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Grand River Revitalization Project

Preliminary Investigation Report

A Portion of the Lower Grand River Watershed Habitat Restoration – Farmland Conservation Project RCPP #1603

GVMC

LOWER GRAND RIVER ORGANIZATION of WATERSHEDS

Grand Rapids, Michigan

December 21, 2018

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Document Review

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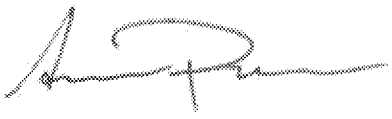	
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List of Acronyms and Abbreviations

°F	degree Fahrenheit
AEG	Anderson Economic Group
EA	environmental assessment
ECT	Environmental Consulting & Technology, Inc.
EPA	U.S. Environmental Protection Agency
ERM	Environmental Resources Management
ESI	Ecological Specialists, Inc.
FEMA	Federal Emergency Management Agency
FTCH	Fishbeck, Thompson, Carr & Huber, Inc.
GRFD	Grand Rapids Fire Department
GRWW	Grand Rapids Whitewater
GVMC	Grand Valley Metropolitan Council
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
MSA	Metropolitan Statistical Area
NEPA	National Environmental Policy Act
NRCS	Natural Resources Conservation Service
NWPM	National Watershed Program Manual
PPP	Public Participation Plan
TES	threatened, endangered, and special concern
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WPP	watershed project plan

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1.0 Introduction

1.1 The State of the Resource

Grand River is the longest river in Michigan; travelling from Jackson to its outlet into Lake Michigan at Grand Haven, this river stretches 260 miles through primarily agricultural areas, draining numerous smaller rural watersheds, but also through some of Michigan's largest urban areas. In days past, there were rapids that ran through what is now the heart of Grand Rapids. Historically, the river has played a central role in the life of the city, serving as a thoroughfare for lumber that fed the burgeoning furniture industry. To meet the needs of this growing and industrious city, in the late 1800s and early 1900s the river was extensively modified, especially between Ann Street and Fulton Street, altering the bedform and even installing "beautification dams" to alleviate odors associated with the city's combined sewer system. Despite the historical alterations, some physical characteristics of the river that made the area so unique remain. The river bed still drops 18.5 feet over the distance between Ann Street and Fulton Street, and some of the original bedrock outcroppings that served as surgeon habitat are still present.

Between Lake Michigan and the city of Ada, a distance of approximately 60 river miles, the river gradient sufficient to restore rapid habitat only exists at the project reach. The geographical extent of the project was identified to maximize rapid potential and encompasses areas between Fulton Street and Ann Street in the main channel of the Grand River (Figure 1-1). The project envisions extensive in-stream habitat restoration activities over an area of approximately 36 acres of river bed that will restore the historic rapids and help recreate some of the lost ecosystem functions that were once provided by the river.

The existing dams alter sediment transport, flow velocity, block fish passage, and are a public safety hazard. As a tributary of Lake Michigan, removal of the four low-head beautification dams would allow fish passage and connectivity of the watershed, access to historical spawning grounds, and previously isolated fish populations. It would also reduce or eliminate the existing public safety hazards created by dam hydraulics. Proposed substrate enhancements would serve to improve habitat diversity and quality, benefitting fish and invertebrates, including the federally-listed endangered snuffbox mussel (*Epioblasma triquetra*), Michigan-listed threatened lake sturgeon (*Acipenser fulvescens*) and river redhorse (*Moxostoma carinatum*), and potentially improving their productivity, which is not as robust as it should be (Figure 1-2).

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Figure 1-1. Project Area Boundary

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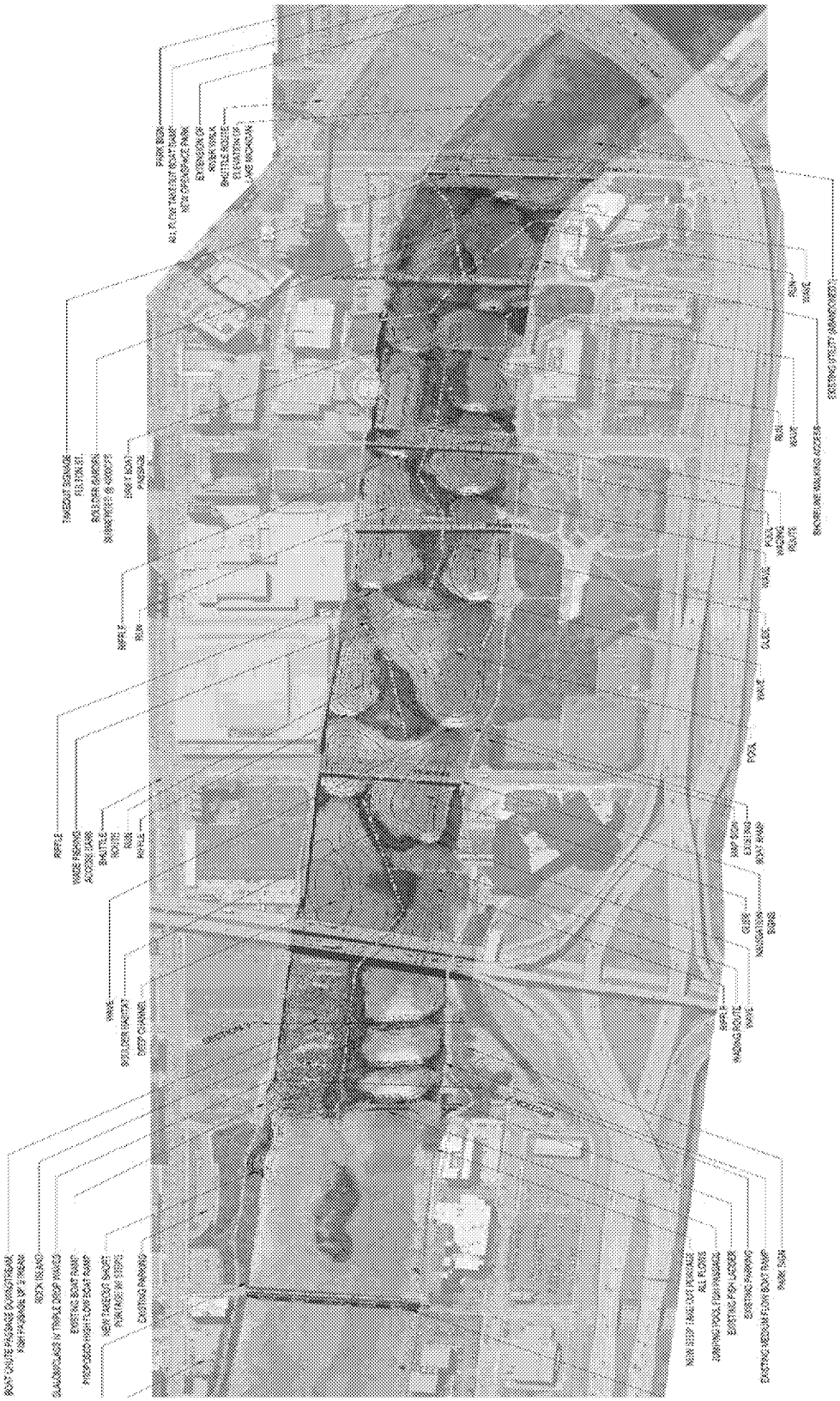

Figure 1-2. Conceptual Image of Proposed Project Enhancements

1.2 Restoring the Resource

Rapids restoration between Ann Street and Fulton Street would serve to oxygenate the water, another benefit to aquatic life, and create new recreational opportunities for the public, such as whitewater boating and fly fishing. Figure 1-1 depicts the current project area.

The project is expected to have an overall long-term beneficial effect on water resources, fish and aquatic species, including threatened and endangered species, and the local economy. An economic impact analysis prepared in 2014 indicated the local economy would benefit from increased access and use of the river by citizens and visitors. An updated economic impact analysis is in process to better gauge the current value of those benefits.

In addition to the in-stream work taking place under the watershed project plan (WPP), farmland conservation practices will be implemented in areas of the upper watershed to reduce soil erosion and improve water quality.

Future projects in the Grand River include the removal of the 6th Street dam and installation of an adjustable hydraulic structure to provide a barrier to migrating sea lamprey. These additional activities will help the WPP project achieve its full potential.

1.3 Compliance with Natural Resources Conservation Service Requirements

The components required by the Natural Resources Conservation Service (NRCS) are addressed within this document and have been checked for completeness against NRCS-CPA-52 form. Appendix B contains an evaluation checklist, including the criteria addressed.

To meet the requirements outlined in NRCS-CPA-52, the following criteria were addressed:

- Objectives (purpose)
- Need for action
- Resource concerns and existing/benchmark conditions, including economic considerations and public health and safety
- Special environmental concerns (e.g., endangered species)

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- Alternatives (including the no-action alternative, effects of alternatives, and the preferred alternative)
- Impacts to special environmental concerns
- Mitigation

1.4 Proposed Alternatives

Along the reach of the river that courses through downtown Grand Rapids, the Grand River drops an impressive 18.5 feet, representing the steepest grade anywhere along its entire length. Only 1 percent of the river habitat in the lower peninsula of Michigan is comprised of rapid-type habitat, which is important to the life cycle of many aquatic species. Rapid-type habitat is defined as a river system with a steep energy gradient, coarse bed substrates, and nonuniform distribution of instream velocities.

