Tenmile Creek Flooding

Summary of Past Channel Capacity Investigations in the Context of its Geomorphic Condition

FINAL DRAFT

Prepared for:

Lewis and Clark County
Public Works

June 2017

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INTRODUCTION

Lewis and Clark County Public Works Department has requested RESPEC summarize the feasibility of increasing capacity of Tenmile Creek to accommodate additional flood volume and reduce the quantity of overflow leaving the main stream corridor. This topic has been studied repeatedly over the past 50 years. Several concepts to increase channel capacity have been presented and discussed in the past including: debris clearing, channel widening, straightening, dredging, and diking/levee construction. In the past few years, public officials and interested citizens met with representatives from multiple agencies to discuss feasibility of a channel capacity enhancement project on Tenmile Creek. In general, agencies resisted the concept of a major flood control project in the Tenmile Creek corridor for numerous reasons, frequently citing cost/benefit limitations, environmental considerations, and landowner resistance to easements. This document serves to summarize past efforts and to present additional flood mitigation strategies for Tenmile Creek.

PREVIOUS STUDIES

In 1975, a flood event on Tenmile Creek caused significant damage in the Helena Valley and spurred creation of the Tenmile Creek Flood Control District, which was formally designated in 1977. After formation of the district, in 1982 a flood control advisory committee was designated by the commissioners. The committee was comprised of people that lived within the district boundaries that were tasked to develop preferable alternatives and costs for feasible flood control projects. The committee coordinated with the Soil Conservation Service (SCS, currently called Natural Resource Conservation Service (NRCS)) who was studying the flood problem at that time. That federal agency proposed several large scale flood control alternatives including: levees, dams, and channelization. Costs to implement those projects were too great and it was not possible to demonstrate a favorable cost-benefit, making those projects ineligible for federal funding assistance. Knowing a large-scale flood control project on Tenmile Creek was likely not feasible, the SCS collaborated with the newly formed citizens flood committee to develop the following projects considered feasible in 1982:

1. Annual Cleaning (i.e., debris removal, channel improvements in areas where capacity is limited, removal of water flow restrictions.)
2. West Drain – includes improvements to D-2 drain.
3. McHugh Drive Ditch (assuming right of way conflicts resolved). Also includes improvements to D-2 drain.
4. Montana Ave. Drainage Improvements – i.e. replace and improve culverts at Montana Avenue and Forestvale Road.

From the list of feasible projects, the committee recommended to the board of commissioners to:

1. Implement "annual cleaning", which includes removal of trees, car bodies, and other obstructions that limit water flow. This debris removal includes removing sand and gravel deposits where they have severely reduced the channel's capacity to carry water, and straightening the stream channel at approaches to bridges located within the district.
2. Develop current engineering standards for design and construction of future bridges spanning Ten Mile Creek. These bridges shall have a capacity that meets or exceeds a 25 year flood.
3. Develop plans for funding and construction of the West Drain.
4. Additional efforts be directed to reducing drainage problems in the district, i.e. identifying and upgrading culverts and ditches that have inadequate capacity to handle historic sheet flooding.
5. A permanent board be established to serve as an advisory body to the commissioners. This board would advise the commission on operation of the district.

In 1981, the flood of record occurred on Tenmile Creek which triggered a flood drainage study (Morrison-Maierle, 1982) to address flooding problems and develop alternatives to protect against and mitigate potential damage and losses in the future. It is suspected this study was conducted to supplement and verify with engineering the flood committees recommendations. This study was developed along with companion studies of Silver Creek, Eastgate Village/Treasure State Acres, Prickly Pear Creek, and Trout Creek. The report summarized previous efforts, in addition to presenting new options supported by engineering analysis. Out of all the previously proposed and new projects, the report prioritized several efforts to reduce flooding and address drainage problems on Tenmile Creek:

Priority 1:	Flood Plain Management
Priority 2:	Channel Improvements at Bridges
Priority 3:	McHugh Drainage
Priority 4:	Bridge Replacement at McHugh Drive
Priority 5:	Channel Cleaning

Between 2004 and 2007, the United States Geologic Survey (USGS) conducted a large-scale flood study (including detailed hydrologic and hydraulic analyses) of Tenmile Creek and the Tenmile Overflow area that leaves the stream corridor and flows into the Helena Valley through residential developments (USGS, 2004-2007). Silver Creek was also studied. The primary focus of these studies was to update the Federal Emergency Management Agency (FEMA), Flood Insurance Rate Maps (FIRMs). The effective Flood Insurance Study (FIS) and FIRMs (FEMA, 2012) utilize these study results.

Substantial flooding occurred again in 2011 across much of the Helena Valley. In the aftermath of this event, the County commissioned a master planning effort aimed at

developing solutions to address flooding problems. The report, Flood Mitigation Master Plan for the Helena Valley (Anderson-Montgomery, 2013), evaluated several alternatives to reduce flooding and prioritized a list of recommended infrastructure projects to mitigate flooding impacts within the Tenmile Creek, Silver Creek, and Prickly Pear Creek drainages. The plan focused on conveyance and detention throughout the valley and contains conceptual level alternatives to manage floodwaters throughout the Helena Valley.

Following finalization of the Valley Flood Mitigation Master Plan (VFMMP) in 2013, public officials and interested citizens met with representatives from multiple agencies to discuss feasibility of a channel capacity enhancement project on Tenmile Creek. For the purposes of this summary document, agencies were solicited for a written response regarding the feasibility of a Tenmile Creek channel alteration project. Those responses are included in **Appendix A**. In general, agencies do not support a capacity enhancement project on Tenmile Creek.

It is likely agencies do not support channel maintenance activities on Tenmile Creek because of the geomorphic condition of Tenmile Creek where flooding occurs.

