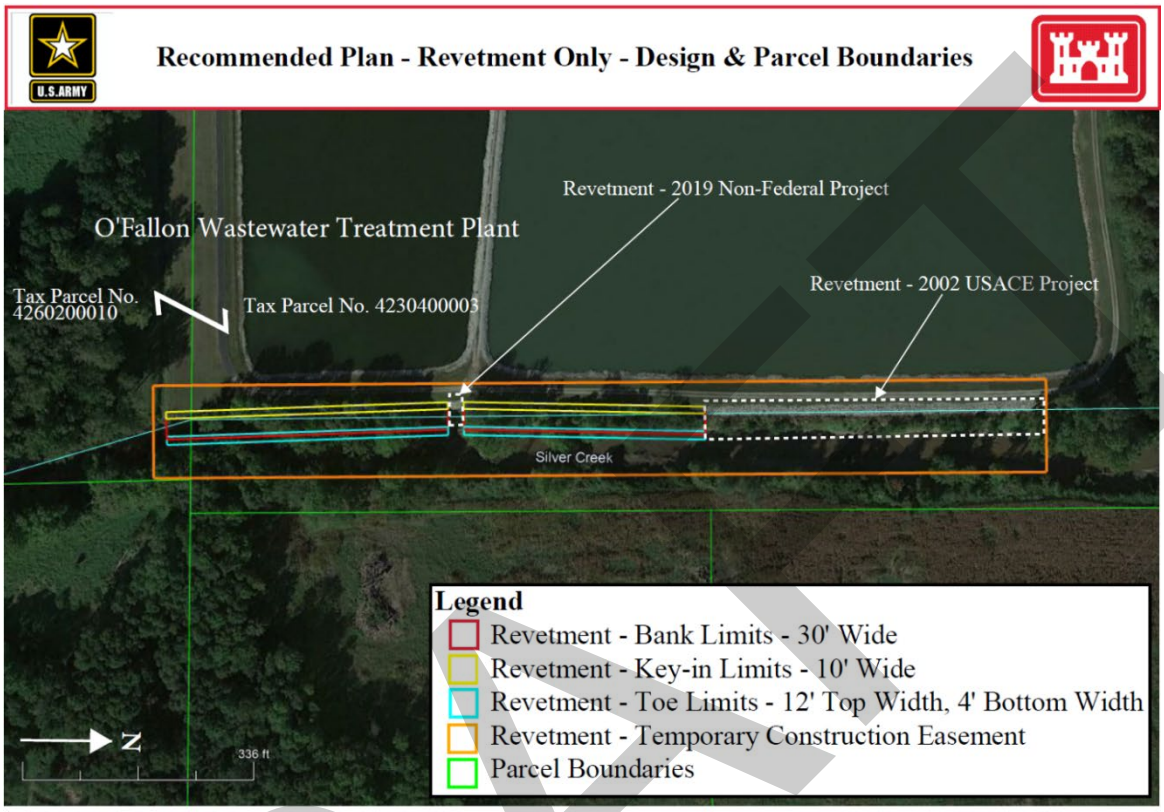
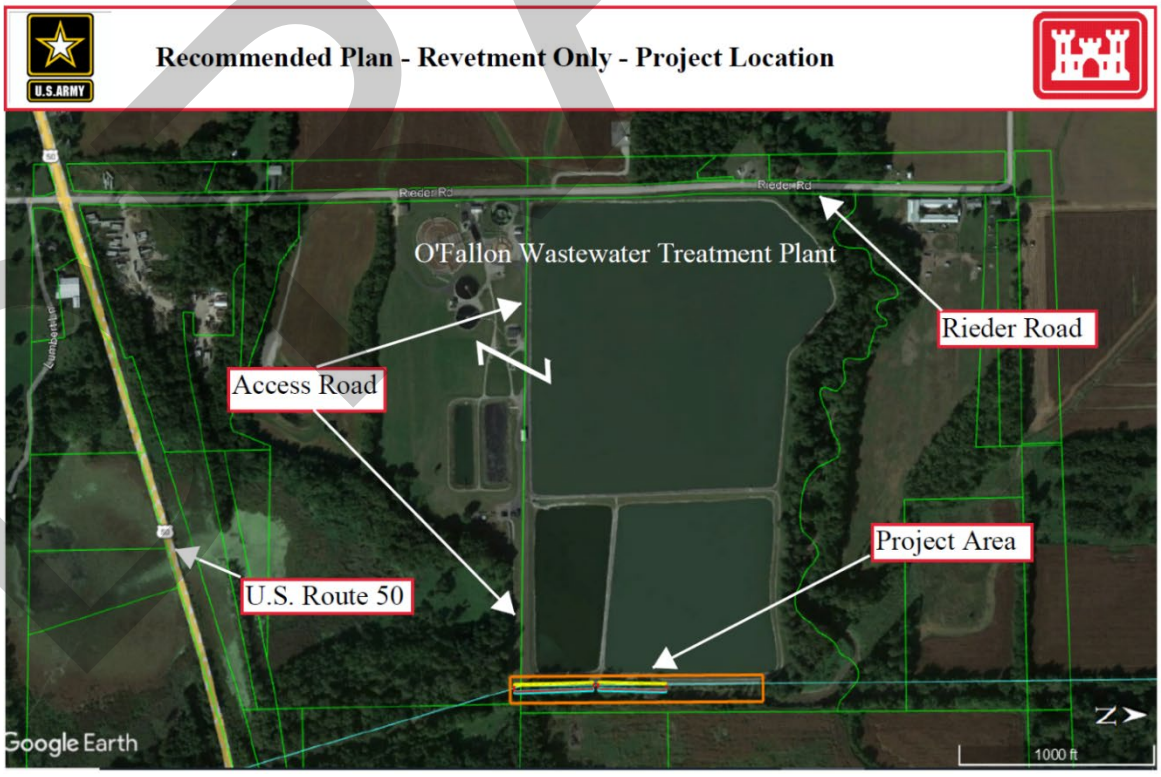
FIGURE 1 – Recommended Plan – Revetment Only