Three project alternatives are being evaluated to support the project:

1. No action
2. Removal of four, low-head beautification dams without substrate improvements
3. Removal of four, low-head beautification dams with substrate improvements

1.5 The Recommended Alternative

The preferred alternative to meet the needs of this project is Item 3, removal of four, low-head beautification dams in the Grand River from 20 meters (65 feet) upstream of Interstate 196 to Fulton Street (the Project Area) and improving substrates over 1 kilometer (3,300 feet) of the Grand River. This will create substrate diversity in more than 36 acres of river bottom and will facilitate revitalization of the ecological, cultural, and recreational functions of the historical rapids. Through implementation of this preferred alternative, project opportunities that will be realized include:

- Protection of threatened, endangered, and special concern (TES) species of fish and mussels, including lake sturgeon, river redhorse, and snuffbox mussel.
- Enhancement of recreational activities with safe public access in an urbanized Great Lakes river corridor.
- Improved habitat diversity and suitability in more than 36 acres of the Grand River, resulting in increased Great Lakes native fish and mussel diversity and productivity.

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2.0 Purpose and Need for Action

2.1 Purpose and Need

The purposes of the Lower Grand River Watershed Habitat Restoration – Farmland Conservation Project are to revitalize, enhance, and maintain the rapids in downtown Grand Rapids. The project will facilitate restoration of the ecological, cultural, and recreational functions of the historic rapids by:

- Restoring aquatic habitat diversity and suitability for threatened, endangered, and special concern (TES) native Great Lakes fish and mussel species.
- Reducing or eliminating public safety hazards generated by existing hydraulics.
- Diversifying in-stream features that will improve habitat and create/enhance recreational activities in the river.

The project's need for federal action is due to the degraded natural resource of the river and several recognized safety problems. Historical physical changes to the Grand River as it flows through downtown Grand Rapids, including construction of four, low-head beautification dams and removal of substrate, have impacted native and TES species of fish and mussels, limited public recreational activities, and altered habitat. Studies have determined TES species of fish and mussel community diversity and productivity are currently much lower than possible. According to the *Lake Sturgeon Habitat* report completed by River Restoration in 2013, "The Grand River is one of only four rivers on the eastern shoreline of Lake Michigan where a known remnant population of lake sturgeon (*Acipenser fulvescens*) successfully reproduces (Smith, MDNR unpublished data). The availability of spawning and staging habitats in rivers is considered a major factor limiting the recovery of lake sturgeon in Lake Michigan (Daugherty *et al.*, 2009; Auer, 1999). Furthermore, remnant sturgeon populations throughout the Great Lakes Basin have been found to be genetically unique, with the Grand River population likely included, and protection of each population is a priority of federal, state and tribal agencies (Welsh *et al.*, 2010; Holey *et al.*, 2000). Recently numerous sturgeon restoration projects have begun (Holtgren *et al.*, 2007); however, very few have focused on increasing spawning and staging habitat in Michigan."

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Four, low-head beautification dams alter flow velocity and create public safety hazards. From 2005 to 2016, the Grand Rapids Fire Department has rescued 72 people from water-related incidents in this reach of the river, resulting in 40 civilian injuries as well as 5 civilian deaths from 2005 to 2016.

Habitat diversity has been significantly reduced. Along the reach of the river that courses through downtown Grand Rapids, the Grand River drops an impressive 18.5 feet, representing the steepest grade anywhere along its entire length. Only 1 percent of the river habitat in the lower peninsula of Michigan is comprised of rapid-type habitat, which is important to the life cycle of many aquatic species. Rapid-type habitat is defined as a river system with a steep energy gradient, coarse bed substrates, and nonuniform distribution of instream velocities.

Three project alternatives are being evaluated to support the project:

1. No action
2. Removal of four, low-head beautification dams without substrate improvements
3. Removal of four, low-head beautification dams with substrate improvements

The preferred alternative to meet the needs of this project is Item 3, removal of four, low-head beautification dams in the Grand River from 20 meters (65 feet) upstream of Interstate 196 to Fulton Street (the Project Area) and improving substrates over 1 kilometer (3,300 feet) of the Grand River. This will create substrate diversity in more than 36 acres of the river bottom and will facilitate revitalization of the ecological, cultural, and recreational functions of the historical rapids. Through implementation of this preferred alternative, project opportunities that will be realized include:

- Protection of TES fish and mussel species, including lake sturgeon, river redhorse, and snuffbox mussel.
- Enhancement of recreational activities with safe public access in an urbanized Great Lakes river corridor.
- Improved habitat diversity and suitability in more than 36 acres of the Grand River, resulting in increased Great Lakes native fish and mussel diversity and productivity.

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In addition, project implementation will align with the goals and objectives of the following regional planning documents:

- Lake Sturgeon Recovery – *Lake Sturgeon Rehabilitation Strategy Draft*. Hayes, Dr. D.B., and Dr. D.C. Caroffino. December 2011. Michigan Department of Natural Resources.
- Restoration of habitats, fishery improvements and encouragement of outdoor recreation – *Lower Grand River Watershed Management Plan*. Lower Grand River Organization of Watersheds. 2011.
- Rapid restoration effect on the local fisheries in the river, productivity and diversity of Lake Michigan, productivity and diversity of Grand River native fish and mussel populations, and river accessibility recreational opportunities – *Grand River Fisheries Assessment*. Hanshue, S.K., and A.H. Harrington. 2017. Michigan Department of Natural Resources Fisheries Report 20, Lansing.

In tandem with these in-stream restoration activities, the region is engaging in multiple actions directed at creating better water quality within the Grand River. Regional Conservation Partnership Program funding has been obtained for best management practices in two upper watersheds: the Rogue River and Indian Mill Creek. The City of Grand Rapids has invested more than $400 million dollars to separate its sewer system, eliminating combined sewer overflows to the Grand River. The City of Grand Rapids and many surrounding communities draining to the Grand River are proactively managing stormwater. Concerted efforts between communities and conservation organizations in the Grand River are planning and implementing efforts to improve water quality. Such previous, ongoing, and future efforts will help ensure the restored rapids habitat between Interstate 196 and Fulton Street will be productive and sustainable.

2.2 Watershed Problems and Resource Concerns

2.2.1 Habitat Conditions

The habitat of the Grand River through Grand Rapids is severely degraded, but it offers a unique opportunity for Michigan and the Great Lakes.

The ecosystem processes of the Grand River have been degraded from loss of the rapids, channelization, dredging, and urban development. Only 1 percent of the river habitat in the lower peninsula of Michigan is comprised of rapid-type habitat, which is important to the life cycle of many aquatic species. Rapid-type habitat is defined as a river area with a steep energy

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gradient, coarse bed substrates, and nonuniform distribution of instream velocities. Prior to dam installation and subsequent dredging and channelization, the Grand River rapids ran through Grand Rapids.

The historical modifications were made to support development of the region, but those industries and practices have long lost their relevance. Five dams have been constructed within Grand Rapids, including the 6th Street Dam and four smaller, low-head beautification dams. The 6th Street Dam was constructed more than 100 years ago to facilitate the floating of logs over the bedrock outcrop upstream of Leonard Street. Four smaller, low-head beautification dams were subsequently constructed downstream of the 6th Street Dam to maintain channel width during low flow to prevent the concentration of raw sewage that was discharged into the river. Dredging and mining of large substrate has occurred in the channel where it runs through the city. In addition, the river is constrained between more than a mile of flood protection walls on both sides of the channel. These modifications have together created a straight, uniform channel with little diversity in flow depth, substrate, or velocity, limiting natural aquatic ecosystem processes and constraining the physical, chemical, and biological processes of the river ecosystem.

Despite drastic modifications to the river system, the habitat supports important species. Snuffbox mussel (federally listed as endangered), lake sturgeon, and river redhorse (state listed as threatened) are species known to inhabit the project area, along with many host fish species. Section 7.7, Fish and Aquatic Species, discusses this further.

2.2.2 Supporting the Important Species of the Region

The removal of four, low-head beautification dams, followed by diversification of in-stream features through creation of riffles, runs, glides, drops, and pools with variable depths and flow velocity throughout the project area reach, will serve to improve habitat quality for the threatened and endangered species and their hosts. This project would:

- Diversify river conditions, providing variability in flow velocity and depth.
- Improve quality of habitat for threatened and endangered species and host fish along 3,300 feet by 476 feet (36 acres) of Grand River.
- Reduce barriers of access for native and regional species, potentially increasing genetic diversity through reconnection with formerly segregated fish populations.
- Initiate Phase 1 of a multiphase project to reconnect access for lake sturgeon to historical spawning grounds just above the 6th Street Dam.

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2.2.3 Risks to Human Health and Safety

The historical modification made to the Grand River have created a public safety concern. Four of the city's five low head dams are located within the project area outlined in this project plan. While the data is not specific to only the dams, the hydraulics created by the dams are a safety risk to boaters and swimmers alike and have contributed to multiple rescue and recovery operations over the years.

According to Grand Rapids Fire Department (GRFD) data, from 2005 to 2016 there were 40 civilian injuries and 5 civilian deaths. Within the same time period, the Grand Rapids Fire Department rescued 72 people from water-related incidents. On average, the Grand Rapids Fire Department averages 10 water rescue incidents per year (GRFD, 2016)

2.2.4 Economic and Social Considerations

Use of the river is expected to increase after project completion. More people are expected to spend time in and around the river using the scenic waterway and enjoying easy access to greater recreational opportunities. As a result, Grand Rapids can expect to attract new businesses that want to capitalize on the improvements made to the river.

Anderson Economic Group (AEG) authored a 2014 economic impact analysis report. In it, the restored river and riverfront were projected to generate between 232,434 and 538,313 new visitor days for Grand Rapids each year. For a breakdown of net new visitor days, AEG estimated an additional 13,090 to 15,400 for whitewater boating users, 42,500 to 50,000 for non-whitewater boating users, 66,844 to 80,213 for fishing users, and between 110,000 to 392,700 for shore-based users. The low-end estimate is a conservative scenario based on data and observations of smaller-scale river restoration projects. The higher estimate is a potential scenario reflecting possible increased draws given the project's location, broad scope, potential to attract several major events, and overall community and statewide interest. The economic impact under these scenarios is $15.9 million to $19.1 million in net new activity every year, respectively. This is driven by direct net new spending of $12.9 million to $15.5 million, which stimulates an additional $3.0 million to $3.6 million in indirect economic impacts within Grand Rapids. This economic impact includes 80 to 96 new jobs and $2 million to $2.3 million in new earnings for the Grand Rapids' workforce.