GEOMORPHIC CONDITION

Tenmile Creek originates on the eastern side of the Continental Divide approximately 20 miles southwest of Helena. As the creek enters the Helena Valley its longitudinal slope decreases markedly which reduces flow velocities and its ability to transport bedload (*competency*). East of the Williams Street Bridge, Tenmile Creek is bounded by a broad alluvial fan that gently slopes to the northeast where it intersects the Prickly Pear Creek alluvial fan immediately southwest of Lake Helena. The present-day landscape within the Tenmile Creek corridor reflects a history of terrain manipulation including floodplain filling, channel straightening, channel berming/diking, road embankment and bridge placement, construction of the Helena Valley Irrigation District (HVID) canal, and rural residential development. The HVID was formed in the 1950s to replace lands that were inundated by the construction of Canyon Ferry Dam and Reservoir. In addition to the canal, a series of drainage ditches were constructed across the valley to lower the groundwater table and facilitate cultivation.

Boulder Batholith geology, consisting of quartz monzonite, is present in significant portions of the upper Tenmile Creek watershed. This unit tends to naturally contribute large volumes of sand to receiving stream channels. Excessive sediment inputs to Tenmile Creek have also resulted from extensive mining in the upper watershed in the Rimini area. Four main factors were proposed by Emory Lane (Lane, 1955) for influencing stream process function: sediment discharge, sediment particle size, stream flow, and stream slope. This relationship is illustrated in **Figure 1**.

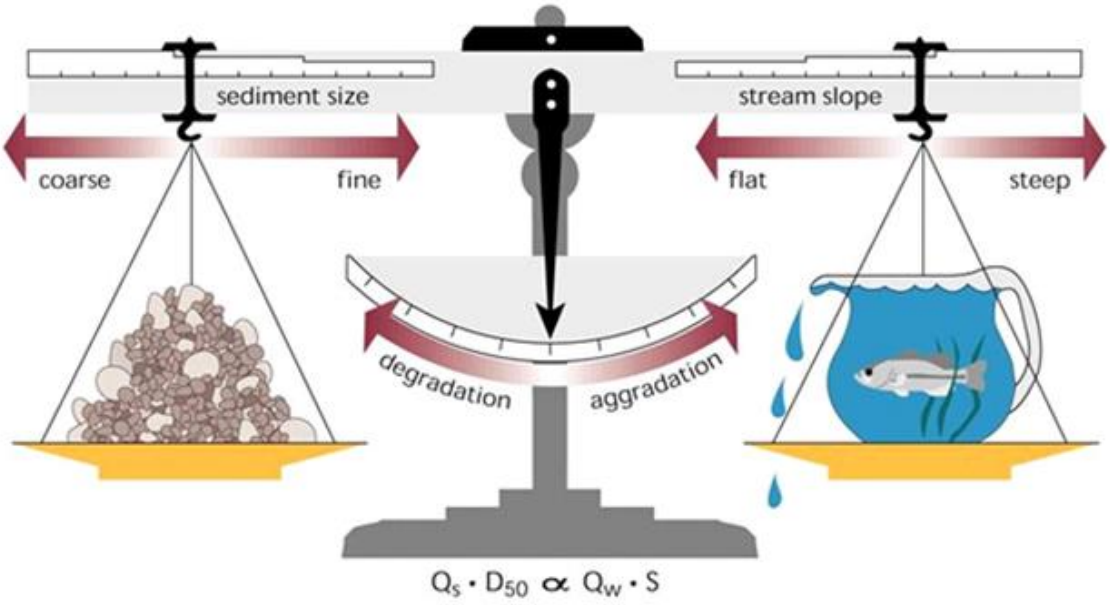

Figure 1. Schematic of the Lane relationship for qualitative analysis (ASCE).

When one or more factors change, either along a reach or at the same point in time, the system responds by adjusting its morphology to accommodate the new balance. This balance is typically considered in the context of anthropogenic influences inducing geomorphic change at a particular location through time. However, this balance illustrates the primary factors responsible for the observed geomorphic condition and can be used to explain general trends. As Tenmile Creek transitions from a steeper, mountainous setting to the low-gradient valley floor, the stream slope is reduced, tipping the scale towards aggradation. An aggradational tendency has likely been the dominant process for several thousand years, as evidenced by historic Tenmile Creek channels observed in aerial imagery and LiDAR topography. Alluvial fans develop in aggradational environments where continued sediment deposition diminishes existing channel capacity and promotes frequent change in preferred flow paths. A streambed profile of Tenmile Creek was extracted from the USGS HEC-RAS model. It is apparent there are two general grade changes that occur throughout their modeled reach with is from confluence with Prickly Pear Creek to 14 miles upstream at the Highway 12 crossing. **Figure 2** illustrates where Green Meadow Drive is located just downstream of where the stream slope changes from 1% to 0.5%.