2. LANDS, EASEMENTS AND RIGHTS-OF-WAY (LER)

The current recommended plan provides for the placement of revetment on certain portions of the western bank of Silver Creek in order to reduce erosion. The construction of the project will require a temporary construction area (easement) of approximately 4 acres and access via an existing road located on the same property as the location of the O'Fallon Wastewater Treatment Plant. In addition, approximately 0.85 acres of fee title is necessary where revetment will be placed. The revetment will encompass two areas, one being approximately 0.45 acres and the other being approximately 0.40 acres.

Temporary Construction Easement Area (includes 0.85 acres of fee where revetment will be placed)					
Address	**Tax Assessor Parcel No.**	**Owner**	**Interest Owned**	**Type of Interest Required**	**Approximate Acres Included in Easement**
(No Site Address Number) Rieder Rd, Lebanon, IL 62254	4230400003	City of O'Fallon	Fee	Temporary Easement	3.83
10378 Rieder Rd Lebanon, IL 62254	4260200010	City of O'Fallon	Fee	Temporary Easement	0.17
Fee - 0.85 acres of Revetment					
Address	**Tax Assessor Parcel No.**	**Owner**	**Interest Owned**	**Type of Interest Required**	**Approximate Acres Included in Easement**
(No Site Address Number) Rieder Rd, Lebanon, IL 62254	4230400003	City of O'Fallon	Fee	Fee	0.81
10378 Rieder Rd Lebanon, IL 62254	4260200010	City of O'Fallon	Fee	Fee	0.04

3. SPONSOR-OWNED LER

The NFS, the City of O'Fallon, Illinois, owns fee title to all lands within the footprint of the sewage treatment facility. However, the project footprint is located at the edge of the NFS' fee title boundary, along an eroded streambank. Therefore, it is critical that the NFS confirm the location of their fee ownership boundary, as well as any easement rights within the proposed project footprint, in general, and along Silver Creek, specifically. The NFS also needs to confirm if any third party interests exist that affect the project area and access to the project area. The NFS should address what authority, if any, the Silver Creek Drainage District Number One, currently has within the project area.

4. NON-STANDARD ESTATES

No non-standard estates are anticipated to be required for this project.

5. EXISTING FEDERAL PROJECTS

One previous CAP Section 14 project was implemented in 2002 and involved using revetment to stabilize portions of the right descending bank of Silver Creek. The location of the revetment from the 2002 project is located contiguous to the north of the current project area as depicted on Exhibit A. The previous 2002 project is located within the current project's temporary construction easement but the revetment areas do not overlap. The City of O'Fallon was the NFS for the previous 2002 project and owned a fee simple interest at that time where the revetment was placed. The CAP 14 O'Fallon Wastewater Treatment Plant will not adversely affect existing Federal projects.

6. FEDERALLY OWNED LANDS

The is no federally owned land included within the required LER for this project.

7. NAVIGATION SERVITUDE

Silver Creek is not considered a navigable stream nor considered navigable waters of the United States, and the project does not serve a purpose which is in the aid of navigation. Navigational servitude does not apply for this project.

8. MAPPING

A map of the site location is included as Exhibit A.

9. INDUCED FLOODING

According to the project delivery team, the recommended plan will not cause induced flooding.

10. BASELINE COST ESTIMATE

A baseline cost estimate is not provided herein as the NFS will not receive credit for LERRDS (see Number 3 of this REP) and there is no anticipated acquisition by the NFS or USACE.

11. RELOCATION ASSISSTANCE

The recommended plan does not require the project to provide temporary or permanent relocation benefits to residential, farm or business entities.

12. MINERAL ACTIVITY

There are no known mineral Rights affecting the study area.