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AEG is updating their 2014 analysis to address additional impacts such as impacts of construction, installation, and maintenance of the project. They are also performing a cost-benefit analysis for the WPP.

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3.0 Public Participation Plan

The intent of the public participation plan is to provide the public with information about the Restore the Rapids Project and encourage their engagement within the planning process. Appendix A contains a copy of the public participation plan that outlines outreach methods and activities that have been or will be employed to reach the broader community of Grand Rapids.

3.1 Sponsors, Local Partners, Agencies, and Tribal Participation

The Sponsor for the project is the City of Grand Rapids, Michigan.

Project sponsors must have the legal authority and resources to carry out, operate, and maintain works of improvement (Public Law 83-566 Section 2).

For the purpose of the project, Partners are the agencies involved in scheduling, facilitating communication, and project design and development. Local partners for the project include:

- Grand Valley Metropolitan Council (GVMC) – Lead Partner.
- Grand Rapids Whitewater (GRWW) – Supporting Partner.

Consultants were procured to provide environmental and economic assessments. The consulting team supporting the effort include:

- AEG.
- EcoAnalysts, Inc.
- Environmental Consulting & Technology, Inc. (ECT).
- Environmental Resources Management (ERM).
- Fishbeck, Thompson, Carr & Huber, Inc. (FTCH).

Agencies involved with the project include state and federal resource agencies such as:

- NRCS.
- U.S. Fish and Wildlife Service (USFWS).
- Michigan Department of Natural Resources (MDNR).
- Michigan Department of Environmental Quality (MDEQ).

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- U.S. Army Corps of Engineers (USACE).
- U.S. Environmental Protection Agency (EPA).

Tribes that have been contacted and invited to participate in the project include:

- Little River Band of Ottawa Indians (federally recognized).
- Grand River Band of Ottawa Indians (federal recognition pending).
- Nottawaseppi Huron Band of the Potawatomi, Anishinaabe community (federally recognized).
- Gun Lake Tribe (federally recognized).
- United Tribes of Michigan (representatives from 12 federally recognized tribes)

Other stakeholders for this project that have contributed time and effort include:

- Downtown Grand Rapids, Inc.
- Grand Rapids Public Museum.
- Kent County Drain Commissioner.
- Lower Grand River Organization of Watersheds.
- Michigan League of Conservation Voters.
- Private foundations and businesses.

3.2 Permits and Compliance

The project will comply with applicable state and federal regulations.

This project will be funded in part using NRCS federal dollars. A prerequisite for funding is a WPP environmental assessment (EA). This process requires compliance with relevant federal and state regulations, including PL 83-566, Section 7, of the Endangered Species Act; Section 106 of the National Historic Preservation Act; and relevant parts of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended by the State of Michigan, as required by the joint permit being submitted (with MDEQ).

3.3 Mitigation

Mitigation measures will be necessary during implementation of the habitat restoration process because of anticipated detriment to some of the fish and aquatic life within the project area.

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Threatened and endangered species unionid mussels within the project area could be harmed during project construction; therefore, a mussel relocation and monitoring plan will be put in place to reduce the number of mussels affected. After the construction area is isolated and the water level lowered, but before dam removal and substrate enhancement activities begin, a team of malacologists/biologists will search and collect unionid mussels for tagging and translocation, with an 80-percent recovery goal. Translocated mussels will be monitored 1 year following each translocation, and an annual report summarizing translocation and monitoring results will be produced.

To mitigate the loss of mussels crushed or otherwise not successfully recovered and translocated, a donor-advised fund will be established to fund research, monitoring, and other conservation measures within the Grand River basin. Wetlands are not known to be present within project area boundaries; however, a delineation survey will be performed for confirmation. Mitigation activity would be incorporated into the project should construction activity negatively impact wetlands found to be within or adjacent to the project area.

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4.0 Environmental Evaluation

As part of the preliminary investigation process, the components required by NRCS are addressed within this document and have been checked for completeness against NRCS-CPA-52 form. Appendix B contains an evaluation checklist, including the criteria addressed.

To meet the requirements outlined in NRCS-CPA-52, the following criteria were addressed:

- Objectives (purpose)
- Need for action
- Resource concerns and existing/benchmark conditions, including economic considerations and public health and safety
- Special environmental concerns (e.g., endangered species)
- Alternatives (including no-action alternative, effects of alternatives, and the preferred alternative)
- Impacts to special environmental concerns
- Mitigation

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5.0 Studies Completed

Several studies are under review/revision or are being conducted by consultants concurrently with the preliminary investigation and will be used to inform and develop the WPP. These studies include a biological assessment prepared by EcoAnalysts, Inc. (formerly Ecological Specialists, Inc.), that is currently under review, and an updated economic impact analyses being prepared by AEG.

Other existing local studies and sources of information are noted in Section 13.0, References.

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6.0 Scope of the WPP

The NRCS-compliant watershed project plan under PL 83-566 will use analyses of current conditions and expected impacts of the proposed project and will leverage existing studies and reports providing relevant data collected within the watershed. The WPP will:

- Meet the requirements of Public Law 83-566, NRCS policy, congressional criteria, executive orders, the National Environmental Policy Act (NEPA), USACE Principles and Guidelines (as applicable), and other applicable laws and regulations.
- Utilize commissioned economic and environmental analyses that evaluate the potential alternatives, including the no-action alternative.
- Include consultation with the State Historic Preservation Office as part of the EA.

The WPP will follow the outline presented in the National Watershed Planning Manual. GVMC and other project Partners will engage all concerned parties in the planning process, including conducting public outreach to obtain input from the local communities.

Project Partners will work together to identify issues and concerns, incorporating them into the final WPP. This project is a non-water resources project, and, as such, the alternatives analysis will not include a national economic development alternative. The development of alternatives will follow the federal *"Principles and Guidelines for Water and Related Land Resources Implementation Studies."*

6.1 Scoping and Public Participation

The WPP and EA planning processes include scoping and public participation to identify environmental, natural resource, economic, and social concerns associated with this watershed project.

Coordination will take place between GVMC, its project Partners, stakeholders, NRCS, and other NEPA agencies involved to determine the format and schedule for the scoping meeting(s) in compliance with Part 501, Subpart C, Section 501.24 of Title 390, National Watershed Program Manual (NWPM).

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6.2 Alternatives

The WPP will include all reasonable alternatives that meet the purpose and need for action. They will be studied and analyzed in the EA plan. Because the WPP and EAs are being produced concurrently by two separate contractors, coordination will be necessary during identification and selection of project alternatives. This coordination will allow WPP development to continue concurrently with the EA development. The coordination meetings will be used to identify project alternatives that meet the following NRCS requirements (Part 501, Subpart B, Section 501.12[A], Title 390 NWPM):

- Inclusion of all reasonable alternatives meeting the purpose and need for action
- Inclusion of the future-without-project condition or no-action alternative
- Rationale provided for excluding alternatives from study
- Discussion of environmental and natural resource concerns raised during WPP scoping

6.3 WPP Development

The WPP will be prepared as required to meet funding approval under Public Law 83-566 as a final comprehensive report containing the EA and the content listed. The WPP will be developed using existing available information and the results of studies conducted by GVMC, GRWW, and other project Partners. Cost estimates and a cost-benefit analysis, focusing specifically on how the project alternatives meet the purpose and need for action, will be included.

The WPP will include the EA in accordance with NRCS requirements. The WPP will also contain information and analyses pertaining to the following required content pursuant to Part 501, Subpart D, Title 390 NWPM.

- Abstract
- Summary
- Purpose and need for action
- EA scope
- Affected environment
- Alternatives
- Environmental consequences
- Documentation of consultation, coordination, and public involvement
- Preferred alternative
- References
- List of preparers
- Distribution list
- Index

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7.0 Affected Resources – Existing Conditions

7.1 Project Setting

The project is in the urbanized section of Grand River as it traverses through the core of Grand Rapids. Surrounded by urban development, the project area runs from just north of the Interstate 196 Bridge to the Fulton Street Bridge, passing right through Grand Rapids. The banks in some areas are channelized with concrete flood protection walls. In some cases, these walls are foundational walls to buildings that act as part of the flood protection system. The river banks are also developed with public parks, multi-use buildings, and parking lots. Bridges and highways cross the river.

Between Lake Michigan and the city of Ada, a distance of approximately 60 river miles, the river gradient sufficient to restore rapid habitat only exists at the project reach. The geographical extent of the project was identified to maximize rapid potential and encompasses areas between Fulton Street and Ann Street in the main channel of Grand River.

7.2 Current Infrastructure

Current infrastructure within the project reach includes a concrete flood protection system, four low-head beautification dams, a fish ladder, and bridge support columns.

7.3 Topography

The topography of the Lower Grand River Watershed is heavily influenced by the region's glacial origins. Proglacial lakes around the state drained through the land that would become the Grand River creating the incised and confined channel that exists to this day. The valley is broad, with a relatively uniform width of 1 mile, which includes incised gullies and relic flood terraces. The river itself has some significant topographical variability along its length. In the 2-mile stretch of Grand River that winds its way through downtown Grand Rapids, the riverbed elevation drops 18.5 feet and contains some of the most dynamic topography in the region (Churches, 2013).

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7.4 Climate

Local climate is heavily influenced by latitude, variation of land surface altitude, and proximity to Lake Michigan. Mean precipitation within the Grand River watershed is approximately 31 inches, whereas annual snowfall can range from as low as 30 inches to more than 100 inches, depending on proximity to the lake (Hanshue and Harrington, 2017). Records from 1981 to 2010 show the mean annual total precipitation within Grand Rapids was 38.1 inches, and mean annual temperature was 48.5 degrees Fahrenheit (°F), with a mean of 129 days per year that fall below 32°F (GLISA. 2016).