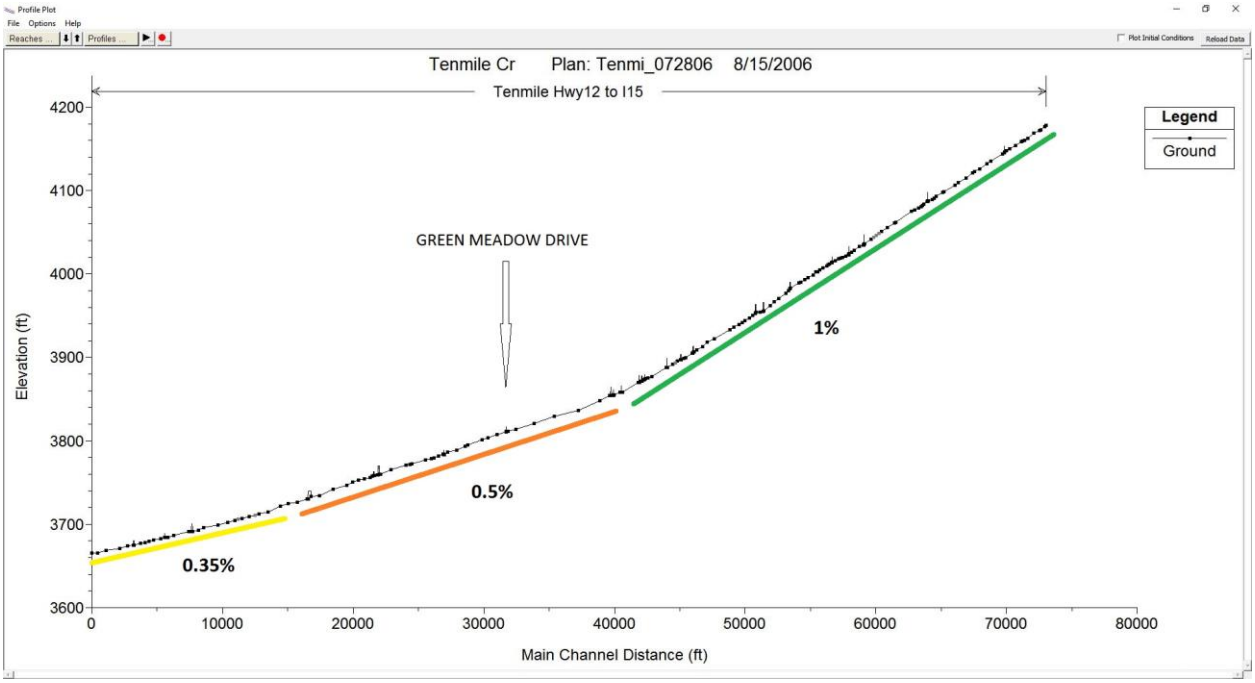

Figure 2. HEC-RAS streambed profile from USGS study illustrating grade break just upstream of Green Meadow Drive.

The location of the grade break just upstream of Green Meadow Drive is the approximate location of where the alluvial fan begins. Upstream of Green Meadow Drive, moderate flood flows begin to leave the Tenmile Creek channel and travel overland to the northeast, where they soon encounter the HVID canal (**Figure 3**). There are seven concrete box culverts that allow overland sheet flow from Tenmile Creek to pass beneath the HVID canal. During flood flow, significant backwater develops upstream of the HVID and McHugh Drive Bridge. This backwater formation is accompanied with low velocity resulting in diminished sediment transport capacity, promoting sediment accumulation or aggradation. **Figures 4** and **5** are oblique aerials looking upstream at the Tenmile Creek drainage area during the 1981 flood event where the HVID canal is observed to back of flood flow.

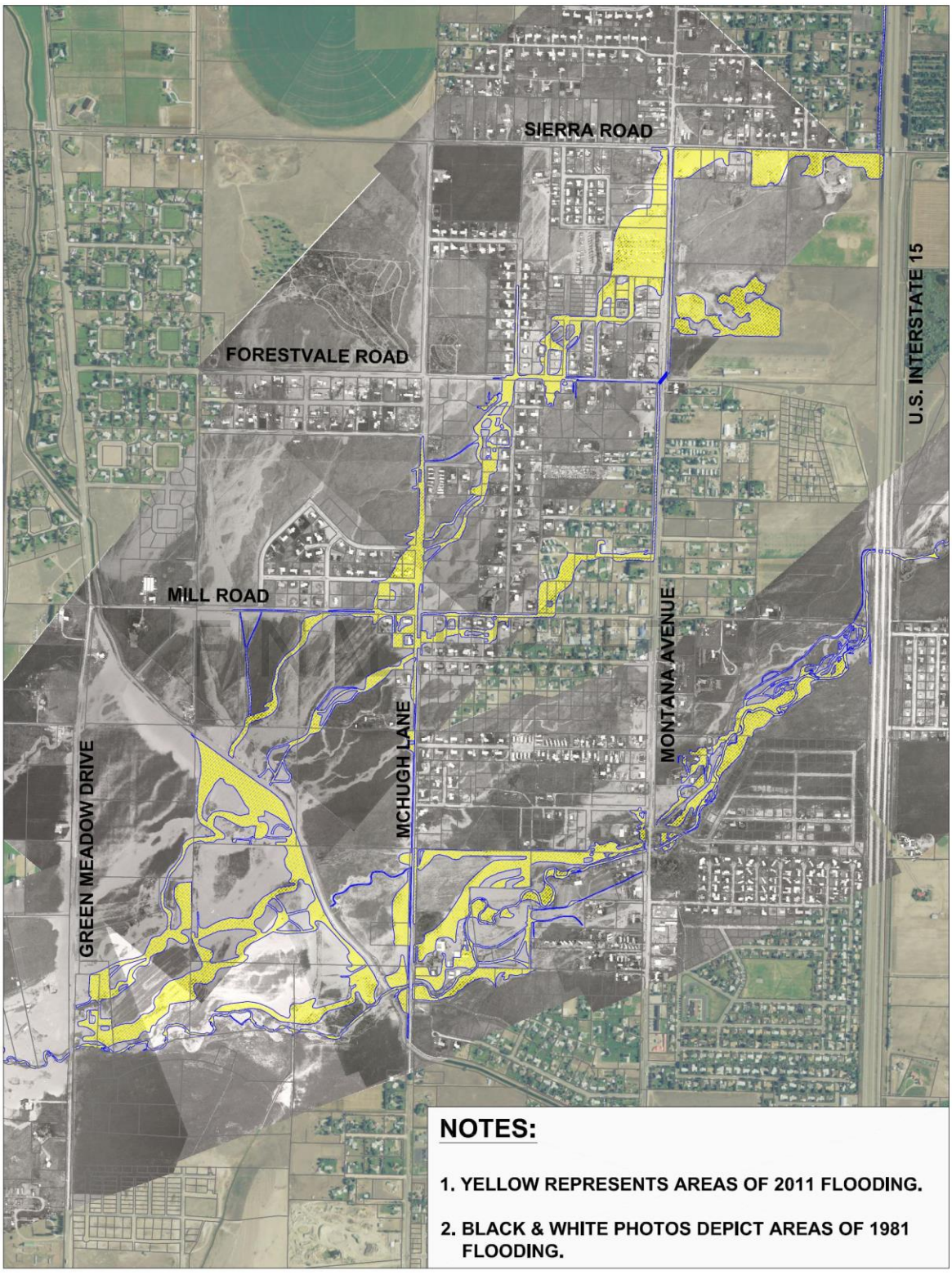

Figure 3. Aerial view of flooding extents for both the 1981 and 2011 events.