13. SPONSOR ASSESSMENT

The NFS has the legal authority and power to enter into a Project Partnership Agreement (PPA). The project area is located outside of the political boundaries of the City of O'Fallon. The NFS Capability Checklist is included as Exhibit B.

14. ZONING

No known zoning ordinances are proposed.

15. SCHEDULE OF LAND ACQUISITION MILESTONES

Land acquisition is not anticipated to be necessary for the project. Typically, a period of one year is allowed to complete all land acquisition activities.

16. FACILITY OR UTLITY RELOCATIONS

There are no known utility relocations required for this project.

17. HTRW

According to Section 3.8 of the main report, a preliminary review of available imagery and environmental databases was performed, but a Phase I Environmental Site Assessment has not been completed. Environmental Site Assessments are recommended prior to the beginning of construction to identify any possible recognized environmental conditions.

18. LANDOWNER ATTITUDE

There is no known landowner opposition to this project.

19. NOTIFICATION TO THE SPONSOR REGARDING THE RISKS ASSOCIATED WITH LAND ACQUISITION BEFORE EXECUTION OF THE PROJECT PARTNERSHIP AGREEMENT (PPA)

The NFS was notified via signed letter of the risks associated with acquiring lands prior to the execution of the Project Partnership Agreement (PPA).

20. OTHER RELEVANT REAL ESTATE ISSUES

All relevant real estate issues have been discussed.

Prepared by:

_____

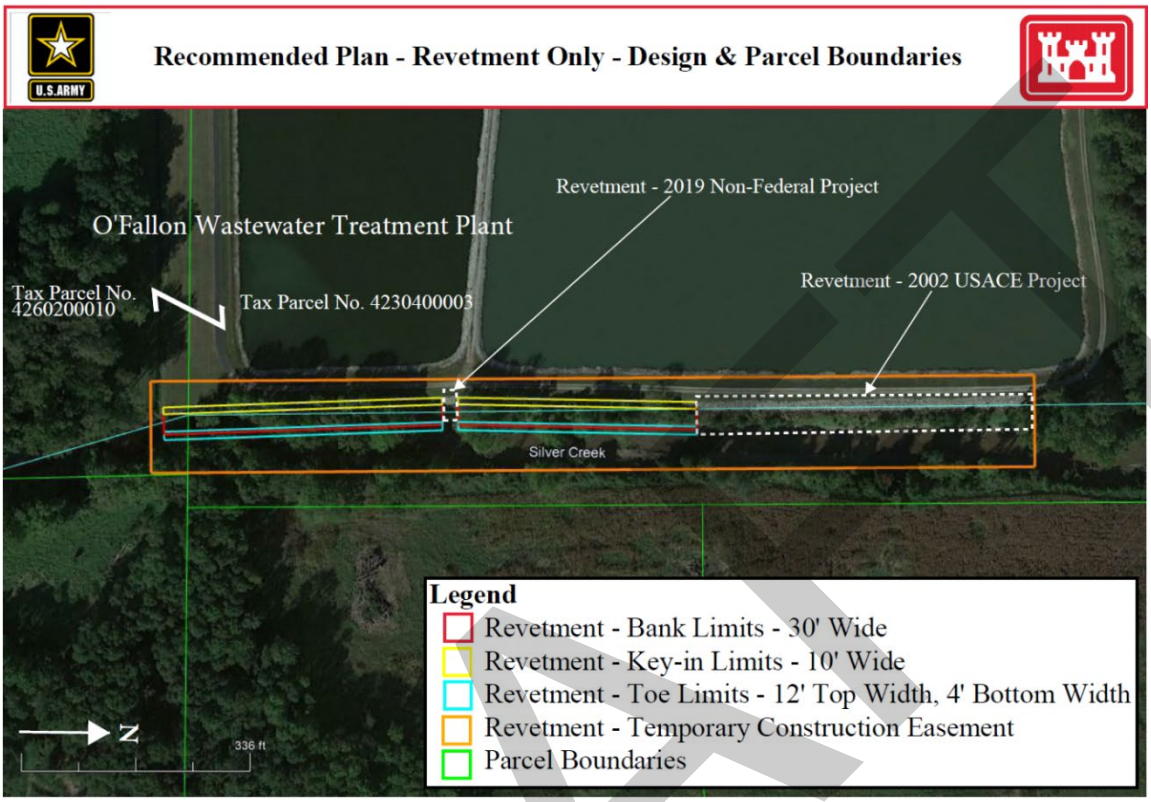
Nicholas W. Jacobs
Realty Specialist
Saint Louis District
Mississippi Valley Division
U.S. Army Corps of Engineers

Reviewed by:

_____

Melissa Lynn Hoerner
Chief of Real Estate
Saint Louis District
Mississippi Valley Division
U.S. Army Corps of Engineers