The area has short, mild springs and falls, warm and humid summers, and cold, snowy winters. Without the lake's moderating influence on regional temperature, the area would have a much more continental climate; because the seasonal temperature variation is moderated by the presence of a nearby water body, the Grand Rapids area can support diverse agricultural products such as peaches, apples, corn, and soybeans.

7.5 Geology and Soils

7.5.1 Geology

"Surficial geology is varied and ranges from coarse-textured end moraine and ice contact topography to glacial lake plains. In some portions of the watershed glacial tills and deposits are several hundred feet thick while other areas are characterized by exposed bedrock" (Hanshue and Harrington, 2017).

7.5.2 Soils

"Soil groups in the Grand River watershed are widely distributed and are largely characterized as having moderately low runoff potential. Soil types with low runoff potential comprise 18 percent of the watershed, whereas soils with high runoff potential comprise 14 percent. Presettlement land cover in the watershed was primarily beech-maple, mixed oak, and coniferous forests. Forested wetlands, shrub-swamp/emergent wetland, wet prairie and open water accounted for approximately 18 percent of the presettlement land cover. Contemporary land use is dominated by agriculture (57 percent); forested land cover has been reduced to 25 percent and wetlands reduced by over 50 percent. Urban land use accounts for 9 percent of the current landscape" (Hanshue and Harrington, 2017).

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The primeval state of the soils in the project area is sandy and reflects the character of the glacial outwash that once coursed through the Grand River Valley. Today the soils in the immediate vicinity of the project area are heavily urbanized, and few retain the hydrologic qualities of their natural state. Most of these areas retain little to no ability to infiltrate water and are heavily dependent on local infrastructure for drainage. In the upper reaches of the project area, the soils drain better and retain many more of the characteristics of the original glacial outwash material (Soil Survey Staff, 2015).

7.6 Water Resources

7.6.1 Surface Water Quality

Water quality in the Grand River basin is influenced by many human activities, including agriculture, industry, and urban development. Waters of the State are protected for designated uses of warmwater or coldwater fisheries, indigenous aquatic life and other wildlife, agriculture, industrial and municipal water supply, navigation, and recreation. Waters of the State that are designated as trout streams or are principal migratory routes for potamodromous salmonids have more stringent dissolved oxygen and temperature standards set to protect coldwater fish. The Grand River main stem from Lake Michigan to the Moores Park Dam is identified as a principal migratory route for salmon and steelhead and therefore receives this additional protection (Hanshue and Harrington, 2017).

Water quality within the project area has been consistently improving and was given a huge boost in 2017 when the city completed the total separation of their combined sewer system. The city of Grand Rapids has monitored water quality within the downtown reach of Grand River going back to 1985. The City of Grand Rapids Environmental Services Department maintains data on dissolved oxygen, fecal coliforms, pH, biological oxygen demand, temperature change, total phosphate, nitrates, total suspended solids, and chlorides. Water quality records specifically pertaining to the project reach will be obtained from the City of Grand Rapids Environmental Services Department and MDEQ.

The Grand River basin historically suffered from poor water quality because of unregulated discharges from municipal and industrial point source discharges. Water quality in the basin is steadily improving, and virtually all point source discharges are now regulated through the National Pollutant Discharge Elimination System permitting program administered by the MDEQ Water Resources Division.

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Nonpoint source pollution remains the greatest factor degrading water quality. This type of pollution enters the water from atmospheric deposition and surface runoff and generally consists of sediment, nutrients, bacteria, organic chemicals, and inorganic chemicals from agricultural fields, livestock feedlots, construction sites, parking lots, urban streets, septic seepage, and open dumps. Implementing best management practices with farmland, construction sites, and urban development designs can significantly reduce runoff, erosion, and influxes of sediment, nutrients, and other chemicals into lakes and streams.

7.6.2 Ground Water

The Grand Rapids area sits on top of thick glacial drift before reaching the Marshall Sandstone formation at approximately 550 feet above sea level. The city does not depend on subterranean aquifers to supply water to its citizens but pipes the water in from Lake Michigan instead (NARA, 2015). While the glacial drift is too thin to support a viable aquifer, many agricultural operations and residential properties in the area around Grand Rapids tap the aquifer supported by the Marshall Sandstone.

7.6.3 Water Rights

As a traditionally navigable waterway, the Grand River from its outlet at Lake Michigan upstream to Fulton Street is under USACE and MDEQ jurisdiction. Waters in Michigan are not divided into water-right owners as in western states; however, permits for water withdrawals are required (MDEQ and MLARA, 2018).

7.7 Fish and Aquatic Species

According to the MDNR Grand River Fisheries Assessment, the Grand River watershed supports 107 species of fish. This fish community includes several species of conservation interest within the project area and/or the larger watershed, including lake sturgeon and river redhorse, which are state-listed as threatened.

The watershed rates highly for Catostomid diversity (11 of 15 species present), sunfish and minnow communities (9 of 16 species present), as well as channel catfish, flathead catfish, largemouth bass, smallmouth bass, walleye, black buffalo, black redhorse, golden redhorse, spotted sucker, river chub, striped shiner, and grass pickerel. These species may not be present

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within the project area but are present within the surrounding watershed. These species are species of great conservation concern within the state of Michigan.

Lake Michigan's proximity to Grand River causes significant seasonal influence, with many potadroumous species like lake whitefish and salmon migrating up the river during the spring and summer, changing the species composition. The major impediment for many of these species is the 6th Street Dam north of the proposed in-stream habitat construction area. This dam blocks all species except steelhead and salmon, which can make use of the fish ladder attached to the 6th Street Dam (Hanshue and Harrington, 2017).

Grand River is known to support numerous unionid mussels, including the federally listed endangered snuffbox mussel (discussed further in Subsection 7.10). Unionid habitat preferences include sand and gravel substrates in small to medium-sized rivers, which is limited under existing conditions. Table 7-1 identifies unionid mussels known to exist within the project area, as well as their host fish.

Table 7–1. Unionid and Host Species Known to Reside in the Project Area

Unionid Mussels		Host fish
Epioblasma triquetra	Snuffbox	Percidae (perches)
Alasmidonta viridis	Slippershell	Percidae (perches)
Cyclonaias tuberculata	Purple wartyback	Ictaluridae (catfish)
Ligumia recta	Black sandshell	Centrarchidae (sunfish and bass), Percidae (perches), *Aplodinotus grunniens* (freshwater drum)
Toxolasma parvum	Lilliput	Centrarchidae (sunfish and bass), Percidae (perches)
Pleurobema sintoxia	Round pigtoe	Cyprinidae (minnows), Centrarchidae (sunfish and bass)
Potamilus alatus	Pink heelsplitter	*Aplodinotus grunniens* (freshwater drum)
Truncilla truncata	Deertoe	*Aplodinotus grunniens* (freshwater drum)
Venustaconcha ellipsiformis	Ellipse	Percidae (perches)
Villosa iris	Rainbow	
Alasmidonta Marginata	Elktoe	Catastomidae (suckers), Centrarchidae (sunfish and bass)
Lasmigona Compressa	Creek heelsplitter	
Lasmigona Costata	Fluted shell	Cyprinidae (minnows), Catastomidae (suckers), Ictaluridae (catfish), Centrarchidae (sunfish and bass), Percidae (perches), *Aplodinotus grunniens* (freshwater drum)
Utterbackia Imbecillis	Paper pondshell	Ictaluridae (catfish), Centrarchidae (sunfish and bass), Percidae (perches)

Source: EcoAnalysts, Inc. 2018.

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The Great Lakes have been invaded many times by species from outside the basin, and controlling their spread and impact is of upmost concern to the people who live in the basin. Many species, such as common carp, round goby, zebra mussel, curly leaf pondweed, and Eurasian water milfoil, are present in Grand River, but for this particular project the greatest threat comes from sea lamprey.

Lamprey are a parasitic species that was introduced to the Great Lakes accidentally when the Welland Canal was constructed. Lamprey lack bones and a jaw and instead have a large sucking disk that they use to cut into the sides of healthy animals. The species is now present throughout the Great Lakes, and its migration to upstream Grand River tributaries is believed to be stopped by the 6th Street dam. However, there is some evidence to suggest lamprey may be able to bypass the dam at certain flow rates (LGRWMP, 2011) (GLFC, 2018).

"Floodplain forests and nearshore environments within the watershed have been significantly altered as a result of the introduction of terrestrial exotics such as the emerald ash borer, Dutch elm disease, garlic mustard, phragmites and purple loosestrife. These changes are transferred to the aquatic ecosystem in the form of reduced productivity and altered habitat" (Hanshue and Harrington, 2017).

7.8 Wildlife

Wildlife as it pertains to land animals will be minimally impacted by the project, as the project area is solely within the river. Wildlife such as mink have been observed in the surrounding area. Species that could occur in the project surrounding area include the federally listed endangered northern long-eared bat (*Myotis septentrionalis*), Indiana bat (*Myotis sodalis*), Karner blue butterfly (*Lycaeides melissa samuelis*), and eastern Massasauga rattlesnake (*Sistrurus catenatus*), a Michigan state-listed species of special concern; however, they are highly unlikely to be present because of the lack of existing suitable habitat and/or they have never been reported in Kent County (MNFI, 2018).

7.9 Vegetation

"The Grand River catchment contains several unique and rare plant communities ranging from dry mesic southern forest to southern floodplain forest to interdunal wetlands. These plant communities represent remnants of the pre-settlement landscape and are rich in biodiversity. These communities provide critical habitats for numerous vertebrate and invertebrate species of

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conservation interest including several that are identified as endangered, threatened, or of special concern" (Hanshue and Harrington, 2017).