Source: Flood Mitigation Master Plan for Helena Valley

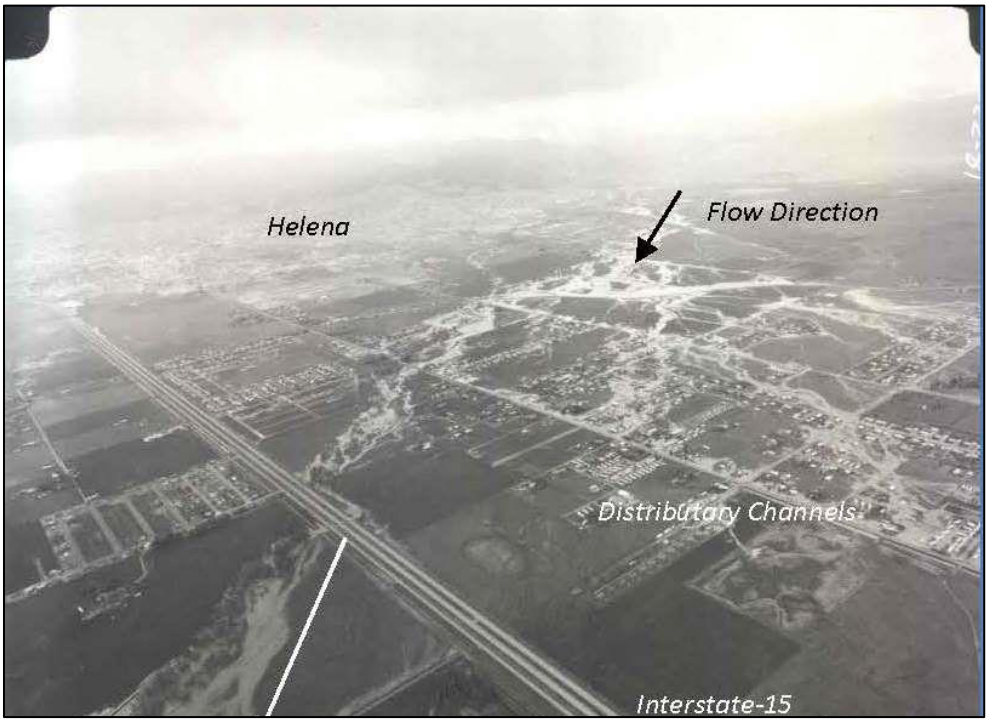

Figure 4. 1981 flooding on Tenmile Creek (looking upstream from I-15).

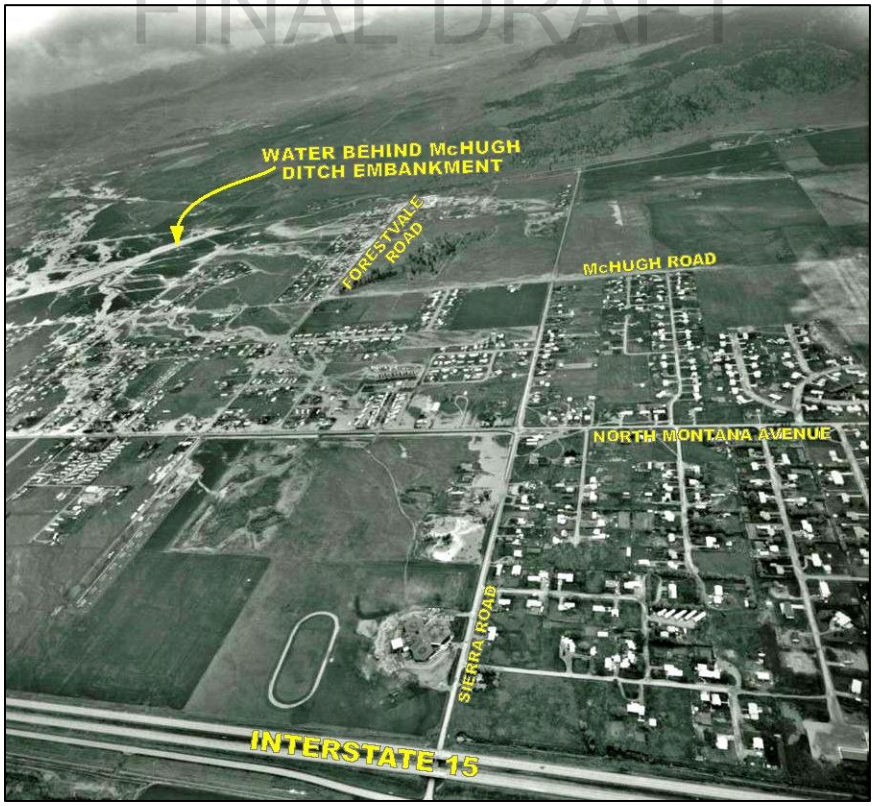

Figure 5. 1981 flooding on Tenmile Creek (looking upstream from I-15; HVID Canal is labeled as McHugh Ditch).

FLOOD MITIGATION STRATEGIES

TENMILE CREEK CHANNEL

Flooding within the Tenmile Creek Study Area (Anderson-Montgomery, 2013), which generally lies north of Tenmile Creek between Green Meadow Drive and Interstate 15, primarily results from flows that leave the creek channel immediately downstream of Green Meadow Drive. This is due to a combination of inadequate channel capacity as a result of bed aggradation and debris accumulation at road crossings (bridges, culverts), and the lack of a functional floodplain due to the perched nature of the channel.