EXHIBIT A – PROJECT STUDY AREA



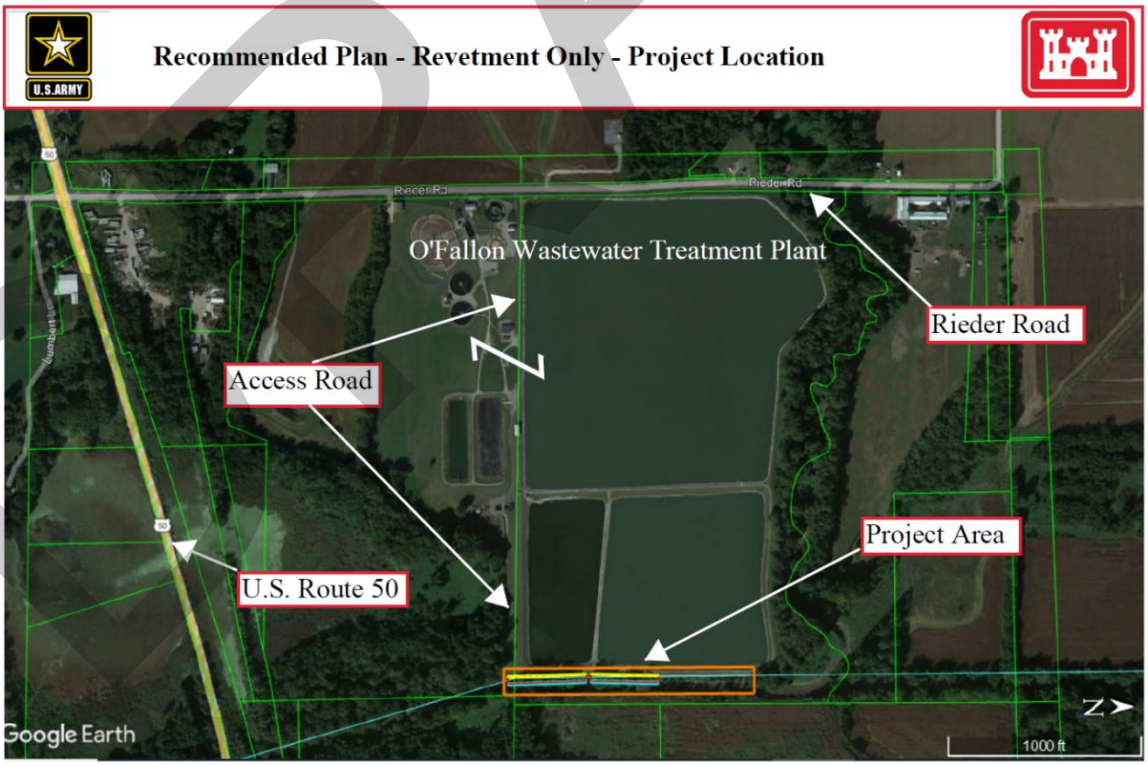


EXHIBIT B - ASSESSMENT OF NON-FEDERAL SPONSOR'S REAL ESATE CAPABILITY

ASSESSMENT OF NON-FEDERAL SPONSOR'S REAL ESTATE CAPABILITY
CAP 14 O'FALLON WASTEWATER TREATMENT PLANT
CITY OF O'FALLON, ILLINOIS

I. Legal Authority:

a. Does the sponsor have legal authority to acquire and hold title to real property for project purposes?

b. Does the sponsor have the power of eminent domain for this project?

c. Does the sponsor have "quick-take" authority for this project?

d. Are any of the lands/interests in land required for the project located outside the sponsor's political boundary?

e. Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn?

II. Human Resource Requirements:

a. Will the sponsor's in-house staff require training to become familiar with the real estate requirements of the Federal project including P.L. 91-646, as amended?

b. If the answer to II.a. is "yes," has a reasonable plan been developed to provide such training?

c. Does the sponsor's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project?

d. Is the sponsor's projected in-house staffing level sufficient considering its other workload, if any, and the project schedule?

e. Can the sponsor obtain contractor support, if required in a timely fashion?

f. Will the sponsor likely request USACE assistance in acquiring real estate?

III. Other Project Variables:

a. Will the sponsor's staff be located within reasonable proximity to the project site?

b. Has the sponsor approved project/real estate schedule/milestones?

IV. Overall Assessment:

a. Has the sponsor performed satisfactorily on other USACE projects?

b. With regard to this project, is the sponsor anticipated to be fully capable?

V. Coordination:

a. Has this assessment been coordinated with the sponsor?

b. Does the sponsor concur with this assessment?