7.10 Threatened and Endangered Species

Any modification of habitat must consider species of local and national concern that are present in the project area. Because the project work is either confined to within the river or in the urbanized areas that border it, aquatic species or species that depend on aquatic environments are assumed to be of particular interest. The Lower Grand River Watershed includes many species that meet these criteria along its length; however, relatively few of these species are present in the vicinity of the WPP area.

Species that are present include:

- Snuffbox Mussels—Protected both at the federal and state level and located in and around the project area. The mussels are medium-sized reaching approximately 2 inches and with a roughly triangular shape. Generally, the mussel's habitat is sandy, gravelly substrates in swift-flowing small streams (MNFI, 2018).
- River Redhorse—Fish species in the genus Catostomidae, or suckers, that reaches the northern limit of its range in Michigan. This sucker is the largest in the family and is emblematic of good water quality and good habitat quality (ODNR, 2012). While the species is rare, records kept by the Michigan Natural Features indicate some of the most recent sightings (2007) occurred in Kent County (MNFI, 2018).
- Lake Sturgeon—Grand River supports a remnant but stable population of lake sturgeon, though their habits are somewhat mysterious. The fish is a long-lived species that only reaches sexual maturity at 17 to 20 years; creating sustainable breeding populations within the state is vital. The species is threatened in Michigan, and there are limitations on how much the population can be boosted with enhanced breeding techniques, since sturgeon populations are genetically linked to their home river (Hanshue and Harrington, 2017) (MNFI, 2018).

7.11 Wetlands

Historically, 42 percent of the wetlands in the Lower Grand River Watershed were drained and converted to agriculture (LGRWMP, 2011). In the more densely populated areas, such as that surrounding the project area, the watershed has been highly urbanized. A wetland delineation survey will be conducted to identify wetlands within and adjacent to the project boundaries.

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7.12 Land Use, Zoning, and Ownership

The project area is located within Grand River as it runs through Grand Rapids. Land uses bordering the project area are a combination of open space, public walkways, and commercial/ mixed-use properties. Zoning surrounding the river is presumed to be mixed-use and commercial, and shoreline property is owned by the City and private investors. Under Michigan law adjacent riverfront property owners own the river bottom to the thalwag, i.e., the lowest elevation within the water course (City of Grand Rapids, 2017).

7.13 Cultural and Historical Properties

The cultural and historical properties assessment has yet to be completed. An archaeologist will be consulted to assess the presence of and potential impact on any significant sites of cultural and historical importance. Investigation of any existing tribal water rights and treaty boundaries that fall within the project area, or that would be affected by the project, will be conducted. Any findings of significance will be factored into the final WPP.

7.14 Recreation

The Grand River supports a variety of game fish, and recreational use by anglers is high throughout the middle and lower reaches of its main stem. The areas near the fish ladder and dams where hydraulics have created deeper pools in which fish congregate are popular locations where the public can be seen fishing. There are numerous coldwater tributaries in the lower segment of the Grand River, both above and below the project area, that support popular fisheries for brown trout, brook trout, and steelhead. "Diverse warm water fisheries for walleye, smallmouth and largemouth bass, northern pike, panfish, and channel and flathead catfish are found on the main stem, tributaries and inland lakes" (Hanshue and Harrington, 2017). Coho and Chinook salmon migrate from Lake Michigan upstream through the project area and fish ladder to access upper reaches of the river.

Recreational boating is also enjoyed within the project area and all along the river, although connection of the upper reach to the lower reach is impeded by the dams. Hydraulic conditions created by these dams cause a public safety hazard when boaters get caught up in the hydraulics and capsize. Pathways and parks adjacent to the proposed project area are enjoyed by the public for numerous activities, including walking, running, picnicking, biking etc., and are conveniently

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accessed from numerous access points along the waterfront by those who visit and/or work in downtown Grand Rapids.

7.15 Socioeconomics

7.15.1 Population

The human population in the project area is increasing at a higher rate than both the state of Michigan as a whole and the region of West Michigan.

The project is located within the second largest city in the state of Michigan. The city is characterized by a population of just under 200,000 residents and is central to the Grand Rapids-Wyoming Metropolitan Statistical Area, with a population of nearly one million people. Grand Rapids has been growing at an accelerated rate relative to West Michigan as a whole, with the population increasing an average 4.2 percent annually over the last 5 years, compared to just 0.7 percent of West Michigan. This compares to a population growth rate of 0.8 percent in Michigan, overall. The percentage of the Grand Rapids population represented by people of color within the metropolitan region is 32.4 percent, whereas the West Michigan proportion is 13.7 percent.

Grand Rapids, much like the entire country, is undergoing massive demographics shifts. In the last 30 years, the percent of the population who identify as people of color has risen from 20 to 42 percent as of 2014 (Table 7-2). This trend, toward a more diverse population, is also reflected in the divide between a more diverse younger population and a more homogenous older population. The trend is expected to continue, with Kent County expected to have a majority of people of color by 2050.

Table 7–2. Selected Regional Population Demographics

Population	1980 (percent)	2014 (percent)
People of color	20	42
White	80	58

Source: PolicyLink and PERE, 2017

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7.15.2 Area Employment, Income, and Agriculture

Grand Rapids currently has a per capita income of $27,549 in 2016 dollars, which is comparable to all of Kent County where the per capita income is $28,070 in 2016 dollars. The biggest employers by number of jobs in the metropolitan region are manufacturing, followed by health care and social assistance, and administrative and support and waste management and remediation services.

On a larger scale, the Grand Rapids-Wyoming Metropolitan Statistical Area (MSA) encompasses four counties in West Michigan: Montcalm, Kent, Ottawa, and Barry. It is one of the most robust, economic regions within the state of Michigan as evidenced by the demographics data displayed in Table 7-3.

Table 7–3. Selected Regional Demographics

Demographic	Grand Rapids-Wyoming MSA	State of Michigan
Population	1,050,000	9,900,000
Number of households	384,790	3,880,000
Median household income	$60,212	$52,492
Median home value	$164,500	$147,100
Percentage minority residents	20.9%	24.7%
Percentage age 65 and over	13.6%	16.2%
Median age	36	39.7
Percentage in poverty	11%	15
Percentage involved in amusement and recreation activities	1.86%	1.23%
Percentage involved in natural resource occupations (farming, fishing, forestry)	2%	0.07%
Top three industries by number of positions	• Manufacturing • Healthcare and social assistance • Retail trade	• Motor vehicles and motor vehicle equipment manufacturing • Restaurants and food services • Hospitals

Source: PolicyLink and PERE, 2017

The median household income within the MSA is roughly 15 percent higher than in the state of Michigan as a whole. The median home value in the Grand Rapids-Wyoming MSA is also approximately 12 percent higher than the state of Michigan as a whole (PolicyLink and PERE, 2017).

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8.0 Estimated Project Implementation Costs

Interstate 196 to Fulton Street (Base Project)

Line No.	60-Percent Design Cost Opinion August 2017	Quantity	Unit Issue	Unit Cost	Partner	Applicant	Request	Total ($)
	General							
1	Mobilization/demobilization/Bonding/Insurance	1	LS	$826,595				$826,595
2	Construction Review/Survey/ Stake/ As Built	1	LS	$165,319				$165,319
3	Construction Oversight and Management	1	LS	$247,978				$247,978
4	Care of water / ESC Program Management	1	LS	$40,000				$40,000
5								
6							**Sub-total**	**$1,279,892**
7								
8	[illegible]							
9	Project Signage	4	EA	$750				$3,000
10	Fueling Area	1	EA	$750				$750
11	Concrete Washout	1	EA	$1,250				$1,250
12	Wheel Wash Area	2	EA	$1,500				$3,000
13	Job Trailer	200	DAYS	$18				$3,600
14	Sanitation Facility	12	MONTHS	$225				$2,700
15	Water Truck for Dust Control	40	DAYS	$400				$16,000
16	Tree Removal and Replacement	4	EA	$1,200				$4,800
17	Protect in Place Mature Trees	2	EA	$300				$600
18	Remove, store and replace light pole	4	EA	$500				$2,000
19	Project in Place Utilities	10	EA	$300				$3,000
20	Protect in Place Existing Wetland	1	LS	$2,500				$2,500
21	Chain Link Construction Fence	450	LF	$5				$2,250
22	Orange Construction Fence	0	LF	$3				$0
23	Certified Weed Free Haybales	100	EA	$22				$2,200
24	Security Gate	2	EA	$2,000				$4,000
25	Silt Fence	2000	LF	$3				$6,000
26	Miscellaneous Erosion Control BMPs	1	LS	$5,000				$5,000
27	Traffic Control	1	LS	$25,000				$25,000
28	Site Restoration	1	LS	$100,000				$100,000
29							**Sub-total**	**$187,650**
30								
31	[illegible]							
32	Project Signage	4	EA	$750				$3,000
33	Fueling Area	1	EA	$750				$750
34	Concrete Washout	1	EA	$1,250				$1,250
35	Wheel Wash Area	2	EA	$1,500				$3,000
36	Dewatering Area	1	EA	$2,500				$2,500
37	Job Trailer	200	DAYS	$18				$3,600
38	Sanitation Facility	12	MONTHS	$225				$2,700
39	Water Truck for Dust Control	40	DAYS	$400				$16,000
40	Tree Removal and Replacement	14	EA	$1,200				$16,800
41	Remove, store and replace light pole	2	EA	$500				$1,000
42	Chain Link Construction Fence	1000	LF	$5				$5,000
43	Certified Weed Free Haybales	100	EA	$22				$2,200
44	Security Gate	2	EA	$2,000				$4,000
45	Silt Fence	1000	LF	$3				$3,000
46	Miscellaneous Erosion Control BMPs	1	LS	$4,000				$4,000
47	Cut and Restore Floodwall	1	LS	$75,000				$75,000
48	Traffic Control	1	LS	$25,000				$25,000
49	Site Restoration	1.00	LS	$5,000				$5,000
50							**Sub-total**	**$173,800**
51	[illegible]	[illegible]						
52	Project Signage	4	EA	$750				$3,000
53	Fueling Area	1	EA	$750				$750
54	Concrete Washout	1	EA	$1,250				$1,250
55	Wheel Wash Area	2	EA	$1,500				$3,000
56	Job Trailer	150	DAYS	$18				$2,700
57	Sanitation Facility	12	MONTHS	$225				$2,700
58	Water Truck for Dust Control	40	DAYS	$400				$16,000
59	Remove and Replace Tree	8	EA	$1,500				$12,000
60	Protect in Place Mature Trees	13	EA	$300				$3,900
61	Protect in Place Utilities	0	EA	$300				$0
62	Remove, store and replace light pole	4	EA	$500				$2,000
63	Chain Link Construction Fence	749	LF	$5				$3,745
64	Post Construction Fence	290	LF	$8				$2,320
65	Security Gate	2	EA	$2,000				$4,000
66	Certified Weed Free Haybales	50	EA	$22				$1,100
67	Silt Fence	256	LF	$3				$768
68	Miscellaneous Erosion Control BMPs	1	LS	$1,500				$1,500
69	Protect in Place Existing Wetland	1	LS	$2,500				$2,500
70	Site Restoration	1	LS	$100,000				$100,000
71							**Sub-total**	**$163,233**
72								
73	[illegible]	[illegible]						
74	Project Signage	4	EA	$750				$3,000
75	Fueling Area	1	EA	$750				$750
76	Concrete Washout	1	EA	$1,250				$1,250
77	Wheel Wash Area	2	EA	$1,500				$3,000
78	Dewatering Area	1	EA	$2,500				$2,500
79	Job Trailer	150	DAYS	$18				$2,700
80	Sanitation Facility	12	MONTHS	$225				$2,700
81	Water Truck for Dust Control	40	DAYS	$400				$16,000
82	Remove and Replace Tree	2	EA	$1,500				$3,000
83	Protect in Place Mature Trees	4	EA	$300				$1,200
84	Protect in Place Utilities	0	EA	$300				$0