Periodic channel maintenance to remove debris (trash, tree branches, etc.) that is transported into a given reach and becomes jammed at natural constriction points or hydraulic structures (bridges, culverts) can increase flow capacity, reduce flooding impacts, and is generally a good maintenance practice. However, more extensive channel dredging activities with the purpose of lowering the bed elevation over extended lengths is not a sound management practice. The increase in channel capacity is typically short-lived as bedload is transported into the reach and fills the dredged area during the receding portion of succeeding flood events.

Likewise, construction of levees above the natural streambank elevation to increase channel capacity is also not a viable, long-term solution for flood protection. Due to its location on an alluvial fan, the Tenmile Creek floodplain is poorly defined and lacks effective flood carrying capacity along the creek alignment. Placement of levees along significant portions of the channel length would only serve to exacerbate flooding impacts by further elevating the channel in relation to the surrounding topography. Flow capacity at bridges and culverts could also be reduced as a result of potential long-term increases in bed elevation, which could result in adverse flood impacts from lower magnitude floods.

The Montana Stream Permitting Guide (MT-DNRC, 2001) provides useful guidance for determining appropriate flood control methods. Chapter 2 (page 2.11) discusses the selection of flood control methods, and provides limited circumstances where channel excavation and levee construction may be appropriate:

> Channel excavation may be appropriate when:
>
> - Cause and effect are clearly understood (flooding is due to a culvert backwater or hillside slump into the channel).
> - Cause can be addressed to prevent recurrence.
> - Gravel excavation occurs in a limited area, requires a single entry, and upstream sources are unlikely to rapidly refill the excavated section of channel.
> - Fisheries and channel stability impacts are judged to be minimal.

Dikes and levees may be appropriate when:

- Protection of public infrastructure takes precedence over stream function.
- Dikes can be designed to avoid significant stream and floodplain impacts.
- An engineered design is provided that meets all permit requirements.
- Alternatives to dikes are deemed unacceptable (see below).

Alternatives to dikes and levees include:

- Raising the grade of structure(s) threatened by frequent flooding.
- Using berms to deflect flooding from a specific structure, rather than confining the stream channel.
- Relocating threatened structures.
- Restoring the channel to address channel instability issues.

ALLUVIAL FAN FLOODING

Alluvial fan flooding is a hazard that is common to communities in the mountainous regions of the western United States. Many of the flood mitigation techniques that are applied to other flood-prone areas have limited or no effectiveness on alluvial fans. Many alluvial fan communities are now recognizing these unique hazards or have experienced repetitive flooding problems, and are seeking to implement flood management and mitigation plans. However, existing structures may need to rely upon flood proofing measures to reduce flood damage.

The Tenmile Creek Study Area is located on the lower portion of the alluvial fan. Sheet flooding and distributary-flow are typical within this portion of alluvial fans. Typical flood protection or mitigation measures utilized in this setting are focused at the subdivision scale or smaller, localized units, and include:

1. Local channel construction/maintenance
2. Detention basins to attenuate peak flows
3. Debris fences
4. Localized grading to directionally convey flows
5. Street design and related drainage infrastructure to intercept/convey flow
6. Localized diking or berms to protect individual structures

These are relatively small-scale measures that can be used in moderate density fans to safely trap debris and route water/sediment around or through residential developments.

A single lot or structure can be protected from flood hazard by using the following protection measures:

1. Elevate and properly design foundations
2. Floodwalls and berms

3. Reinforcement of uphill walls, windows and doors against debris and water impact

These measures are most effective when implemented at low development densities. There is potential to induce adverse impact to adjacent properties when implemented at higher densities.

DISCUSSION

Past investigations to control Tenmile Creek flooding have settled on similar conclusions: channel capacity improvement projects and projects that effectively manage overflow. The lack of attention for large scale flood mitigation efforts such as levees, dams, and channel straightening in studies over the past 50 years reinforces the fact that a project of that caliber is not feasible, primarily from a cost-benefit standpoint but also rejected by agencies and recreation users, and resistance from property owners adjacent to Tenmile Creek.

The 1982 flood advisory committee recommended several feasible projects. The first project focused on channel clearing and the second project managing overflow and improving D2 Drain Ditch. The county implemented a channel clearing project in 1994 which cost approximately $12,000 (1994 dollars, approximately $20,000 in 2017 dollars) which lasted approximately two weeks. Newspaper publications conveyed a message of success and support from the community. However, the effort was met with some resistance by property owners adjacent to Tenmile Creek that would not allow access through their property. Additionally, there was a threatened lawsuit against the county related to fouling of irrigation infrastructure downstream of where the work occurred. This type of work generates significant sediment into the system which clogs irrigation infrastructure and can be a detriment to aquatic life. The debris that is "clogging" the channel is habitat for numerous forms of aquatic and terrestrial life.

The current consensus is that it's likely that a limited and temporary benefit was reaped from the undertaken effort and the assumed liability when the regular inflow of debris that will re-accumulate is considered, in addition to the fact that two years following that work another flood occurred.

Under current regulatory requirements, numerous stream permits are required to accomplish this task including: 310/124 Permit, 318 Permit, 404 Permit, 401 Permit, and floodplain development permit. The sentiment from Fish, Wildlife, and Parks (FWP) and the Lewis and Clark Conservation District is in general opposition to this type of project (**Appendix A**). Similar sentiment was written into the FWP permit for the work in 1994, where the stream was walked by the fisheries biologist designating which debris was allowed to be removed and which must remain as critical habitat. Under current requirements, a floodplain development permit for work in a detailed study area with floodway such as Tenmile Creek, requires a hydraulic analysis be performed and certified by a Professional Engineer. If a "no-rise" condition as a result of the work can be achieved, a permit can be issued. If there are any changes to the flooding characteristics, whether increases or decrease, the project is required to go through the FEMA Letter of Map Revision Process, which adds considerable

expense on top of development of the required hydraulic analysis. Applying for these permits under current requirements is a substantial effort that will likely make the project not worthwhile due to cost-benefit.