_____

Nicholas W. Jacobs
Realty Specialist
Saint Louis District
Mississippi Valley Division
U.S. Army Corps of Engineers

EXHIBIT C – RISK NOTIFICATION LETTER

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, ST. LOUIS DISTRICT
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103

August 16, 2022

Real Estate Division
Planning and Acquisition Branch

SUBJECT: Continuing Authorities Program, Section 14 O'Fallon Wastewater Treatment Plant
Notification of Real Estate Acquisition Risk

Mr. Herb Roach, Mayor
City of O'Fallon, IL
255 South Lincoln
O'Fallon, IL 62269

Dear Mr. Roach:

The purpose of this letter is to inform the non-federal partner, the City of O'Fallon (herein referred to as the "Sponsor"), about the real estate requirements and the risks involved in acquiring real estate before the Project Partnership Agreement (PPA) is signed by the Sponsor.

If this project requires the acquisition of various real estate interests to support the design features. The procedures for acquiring real estate right-of-way in conjunction with Federal Programs are outlined in the Uniform Real Property Acquisition and Relocation Assistance Act, Public Law 91-646, as amended. Detailed discussions will be held with the Sponsor when final right-of-way requirements for the project are identified by the U. S. Army, Corps of Engineers, St. Louis District, Real Estate Division.

The St. Louis District is advising the Sponsor of the potential risks associated with starting an acquisition program before execution of the PPA. Generally, these risks include but are not limited to, the following:

1. Congress may not appropriate funds to construct the proposed project.

2. The proposed project may otherwise not be funded or approved for construction.

3. A PPA mutually agreeable to the non-Federal partner and the Government may not be executed and implemented.

4. The non-Federal Partner may incur liability and expense by virtue of its ownership of contaminated lands, or interests therein, whether such liability should arise out of local, state, or Federal laws or regulations including liability arising out of the Comprehensive Environmental Response, Compensation, and Liability ACT of 1980, as amended (CERCLA).

5. The non-Federal Partner may acquire interests or estates that are later determined by the Government to be inappropriate, insufficient, or otherwise not required for the project.

6. The non-Federal Partner may initially acquire insufficient or excessive real property acreage which may result in additional negotiations and/or benefit payments under P.L. 91-646, as well as the payment of additional fair market value to affected landowners which could have been avoided by delaying acquisition until after PPA execution and the Government's notice to commence acquisition and performance of the Lands, Easements, Rights-of-Way, Relocations and Disposals (LERRDS).

7. The non-Federal Partner may incur costs or expenses in connection with its decision to acquire or perform LERRDS in advance of the executed PPA and the Government's notice to proceed which may not be creditable under the provisions of Public Law 99-662 or the PPA.

We look forward to working closely with you on this important project. If you have questions regarding this information, please contact Nick Jacobs at 314-331-8167 or Nicholas.W.Jacobs@usace.army.mil.

Sincerely,

Melissa Lynn Hoerner

Melissa Lynn Hoerner
Real Estate Contracting Officer
Chief, Real Estate Division

EXHIBIT D – ESTATES

FEE:
The fee simple title to (the land described in Schedule A) (Tracts Nos. _____, and _____), Subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

TEMPORARY WORK AREA EASEMENT:
A temporary easement and right-of-way in, on, over and across (the land described in Schedule A) (Tracts Nos. _____, _____ and _____), for a period not to exceed _____, beginning with date possession of the land is granted to the United States, for use by the United States, its representatives, agents, and contractors as a (borrow area) (work area), including the right to (borrow and/or deposit fill, spoil and waste material thereon) (move, store and remove equipment and supplies, and erect and remove temporary structures on the land and to perform any other work necessary and incident to the construction of the _____ Project, together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions, and any other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

Appendix D - Civil Engineering

Continuing Authorities Program, Section 14
O'Fallon Wastewater Treatment Plant
O'Fallon, Illinois

October 2022

U.S. Army Corps of Engineers
St. Louis District
Regional Planning & Environmental Division North
1222 Spruce Street
St. Louis, Missouri 63103-2833

1 EXISTING CONDITIONS

1.1 PROJECT LOCATION AND HISTORY

The proposed project is located approximately 16 miles east of St. Louis, Missouri, just east of O'Fallon, Illinois. It's located on Silver Creek, approximately 1000 feet upstream of where it crosses Highway 50, immediately adjacent to the eastern edge of the City of O'Fallon Wastewater Treatment Plant (WWTP; Figure 1) in Lebanon, IL. There are industrial, commercial, agricultural, and residential properties within the project vicinity.

The wastewater treatment plant for the City of O'Fallon, IL is located on the right descending bank of Silver Creek. Silver Creek is incising, creating steep banks susceptible to erosion. In addition to regular flows eroding the banks, debris in the creek can deflect flows toward the banks causing focused areas of erosion. The erosion is threatening one of the City's sewage lagoons and, without proper intervention, continued erosion progression could potentially affect the integrity of the lagoon berms and cause the berms to fail and discharge untreated or partially treated sewage into Silver Creek.