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Line No.	60-Percent Design Cost Opinion August 2017	Quantity	Unit Issue	Unit Cost	Partner	Applicant	Request	Total ($)
85	Remove, store and replace light pole	7	EA	$500				$3,500
86	Chain Link Construction Fence	663	LF	$5				$3,315
87	Security Gate	1	EA	$2,000				$2,000
88	Certified Weed Free Haybales	70	EA	$22				$1,540
89	Silt Fence	380	LF	$3				$1,140
90	Miscellaneous Erosion Control BMPs	1	LS	$1,500				$1,500
91	Protect in Place Existing Wetland	1	LS	$2,500				$2,500
92	Site Restoration	1	LS	$100,000				$100,000
93							**Sub-total**	**$151,595**
94								
95	[illegible]	[illegible]						
96	Project Signage	3	EA	$750				$2,250
97	Fueling Area	0	EA	$750				$0
98	Concrete Washout	0	EA	$1,250				$0
99	Wheel Wash Area	0	EA	$1,500				$0
100	Job Trailer	0	DAYS	$18				$0
101	Sanitation Facility	2	MONTHS	$225				$450
102	Water Truck for Dust Control	0	DAYS	$400				$0
103	Remove and Replace Tree	1	EA	$1,500				$1,500
104	Protect in Place Mature Trees	2	EA	$300				$600
105	Project in Place Utilities	1	EA	$500				$500
106	Remove, store and replace light pole	1	EA	$500				$500
107	Chain Link Construction Fence	132	LF	$5				$660
108	Security Gate	1	EA	$2,000				$2,000
109	Certified Weed Free Haybales	20	EA	$22				$440
110	Silt Fence	0	LF	$3				$0
111	Miscellaneous Erosion Control BMPs	1	LS	$1,500				$1,500
112	Site Restoration	1	LS	$20,000				$20,000
113							**Sub-total**	**$30,400**
114								
115	[illegible]	[illegible]						
116	Project Signage	6	EA	$750				$4,500
117	Fueling Area	0	EA	$750				$0
118	Concrete Washout	0	EA	$1,250				$0
119	Wheel Wash Area	2	EA	$1,500				$3,000
120	Job Trailer	150	DAYS	$18				$2,700
121	Sanitation Facility	12	MONTHS	$225				$2,700
122	Water Truck for Dust Control	40	DAYS	$400				$16,000
123	Remove and Replace Tree	9	EA	$2,500				$22,500
124	Protect in Place Mature Trees	6	EA	$300				$1,800
125	Protect in Place Utilities	1	EA	$300				$300
126	Protect in Place Concrete stairs	1	ES	$300				$300
127	Temporary relocation and storage of Statue	1	EA	$3,000				$3,000
128	Temporary demo of wall and railing	1	LS	$3,000				$3,000
129	Remove, store and replace light pole	8	EA	$500				$4,000
130	Chain Link Construction Fence	534	LF	$5				$2,670
131	Security Gate	1	EA	$2,000				$2,000
132	Certified Weed Free Haybales	50	EA	$22				$1,100
133	Silt Fence	160	LF	$3				$480
134	Miscellaneous Erosion Control BMPs	1	LS	$1,500				$1,500
135	Site Restoration	1	LS	$150,000				$150,000
136							**Sub-total**	**$221,550**
137								
138	[illegible]	[illegible]						
139	Traffic Control	1	LS	$120,000				$120,000
140	Care of Water Pumping	400	EA	$250				$100,000
141	Care of Water Filter	1	LS	$60,000				$60,000
142	Turbidity Curtain	1200	LF	$18				$21,600
143	Oil Boom	1200	LF	$10				$12,000
144	Silt Fence	995	LF	$3				$2,985
145	Barrier Fence	2414	LF	$2				$4,828
146	Furnish and Install Stage 3 (River Right) Alluvial Coffer Dam	13000	CY	$42				$546,000
147	Reconfigure Causeway Coffer System	13000	CY	$18				$234,000
148	Furnish and Install Stage 1 Sheetpile (20' lengths)	55000	SF	$20				$1,100,000
149	Demo and Dispose Sheetpile	55000	SF	$0				$0
150	Stage 1 Access Ramps	2	EA	$35,000				$70,000
151	Stage 2 Sheetpile re-configuration	1480	LF	$30				$44,400
152	Stage 2 Work Bridges	2	EA	$150,000				$300,000
153	Install Stage 3 (Pearl to Fulton) Sheetpile (re-use stage 1)	1408	LF	$30				$42,240
154	Stage 3 (Pearl to Fulton) Access Ramps	1	EA	$35,000				$35,000
155	Stage 4 (Pearl to Fulton) Sheetpile re-configuration	1480	LF	$30				$44,400
156	Stage 4 (Pearl to Fulton) Work Bridges	1	EA	$150,000				$150,000
157	Certified Weed Free Haybales	100	EA	$22				$2,200
158	Rip Rap Scour Protection	1973	TONS	$75				$147,941
159	Temporary Grade Control	785	TONS	$75				$58,874
160	Sediment Removal	5000	TONS	$10				$50,000
161	Filter Area	3	EA	$4,500				$13,500
162	PIP or Maintain Stormwater outfall	4	EA	$2,500				$10,000
163	PIP Existing Wetland	2	LS	$2,500				$5,000
164	PIP Existing USGS Stream Gage	1	EA	$3,000				$3,000
165	Care of water / ESC Program Management	1	LS	$40,000				$40,000
166	Plant Native E.C. Grass with mulch/tackifier	5	ACRES	$3,500				$17,500
167							**Sub-total**	**$3,235,468**
168								
169	[illegible]	[illegible]						
170	Excavation hauloff and dispose of grouted boulder	40	CY	$45				$1,800
171	Excavation of riprap	35	CY	$12				$420
172	Slab Rock, delivered & placed	200	TONS	$450				$90,000
173	Tie-in boulder (12"-24"), delivered & placed	150	TONS	$156				$23,400
174	Hauloff or stockpile excavated riprap	38	TONS	$20				$759
175	3" Minus Gravel Bedding, furnish and place	14	TONS	$35				$479
176	Excavation backfill with alluvium produced on site	29	CY	$12				$346
177	Filter Fabric	149	SY	$4				$598
178	Tie-in to exisitng path and finish	4	LS	$2,000				$8,000
179							**Sub-total**	**$125,803**
180								
181	[illegible]	[illegible]						
182	Removal of low Head Existing Dam	2109	CY	65				$137,085
183	Unclassified Excavation	3610	CY	6				$21,658
184	Furnish and Deliver Boulder	11091	tons	75				$831,805
185	Placement Boulder	11091	tons	56				$621,081
186	Furnish and Deliver Riprap Substructure	3883	CY	65				$252,369

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Line No.	60-Percent Design Cost Opinion August 2017	Quantity	Unit Issue	Unit Cost	Partner	Applicant	Request	Total ($)
187	Placement Riprap Substructure	3883	CY	12				$46,591
188	Grading of Alluvium (Imported)	27583	CY	12				$330,996
189	Grading of Alluvium (Native)	3896	CY	12				$46,752
190	Furnish and Deliver Alluvium (assumes repurposed cut)	23117	CY	42				$970,925
191	Install Grout in Boulder Matrix	200	CY	200				$40,000
192	Precast Structures	17	CY	15000				$255,000
193	Excavate & Dispose Unsuitable non-HTRW	100	CY	45				$4,500
194	Bridge Riprap	6426	CY	65				$417,685
195							**Sub-total**	**$3,976,448**
196								
197								
198								
199								