From a geomorphic standpoint, excavating Tenmile Creek streambed material is likely considered futile amongst engineers, hydrologists, and geomorphologists because during a large flood, bedload will fill in the "holes" that were excavated in attempt to increase capacity. The excavations will flatten out, rendering the effort inconsequential. There is virtually an infinite supply of bedload material contained in the Tenmile Creek watershed.

The 1982 Morrison Maerile study of Tenmile Creek presented priorities for projects. The number one priority focused on floodplain management to restrict or limit development in floodprone areas. The second priority emphasized improving the channel alignment at bridges, namely Green Meadow Drive and Sierra Road. It should be noted that Green Meadow Bridge has been replaced since that report was published. The bridge was designed with a skew to accommodate the channel alignment, rather than realign the channel. The third and fourth priority focused on drainage improvements at McHugh ditch and McHugh bridge, respectively. McHugh Bridge has been replaced since publication of this study with a larger span, as the report recommended. The last priority focused on channel cleaning. It is likely that channel cleaning was the lowest priority because the benefits were recognized to be short-lived. Although the Green Meadow Drive Bridge has been replaced with a skew, the McHugh Bridge has been upgraded to a larger span, and channel cleaning efforts occurred, Tenmile Creek continues to overflow its banks and flood the Helena Valley.

The Valley Flood Mitigation Master Plan focused on managing overflow rather than emphasize a Tenmile Creek channel project. Implementation of the Valley Flood Mitigation Master Plan projects has initiated with a detailed hydrologic and hydraulic analysis. It is imperative to utilize the hydraulic model to understand impacts to downstream property owners prior to implementation of any flood mitigation project. It is the County's priority to practice no-adverse impact. Currently, a flood on Tenmile Creek that causes overflow will enter the D2 Drain Ditch. The D2 Drain Ditch is the lowest point in the valley and at one point in time, prior to settlement, was the primary Tenmile Creek channel, as suggested by historic flowpaths evident in imagery and LiDAR topography. It is important to understand that on an alluvial fan, there is not a traditional floodplain and the floodplain is the overflow channels. The main stream channel aggrades until is overflows and a new preferential channel is established. Currently, the stream is confined to its banks and "locked in place". Since Tenmile Creek is no longer allowed to change its course for relief, the focus of the VFMMP is to set aside permanent overflow channels, to accommodate nature's demands through the built environment. Attempts to channelize, levee, and dredge today's Tenmile Creek channel will likely result in a short-lived return on the investment and become a long-term financial liability.

RECOMMENDATIONS

Current flood mitigation activities should build upon previous studies within the context of current environmental regulations, cost-benefit considerations, and social acceptance. Past studies have dismissed large-scale flood control projects on Tenmile Creek corridor due to numerous factors discussed.

Historic studies have included a channel cleaning component in the suite of feasible options. Under current environmental regulations and in consideration of the geomorphic processes at work, the feasibility and effectiveness of a cleaning option is questioned. A channel cleaning and dredging project will require substantial permitting from multiple agencies that, in general, will be opposed to this type of project for the numerous reasons discussed.

Although there can be expected opposition amongst regulatory agencies, a capacity enhancement, or perhaps capacity maintenance project, should not necessarily be discarded; however, further investigation is necessary. What needs to be understand is whether Tenmile Creek and its bedload have reached an equilibrium state considering the built environment or is it gradually continuing to aggrade over time to the point when its capacity will be substantially diminished from current. If the latter is the case, an effort to maintain a defined capacity in the channel and/or through bridges would be warranted. A large, reach scale dredging effort may not be appropriate, but rather localized sediment removal at key locations that become formalized as long term maintenance sites.

A Tenmile Creek streambed monitoring plan could be developed and implemented to understand changes to the bed elevation over time. The plan would likely consist of annual cross section surveys throughout the "spill reach" following high flow events and could also include scour chains installed at bridges. This will allow a quantitative comparison of bed elevation over time. Additionally, a continuous flow monitoring station should be installed within the spill reach to correlate quantity of high flow events to changes in bed elevation. The study should be designed to understand the sediment regime in the spill reach over time, to understand infrastructure capacities downstream to ensure an enhancement project will not adversely impact downstream conditions, and to provide design alternatives if the data suggests a channel capacity project is appropriate.

Both historic and recent studies also have prioritized managing overflow as a feasible solution to reduce flood risk in Helena Valley. Based on past studies and events transpired since their publications, it is recommended that Lewis and Clark County continue a strong focus on managing overflow. Additionally, it is recommended that Lewis and Clark County consider incorporation of a field study of the Tenmile Creek bed elevation within the spill reach. A focused study of this nature would be essential to justify permits required to implement a capacity enhancement project in the Tenmile Creek channel.

REFERENCES

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APPENDIX – A: AGENCY RESPONSE TO A TENMILE CREEK CHANNEL ENHANCEMENT PROJECT

Montana Fish, Wildlife & Parks

March 28, 2017

PO Box 200701
930 Custer Ave W
Helena, MT 59620

Daniel Karin
Lewis & Clark County Engineer
316 N Park Ave
Helena, MT 59623

Dear Dan,

This letter is a follow up to our previous conversation regarding flood control of Tenmile Creek by dredging the stream channel and construction of a levee system. As I stated during our conversation, FWP is generally opposed to this type of flood control. Outlined below are specific reasons why this type of action might not be a viable solution for flood control on Tenmile Creek.