One source of the current problem appears to be additional development in the watershed, which has impacted stream flows and steadily caused erosion in this reach. Review of aerial imagery from 2002 to the present shows approximately a 6 square mile (about 2%) increase in urban area within the watershed, with most of that occurring within 6 miles of the treatment plant. The total watershed includes 327 square miles and Silver Creek extends approximately 40 miles upstream of the lagoons. The higher runoff coefficient associated with urban area, in close proximity to the lagoons, results in higher runoff volume and is considered a major driver of the channel incision and bank erosion.

One area of localized erosion begins about 30 feet downstream of the existing revetment and extends for another 20-30 feet. This eroded area is bounded by two mature trees near the toe of the bank. The eroded face is concave in shape and is about 10 feet tall with a nearly vertical slope. In other areas the toe of the right descending bank is eroded out and approximately a 4-5 feet vertical face exists. In these areas stress cracks are present further up the bank where it appears that the bank is at risk of sliding.

Figure 1. Approximate location of the proposed project vicinity and area near O'Fallon, Illinois.

1.2 EXISTING FEATURES

A portion of the upstream berm and bank is armored with rock placed for a Section 14 project completed in 2002 (O'Fallon Sewage Lagoons, Silver Creek Ditch, IL). At the time of construction, this action addressed an erosion threat to the upstream lagoon caused by flood events that had deposited a snag of trees in the creek, causing a sand bar to form and diverting flows toward the lagoon berm. The downstream berm was not threatened. The snag and sand bar were removed and have not re-formed. The 2002 project is performing as designed and is not causing the current erosion problem.

The design for the 2002 revetment project (Figures 2 & 3) was used to inform this design, using the stone size and bedding material dimensions, and making improvements on design items such as a larger toe, limits of the stone going 15 feet up the slope rather than all the way to the top, and the addition of a bank key-in to solidify the entire field of revetment stone to the slope. There also existed prior to the 2002 revetment project, a "sediment island" in the Silver Creek channel that was remedied by Section A-A shown below. These conditions were not observed during the project site visit conducted in the Spring of 2021.

A smaller portion of the bank, near to the intersection of access roads between the two sewage lagoons shown in the plan view of Figure 4, was repaired with the same design as the 2002 project. This repair was done by the City of O'Fallon to both head off any further damage, but also as a test site for the further revetment described in this appendix and report.

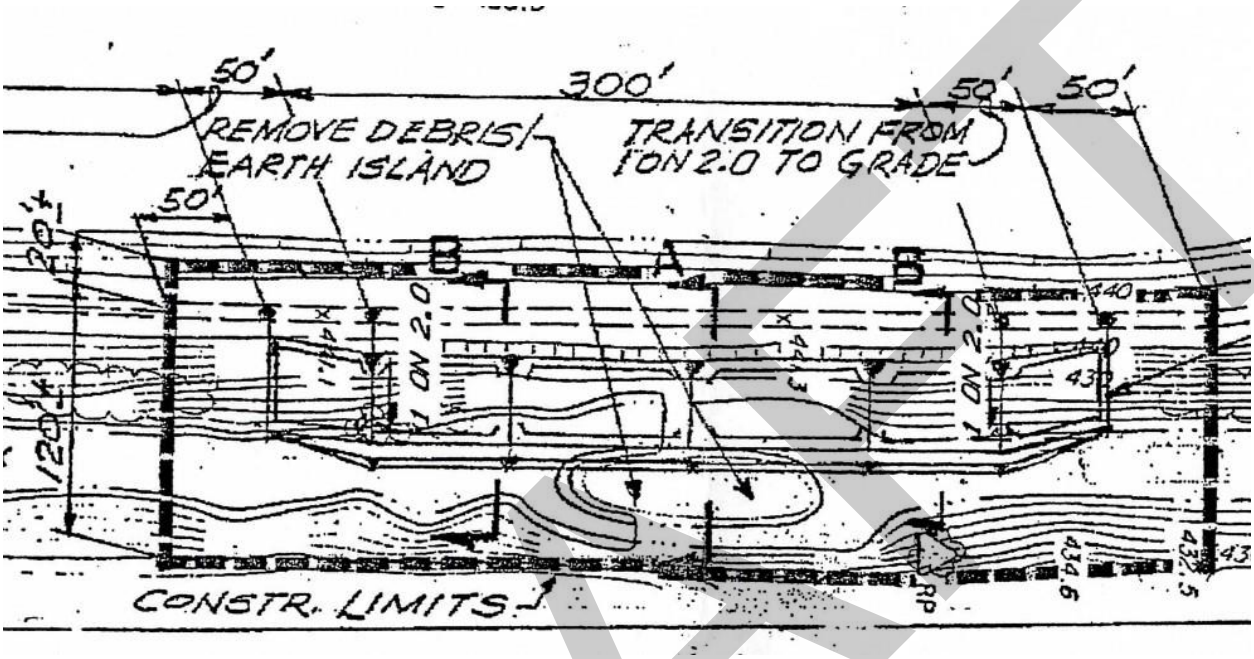


Figure 2. Plan View from 2002 Revetment Project at the O'Fallon, IL Wastewater Treatment Plant