Construction Soft Costs $1,279,892
Total for Downstream of Bridge Street $8,265,946
15% Contingency $1,431,876

Total with Contingency $10,977,714

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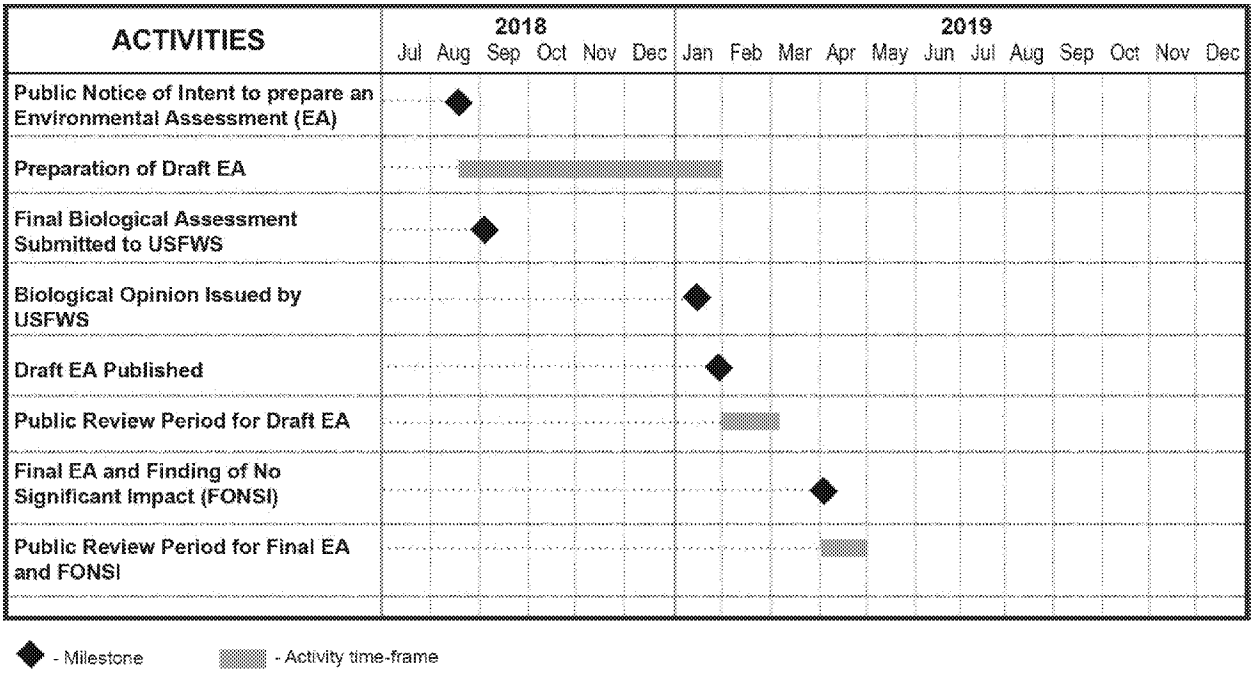
9.0 Schedule for Plan – EA Completion

The EA is being conducted by ERM and is currently in progress. The anticipated schedule is as follows:



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10.0 Additional Studies Needed

The following studies are being performed on behalf of this project:

- Biological assessment prepared by EcoAnalysts, Inc. (formerly Ecological Specialists, Inc.)
- Economic impact analyses being prepared by AEG
- Cost benefit analysis being prepared by AEG
- EA being prepared by ERM
- Sediment transport study prepared by River Restoration
- Flood modeling prepared by River Restoration

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11.0 Interdisciplinary Technical Procedures

Generation of the necessary technical documents, as identified in Section 10.0, include interdisciplinary efforts performed by stakeholders. The technical procedures required for each of these documents is driven by regulatory agencies, including:

- NEPA.
- MDEQ.
- NRCS.
- USFWS.
- U.S. Department of Agriculture.
- Security and Exchange Commission.
- Bureau of Consumer Financial Protection.

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12.0 Alternatives

12.1 Formulation Process

To determine the most viable alternatives to meet the project's purpose and need, the City of Grand Rapids, lead partner GVMC, and supporting partner GRWW considered the goals for conservation and restoration, needs of recreational users (anglers, boaters, general public), the current status of the existing infrastructure, and resources and funding available for project implementation. Alternatives considered during project development but proposed for elimination from detailed study due to lack of feasibility or lack of consistency with the project's purpose and need is discussed in Section 12.2. The preferred Proposed Action Alternative is described in Section 12.3.1 and the No-Action Alternative is described in Section 12.3.2.

12.2 Alternatives Proposed for Elimination from Detailed Study

Alternative 2, removal of four low-head beautification dams without substrate enhancements, will likely be eliminated from detailed study, because it fails to meet all the needs identified in the purpose and needs statement.

Alternative 2 involves removal of the four aged low-head beautification dams between the Interstate 196 Bridge and Fulton Street Bridge without subsequent substrate enhancement. Removal of the low-head dams would improve connectivity for fish migration up-stream and remove the dangerous hydraulic conditions that create a public safety hazard that has caused drownings and numerous rescues over the years. Without substrate enhancement, however, the quality of the habitat will not be improved, and expanded recreational opportunities will not be realized.

12.3 Description of Alternatives Considered

12.3.1 Preferred Proposed Action

Alternative 3 (preferred alternative) entails removal of the four aged low-head beautification dams and enhancement of substrate to improve habitat and expand recreational opportunities. These actions would fulfill the purpose and needs of the project. Removal of the low-head dams would improve connectivity for fish migration up-stream and remove the dangerous hydraulic

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conditions that create a public safety hazard that has caused drownings and numerous rescues over the years. Substrate enhancement will improve the quality of habitat for threatened and endangered species, in addition to other local and regional aquatic species, and create river features that provide additional recreational opportunities that currently do not exist, such as whitewater boating and fly-fishing.

12.3.2 No-action Alternative

The no-action alternative (Alternative 1) would leave the current conditions as they are. The low-head beautification dams would be left in place, and the related public safety issues would continue to be present. There would be no substrate enhancement; therefore, habitat quality would not be improved. The existing limited recreational activities would not be affected.

12.4 Economics

In accordance with Title 390, NWPM, Part 501, Subpart B, Section 501.11B(1), a national economic development analysis is not required because this project is not a water resources project. However, an economic impact analysis for a larger area (of which this project is a portion) was conducted by AEG in 2014 and is now being updated (by AEG) to specifically assess the impacts of this specific project. AEG is also generating an economic impact cost-benefit analyses report for the project. The alternative that achieves the agreed-on level of resource protection while maximizing the net economic benefit will be the preferred alternative. All costs, including operation, maintenance, and replacement, expected to be incurred over the period of analysis will be included.

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Appendix A

Public Participation Plan

Appendix A
Public Participation Plan

The public participation plan (PPP) is an integral part of the project development process and is designed to encourage collaboration between stakeholders, including partners, agencies, tribes, and the public. This preliminary investigative report was prepared to provide information to assist in evaluation of further planning, objectives, and goals, and aid in the securing of funding for the Lower Grand River Watershed Habitat Restoration – Farmland Conservation Project. During development of this report, the project Sponsor, lead Partner, and supporting Partner conducted initial consultation with natural resource agencies and stakeholders. The project Sponsor and its Partners will conduct further comprehensive public scoping prior to preparation of the WPP as described in Section 6.0, Scope of the WPP.

The purpose of the PPP is to outline methods for encouraging involvement of citizens, organizations, and other interested parties in the development of the WPP. The objective of the PPP is to:

- Create awareness among the public regarding the Lower Grand River Habitat Restoration -Farmland Conservation Project and alternatives considered.
- Educate the public about the purpose and need for the draft Grand River WPP goals and objectives.
- Establish a process that encourages members of the public and other interested parties to participate in development of the WPP.
- Make sure interested stakeholders can review and comment on the draft WPP.

Public Participation Events

Public participation events will be hosted in three locations within the project area to provide opportunities for the public to obtain information, ask questions, and express concerns they may have regarding the proposed project. These events may include community/business forums, public meetings, or other scheduled community events such as farmer's markets. Concerns brought forth through this process will be noted in the WPP and addressed as necessary.

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Advertisement of PPP Events

The public and other interested parties will be notified of the WPP and PPP events using one or more of the following tools:

- Printed Information—Printed flyers about the WPP and PPP event dates will be prepared and distributed.
- Web Sites—Information about the WPP and PPP event dates will be made available for existing websites and online calendars.
- Social Media—Information about the WPP and PPP event dates will be made available for use on Twitter, Facebook, Instagram, or other social media outlets.
- Press and Media—Information about the WPP and PPP event dates will be provided to local press and media for print, radio, or online dissemination.

These tools will be used for distribution of notices through Partner and stakeholder agencies and organizations including, but not limited to:

- Grand Valley Metro Council.
- City of Grand Rapids.
- West Michigan Environmental Action Council.
- West Michigan Sustainable Business Forum.
- Grand Rapids Public Library.
- West Grand Neighborhood Association.
- Lower Grand River Organization of Watersheds.
- Grand Rapids Press.
- The Grand Rapids Times.
- MLive.com.
- Radio (stations WBLU, WYCE, WGRD, WFGR).

PPP Event Engagement Tools

An open house format will be used to introduce the purpose and need for the WPP, introduce the Grand River Revitalization project, and offer opportunities to ask questions and express concerns. Content will be focused around the four aspects of the project: physical, biological, economical, and social. Additionally, outreach participants and the public will be invited to

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provide input through a survey using Survey Monkey, an online survey development cloud-based software. This will allow the community to engage when time allows.

PPP Outcomes

Questions and concerns received through public participation events will be documented for WPP planning efforts. Additional information documented for each public participation event will include the date, type, and purpose of the activity, as well as the names of the participating organizations and the public. Questions and concerns received at the events will be used to focus the scope of the WPP, and specific concerns will be addressed in the WPP.