Dredging the stream channel can be an effective flood control measure at discrete locations, such as areas where the stream channel and floodplain become constricted (for example, at a bridge or culvert). Dredging is often a temporary solution, as stream bedload typically quickly refills the dredged area during the next high flow event. The dredged area can also result in headcutting, which can cause channel instability and migration. Dredging for long term flood control is rarely cost effective as regular removal of bedload is necessary to maintain the desired condition. Poor maintenance could lead to increased flood damage.

Levee construction can be a viable solution for protecting infrastructure under some circumstances. In well-defined floodplains levees constructed near the periphery of the floodplain can protect infrastructure while reducing impacts to stream and floodplain function. Since Tenmile Creek (and most of the Helena valley) sits upon an alluvial fan, the floodplain is not well defined and levee construction could negatively impact stream function. If levees were to constrict the floodplain and constrict flood flows, aggradation within the levees could raise the base flood elevation across the entire floodplain, causing substantially more flood damage with lower magnitude floods.

A useful reference for any sort of stream or floodplain work in the state of Montana is Montana Stream Permitting, A Guide for Conservation District Supervisors and Others (2001). Chapter 2, page 2.11 provides the following guidelines for channel excavation (dredging) and levee construction:

> Channel excavation may be appropriate when:
> - Cause and effect are clearly understood (flooding is due to a culvert backwater or hillside slump into the channel).
> - Cause can be addressed to prevent recurrence.

- Gravel excavation occurs in a limited area, requires a single entry, and upstream sources are unlikely to rapidly refill the excavated section of the channel.
- Fisheries and channel stability impacts are judged to be minimal.

Dikes and levees may be appropriate when:

- Protection of public infrastructure takes precedence over stream function.
- Dikes can be designed to avoid significant stream and floodplain impacts.
- An engineered design meets all permit requirements.
- Alternatives to dikes are deemed unacceptable (see below).

Alternatives to dikes and levees include:

- Raising the grade of structure(s) threatened by frequent flooding.
- Using berms to deflect flooding from a specific structure, rather than confining the stream channel.
- Relocating threatened structures.
- Restoring the channel to address channel instability issues.

These alternatives to dikes can provide long-term security, and can be cost effective compared to on-going maintenance typical of flood control projects.

Using the criteria outlined above, channel excavation (dredging) of Tenmile would not be appropriate because:

1. Flooding is not due to the influence of one structure or a single constriction (such as a bridge or culvert).
2. Flooding is a function of the geomorphology of Tenmile Creek and high volume of bedload when the stream hits the alluvium of the Helena valley. This is a naturally occurring phenomenon and reducing the bedload throughout the entire Tenmile watershed is not feasible.
3. Excavation would occur over a large area, and excavated areas would likely refill with bedload.
4. Fisheries impacts would be substantial due to habitat degradation by removing debris and woody vegetation. Vegetation impacts would negatively influence stream bank stability.
5. Dredging would increase channel instability/migration and likely result in greater property damage during high water events.

Construction of levees or dikes would have to be a community decision. FWP would recommend a detailed analysis of groundwater infiltration during flood flows, as a levee or dike system would likely do little to slow groundwater infiltration during high flows. Groundwater can substantially impact infrastructure during flood events, and levees would do little to mitigate these impacts.

Levees or dikes that constrict the floodplain would raise base flood elevations, and could cause more infrastructure damage during floods. Construction of levees and dikes tends to move flood risk downstream, which could jeopardize housing and infrastructure not currently impacted by floods. Maintenance of the system would be critical to prevent future floods.

FWP appreciates the challenges associated with balancing infrastructure needs with stream and floodplain function. We feel that restoration of some stream reaches may positively influence flood flows by improving channel capacity. Tenmile Creek from Green Meadow Drive to McHugh largely flows across open space and ag land, and has likely been straightened over the past decades. Adding sinuosity to this stream reach would reduce water velocity during high flows, and expanding the floodway would improve channel capacity to convey flood flows. Restoration would be cost effective over the long term, as minimal maintenance would be required after construction. Stream restoration coupled with

downgradient drainage improvements proposed in the Lewis & Clark County Helena Valley Flood Mitigation Master Plan (2013) could substantially improve conveyance of surface water away from infrastructure.

Thank you for considering our comments on this issue. Please get in touch if you would like to discuss further.

Sincerely,

Eric Roberts
Helena Area Fish Biologist

Literature Cited:

Lewis and Clark County Helena Valley Flood Mitigation Master Plan. 2013. Helena, MT.

Montana Stream Permitting, A Guide for Conservation District Supervisors and Others. 2001. Conservation Districts Bureau, Montana Department of Natural Resources and Conservation, Helena, MT.

LEWIS & CLARK CONSERVATION DISTRICT
790 Colleen Street • Helena, Montana 59601 • 449-5000 ext. 112

May 3, 2017

Lewis & Clark County
Board of County Commissioners

RE: Valley Flooding issues

Dear BOCC:

The Lewis & Clark Conservation District was asked to provide rationale on our role in permitting on the streams in the valley and the greater county specifically regarding flooding issues on Ten Mile and Silver Creeks.

At a community meeting a few years ago, I sat on a panel with other water professionals and discussed the requirement for permitting for any activities affecting the bed or banks of perennial streams, the value of having a functioning floodplain and the resistance on the part of the Conservation District in permitting dredging, channelization, dikes/levees and lining the streams in concrete.

The purpose of a floodplain is to allow high water to spread out while it is being conveyed downstream. In the case of the Helena Valley streams, as they drop out of the steeper terrain, they cannot carry the bedload of sediment and rock due to moving into less steep terrain. This deposition is natural and cannot be "fixed". In natural systems it leads to streams moving around a lot. Since so much development has been allowed to occur in the Ten Mile and Silver Creek flood plains, it means that landowners/homeowners are affected.