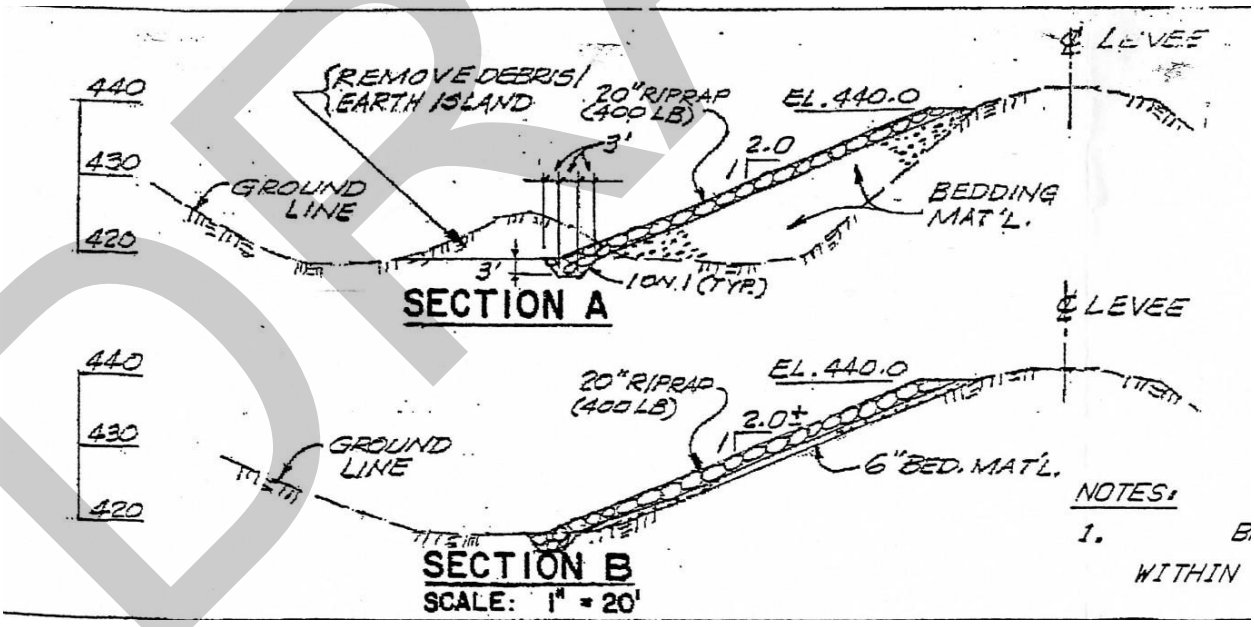


Figure 3. Cross Sections from 2002 Revetment Project at the O'Fallon, IL Wastewater Treatment Plant

2 TENTATIVELY SELECTED PLAN DETAILS

2.1 DESIGN DETAILS

The tentatively selected plan is Alternative B (Figures 3 and 4)

The stone on the slope will be locked in place using a large stone toe at the toe of the slope as it meets the bottom of the Silver Creek channel and a key-in at the top of the bank that will connect the slope stone to the existing hillside. The combination of these features on the top and bottom sides of the revetment will solidify the stone field as a whole and make it much more resilient to changing rainfall and stream conditions in the future.

During construction, it is recommended that the existing vegetation is surveyed for invasive species and/or vegetation with poor root structure and then selectively removed for the mobilization of construction equipment. This will provide a benefit to the project after construction by allowing vegetation with stronger root structure more room to grow above the revetment stone field and provide better slope protection in the future.

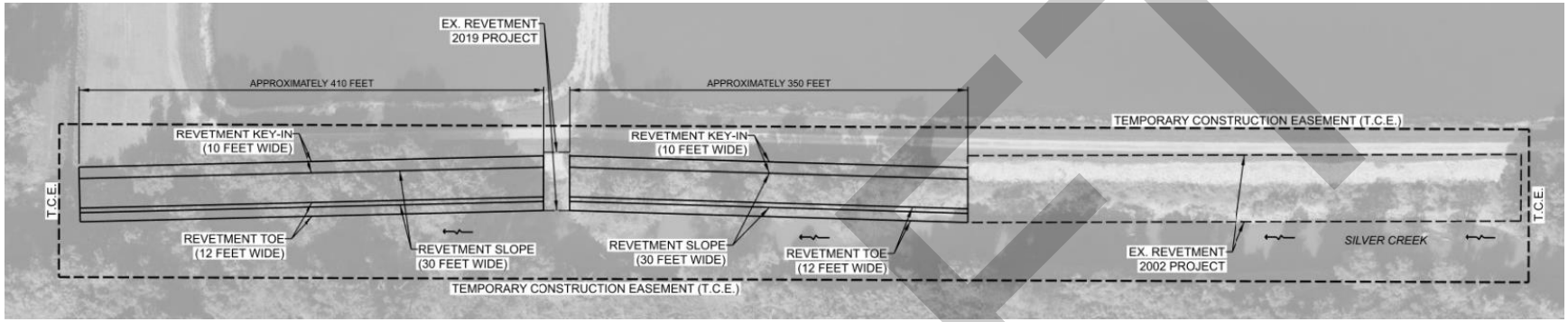


Figure 4. Streambank revetment plans and construction limits on Silver Creek, St. Clair County, IL.