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Appendix B

Environmental Evaluation Checklist (NRCS-CPA-52)

U.S. Department of Agriculture
Natural Resources Conservation Service

NRCS-CPA-52
4/2013

ENVIRONMENTAL EVALUATION WORKSHEET

A. Client Name:

B. Conservation Plan ID # (as applicable):
Program Authority (optional):

C. Identification # (farm, tract, field #, etc. as required):

D. Client's Objective(s) (purpose):

E. Need for Action:

H. Alternatives

No Action √ if RMS ☐	*Alternative 1* √ if RMS ☐	*Alternative 2* √ if RMS ☐

Resource Concerns

In Section "F" below, analyze, record, and address concerns identified through the Resources Inventory process. (See FOTG Section III - Resource Planning Criteria for guidance).

F. Resource Concerns and Existing/ Benchmark Conditions (Analyze and record the existing/benchmark conditions for each identified concern)	I. Effects of Alternatives					
	No Action		*Alternative 1*		*Alternative 2*	
	Amount, Status, Description *(Document both short and long term impacts)*	√ if does NOT meet PC	**Amount, Status, Description** *(Document both short and long term impacts)*	√ if does NOT meet PC	**Amount, Status, Description** *(Document both short and long term impacts)*	√ if does NOT meet PC
SOIL: *EROSION*						
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
SOIL: *SOIL QUALITY DEGRADATION*						
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
WATER: *EXCESS / INSUFFICIENT WATER*						
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
WATER: *WATER QUALITY DEGRADATION*						
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC

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F. Resource Concerns and Existing/ Benchmark Conditions (Analyze and record the existing/benchmark conditions for each identified concern)	I. (continued)					
	No Action		*Alternative 1*		*Alternative 2*	
	Amount, Status, Description *(Document both short and long term impacts)*	√ if does NOT meet PC	**Amount, Status, Description** *(Document both short and long term impacts)*	√ if does NOT meet PC	**Amount, Status, Description** *(Document both short and long term impacts)*	√ if does NOT meet PC
AIR: *AIR QUALITY IMPACTS*						
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
PLANTS: *DEGRADED PLANT CONDITION*						
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
ANIMALS: *INADEQUATE HABITAT FOR FISH AND WILDLIFE*						
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
ANIMALS: *LIVESTOCK PRODUCTION LIMITATION*						
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
ENERGY: *INEFFICIENT ENERGY USE*						
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
HUMAN: *ECONOMIC AND SOCIAL CONSIDERATIONS*						

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Special Environmental Concerns: Environmental Laws, Executive Orders, policies, etc.

In Section "G" complete and attach Environmental Procedures Guide Sheets for documentation as applicable. Items with a "•" may require a federal permit or consultation/coordination between the lead agency and another government agency. In these cases, effects may need to be determined in consultation with another agency. Planning and practice implementation may proceed for practices not involved in consultation.

G. Special Environmental Concerns (Document existing/ benchmark conditions)	J. Impacts to Special Environmental Concerns					
	No Action		*Alternative 1*		*Alternative 2*	
	Document all impacts (Attach Guide Sheets as applicable)	√ if needs further action	Document all impacts (Attach Guide Sheets as applicable)	√ if needs further action	Document all impacts (Attach Guide Sheets as applicable)	√ if needs further action
•Clean Air Act *Guide Sheet FS1 FS-2*		☐		☐		☐
•Clean Water Act / Waters of the U.S. *Guide Sheet Fact Sheet*		☐		☐		☐
•Coastal Zone Management *Guide Sheet Fact Sheet*		☐		☐		☐
Coral Reefs *Guide Sheet Fact Sheet*		☐		☐		☐
•Cultural Resources / Historic Properties *Guide Sheet Fact Sheet*		☐		☐		☐
•Endangered and Threatened Species *Guide Sheet Fact Sheet*		☐		☐		☐
Environmental Justice *Guide Sheet Fact Sheet*		☐		☐		☐
•Essential Fish Habitat *Guide Sheet Fact Sheet*		☐		☐		☐
Floodplain Management *Guide Sheet Fact Sheet*		☐		☐		☐
Invasive Species *Guide Sheet Fact Sheet*		☐		☐		☐
•Migratory Birds/Bald and Golden Eagle Protection Act *Guide Sheet Fact Sheet*		☐		☐		☐
Natural Areas *Guide Sheet Fact Sheet*		☐		☐		☐
Prime and Unique Farmlands *Guide Sheet Fact Sheet*		☐		☐		☐
Riparian Area *Guide Sheet Fact Sheet*		☐		☐		☐
Scenic Beauty *Guide Sheet Fact Sheet*		☐		☐		☐

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•Wetlands *Guide Sheet* *Fact Sheet*		☐		☐		☐
•Wild and Scenic Rivers *Guide Sheet* *Fact Sheet*		☐		☐		☐

K. Other Agencies and Broad Public Concerns	***No Action***	***Alternative 1***	***Alternative 2***
Easements, Permissions, Public Review, or Permits Required and Agencies Consulted.			
Cumulative Effects Narrative (Describe the cumulative impacts considered, including past, present and known future actions regardless of who performed the actions)			
L. Mitigation (Record actions to avoid, minimize, and compensate)			
M. Preferred Alternative — √ preferred alternative	☐	☐	☐
M. Preferred Alternative — Supporting reason			

N. Context (Record context of alternatives analysis)

The significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality.

O. Determination of Significance or Extraordinary Circumstances

Intensity: Refers to the severity of impact. Impacts may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

If you answer ANY of the below questions "yes" then contact the State Environmental Liaison as there may be extraordinary circumstances and significance issues to consider and a site specific NEPA analysis may be required.

Yes	No	
☐	☐	• Is the preferred alternative expected to cause significant effects on public health or safety?
☐	☐	• Is the preferred alternative expected to significantly affect unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas?
☐	☐	• Are the effects of the preferred alternative on the quality of the human environment likely to be highly controversial?
☐	☐	• Does the preferred alternative have highly uncertain effects or involve unique or unknown risks on the human environment?
☐	☐	• Does the preferred alternative establish a precedent for future actions with significant impacts or represent a decision in principle about a future consideration?
☐	☐	• Is the preferred alternative known or reasonably expected to have potentially significant environment impacts to the quality of the human environment either individually or cumulatively over time?
☐	☐	• Will the preferred alternative likely have a significant adverse effect on ANY of the special environmental concerns? Use the Evaluation Procedure Guide Sheets to assist in this determination. This includes, but is not limited to, concerns such as cultural or historical resources, endangered and threatened species, environmental justice, wetlands, floodplains, coastal zones, coral reefs, essential fish habitat, wild and scenic rivers, clean air, riparian areas, natural areas, and invasive species.
☐	☐	• Will the preferred alternative threaten a violation of Federal, State, or local law or requirements for the protection of the environment?

P. To the best of my knowledge, the data shown on this form is accurate and complete:

In the case where a non-NRCS person (e.g. a TSP) assists with planning they are to sign the first signature block and then NRCS is to sign the second block to verify the information's accuracy.

Signature (TSP if applicable)	Title	Date
Signature (NRCS)	**Title**	**Date**

If preferred alternative is not a federal action where NRCS has control or responsibility and this NRCS-CPA-52 is shared with someone other than the client then indicate to whom this is being provided.

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The following sections are to be completed by the Responsible Federal Official (RFO)

NRCS is the RFO if the action is subject to NRCS control and responsibility (e.g., actions financed, funded, assisted, conducted, regulated, or approved by NRCS). These actions do not include situations in which NRCS is only providing technical assistance because NRCS cannot control what the client ultimately does with that assistance and situations where NRCS is making a technical determination (such as Farm Bill HEL or wetland determinations) not associated with the planning process.

Q. NEPA Compliance Finding (check one)

The preferred alternative:		Action required
☐	1) is **not a federal action** where the agency has control or responsibility.	Document in "R.1" below. No additional analysis is required
☐	2) is a federal action **ALL** of which is **categorically excluded** from further environmental analysis **AND** there are **no extraordinary circumstances as identified in Section "O".**	Document in "R.2" below. No additional analysis is required
☐	3) is a federal action that has been **sufficiently analyzed** in an existing Agency state, regional, or national NEPA document **and** there are no predicted significant adverse environmental effects or extraordinary circumstances.	Document in "R.1" below. No additional analysis is required.
☐	4) is a federal action that has been sufficiently analyzed in another Federal agency's NEPA document (EA or EIS) that addresses the proposed NRCS action and its' effects **and has been formally adopted by NRCS**. NRCS is required to prepare and publish its own Finding of No Significant Impact for an EA or Record of Decision for an EIS when adopting another agency's EA or EIS document. (**Note: This box is not applicable to FSA)**	Contact the State Environmental Liaison for list of NEPA documents formally adopted and available for tiering. Document in "R.1" below. No additional analysis is required
☐	5) is a federal action that has **NOT** been sufficiently analyzed or may involve predicted significant adverse environmental effects or extraordinary circumstances and may require an EA or EIS.	Contact the State Environmental Liaison. Further NEPA analysis required.

R. Rationale Supporting the Finding

R.1 Findings Documentation	
R.2 Applicable Categorical Exclusion(s) **(more than one may apply)**	
7 CFR Part 650 *Compliance With NEPA*, subpart 650.6 *Categorical Exclusions* states prior to determining that a proposed action is categorically excluded under paragraph (d) of this section, the proposed action must meet six sideboard criteria. See NECH 610.116.	

I have considered the effects of the alternatives on the Resource Concerns, Economic and Social Considerations, Special Environmental Concerns, and Extraordinary Circumstances as defined by Agency regulation and policy and based on that made the finding indicated above.

S. Signature of Responsible Federal Official:

Signature	Title	Date

Additional notes

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