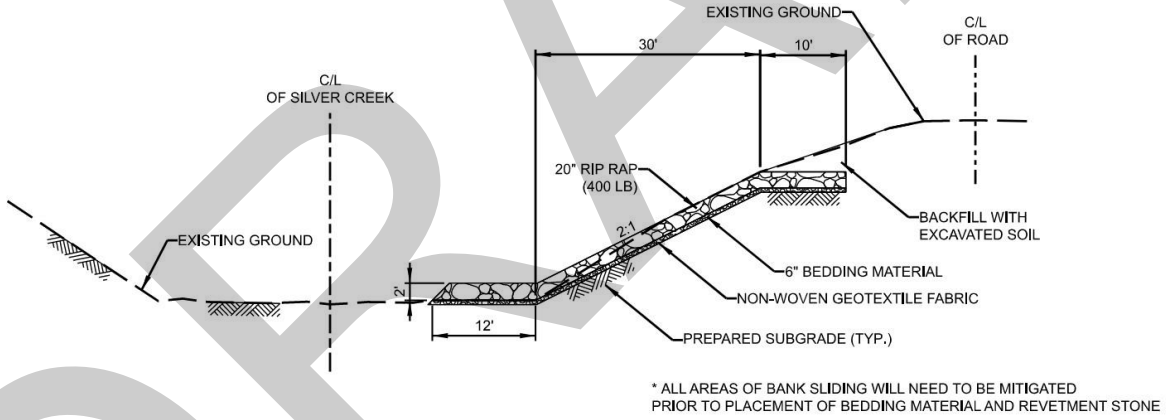


Figure 5. Typical plan section of Streambank revetment placement, not specific to this project, not to scale.

2.2 OMRR&R AND ADAPTIVE MANAGEMENT

The periodic operation and maintenance requirements for this project are expected to include regular inspections; mowing of turf; application of herbicides for weeds and brush (esp. Johnson Grass and Willows) as well as potential sprouts from tree stumps; and removal of woody growth and rodents and burrowing animals (and their dens). These regular actions are anticipated to cost approximately $1,300 per year.

In addition to the above activities, the sponsor will be required to repair any damage that may occur to the stone protection (due to subsidence, displacement, washouts, etc.) and remove any debris that accumulates on the project and snags that may form in the creek adjacent to the project. Additionally, any loss of project plantings will need to be replaced. These costs are not in the above OMRR&R estimate because it is not known if or when they may occur.

The sponsor should also periodically (every 5 to 10 years) monitor the channel for significant incision that could negatively impact the performance of the project. This monitoring can be done by comparing the as-built channel bathymetry (provided at the end of construction) to a current survey. Shifts in stone protection may also indicate channel incision, at which point survey collection is recommended. In the event that the current channel incision progresses beyond the slope stabilization abilities of this project, the sponsor may consider the construction of one or more grade control structures in-line with the current and future revetment fields and/or downstream of the project site. These would use stone large enough to resist movement, but graded as such that it is capable of launching into any scour that forms, and graded to self-filter in lieu of traditional bedding layers.

3 QUANTITIES

Estimate quantities for the revetment stone, bedding, and excavation required can be found below:

Stone Revetment Totals	
Stone (CY)	2,950.00
Stone (TONS)	4,720.00
Bedding Material (CY)	823.33
Bedding Material (TONS)	1,317.33
Non-Woven Geotextile Fabric (SF)	33,060.00
Excavation for Key-in & Toe (CY)	1,510.62
Temporary Erosion Control Fabric (SF)	11,400.00
Live Cuttings (EA)	380.00
Selective Vegetation Clearing (AC)	0.90

Table 1. Overall Quantities for Stone Revetment

Stone Revetment Calculator			
Key-in			
Depth (FT)	Width (FT)	Length (FT)	Volume (CY)
1.67	10.00	760.00	469.14
Banks			
Depth (FT)	Width (FT)	Length (FT)	Volume (CY)
1.67	33.50	760.00	1,571.60
Toe Anchor (Trapezoid with 4' bottom, 12' top, 4' height)			
Area (SQ FT)	Length (FT)	Volume (CY)	
32.00	760.00	900.74	

Table 2. Stone Quantities Worksheet

4 REFERENCES

ER 1110-2-1150, Engineering and Design for Civil Works Projects

EM 1110-2-1601, Hydraulic Design of Flood Control Channels