One alternative is to have the County Open Space program buy up easements along the stream so that the floodplain could be allowed to function normally without human interference. The next best approach is for the county, city and landowners to keep culverts and bridges cleaned out, that loose debris and garbage be cleaned out of the stream regularly and that landowners be prepared for high water every year just like homeowners in the wildland urban interface prepare for fire every year.

Private landowners are required to obtain a 310 permit through the Conservation District to do any work on any perennial stream in the county. Government entities have to obtain an SPA 124 permit through Fish Wildlife and Parks for similar work. Both agencies (CD and FWP) have emergency provisions.

I can be reached at 406-449-5000 ext. 112 if you have questions, or via email at lccd@mt.net.

Sincerely,

LEWIS & CLARK CONSERVATION DISTRICT

Chris Evans
District Administrator

Matthew W. Johnson

From: Story, Steve <sestory@mt.gov>
Sent: Friday, February 17, 2017 12:38 PM
To: Matthew W. Johnson
Cc: Langel, Jan; Robinson, Fred; Sears, Traci; Ludlow, Walter
Subject: RE: Tenmile Creek Flood Control

Follow Up Flag: Follow up
Flag Status: Flagged

Matt,

Laurence and I did attend and participate in a public meeting back in April 2014 organized by the L&C County Water Quality Protection District. A panel addressed and discussed the pros and cons of dredging Ten Mile Creek. Panelists included, Laurence/DNRC, Todd Tillinger/USACE, Eric Roberts/FWP, and others. Jim Wilber, Water Quality District Coordinator organized the event. I assumed that there were meeting minutes/notes, but those would have been recorded by WQDC. I believe press attended and there was some news coverage on it.

The challenges of the dredging approach seemed daunting, and its practicality was questioned on many fronts. For one, acquiring the easements/right of way by the county was the first mountain, along with the capital investment involved. Then all the issues with permitting – getting the 404 permit sounded questionable, but I'm sure you're inquiring with USACE. As you know, all other necessary permits would need to be acquired before any floodplain permit(s) could be issued or become effective. A project involving widening and dredging of Ten Mile Creek would be a major undertaking that would trigger a plethora of environmental and other assessments, cost benefit analysis, and more. The cost of a levee protection system? Well, that's immense. A feasibility look at all the issues and remedial options makes sense and is a starting point. I believe there's been past investigations/studies performed by other contractors, which have steered the flood mitigation efforts to date.

Under the state floodplain program DNRC doesn't exercise any authority relating to such a project. The state and FEMA minimum standards are incorporated into the counties floodplain ordinance. L&C County administers and enforces the floodplain regulations within their county, not the state. As far as floodplain study/mapping is concerned, mitigation types of projects/activities that would affect the mapping should include costs to update the mapping as necessary, which should be a condition of any floodplain permits issued by the county. In general, we support sensible and effective flood mitigation activities and long term community planning to mitigate flood damages and alleviate the risk to public health, safety, and welfare.

Thanks,
Steve

Steve Story
MT DNRC, Water Resources Division
406.444.6816

From: Matthew W. Johnson [mailto:Matthew.Johnson@respec.com]
Sent: Thursday, February 16, 2017 11:34 AM
To: Story, Steve
Subject: Tenmile Creek Flood Control

Hi Steve,

I hope you're doing well! As I mentioned during a previous meeting, I'm working with Lewis and Clark County to mitigate flooding in the Helena valley. It has been suggested by multiple affected people that we could – and should – concentrate our effort on confining Tenmile Creek within the banks rather than managing overflow. The suggested approach is to remove in-stream vegetation, regularly clear accumulating debris, and to widen and dredge the stream to increase capacity. It has also been suggested to construct levees.

About 5 years ago, there was an multi-agency/public meeting to discuss this topic where it was explained this option is not likely feasible for multiple reasons. I don't think much was documented from that meeting and the topic has resurfaced. We are attempting to document the feasibility as it relates to regulatory and environmental issues and concerns with a flood control project of this nature and I thought you might be able to provide feedback from the perspective of the DNRC Water Operations Bureau.

I'm hoping DNRC could provide a brief letter on this topic as it relates to their jurisdictions. Feel free to give me a call at your convenience to discuss in more detail.
Best,
Matt

MATT JOHNSON P.E., CFM
Project Engineer

RESPEC
3810 Valley Commons Drive, Suite 4
Bozeman, MT 59718
406.284.2528 office // 406.599.2287 cell
respec.com

Matthew W. Johnson

From: Kenning, Jon <JKenning@mt.gov>
Sent: Friday, March 3, 2017 1:16 PM
To: Matthew W. Johnson
Subject: Ten Mile Creek Project

Follow Up Flag: Follow up
Flag Status: Flagged

Matt,

Any work on Ten Mile Creek would require a Clean Water Act Section 404 permit from the Army Corps of Engineers. Before a 404 permit can be issued, Section 401 certification must be obtained from DEQ. The 401 certification process evaluates whether beneficial uses of the water body will be protected by the project. In the case of Ten Mile Creek, numerous impairments already exist and a Total Maximum Daily Load (TMDL) was written that essentially requires the opposite of what is proposed by Lewis and Clark County Public Works. The project would also require a 318 authorization from DEQ to allow for short-term increases in turbidity during construction.

Also, population growth will someday push the Ten Mile Creek Watershed above the population threshold where counties are required to obtain municipal separate storm sewer (MS4) permit coverage. Under MS4, DEQ would require additional layers of environmental protection of Ten Mile Creek.

I hope that helps your understanding of the regulatory issues. If you would like to discuss more, feel free to contact me.

Jon Kenning
Water Protection Bureau Chief
Montana Department of Environmental Quality
406-444-0420

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
HELENA REGULATORY OFFICE
10 WEST 15TH STREET, SUITE 2200
HELENA, MONTANA 59626

REPLY TO
ATTENTION OF

March 24, 2017

Regulatory Branch
Montana State Program
Corps No. **NWO-2017-00338-MTH**

Subject: Lewis & Clark County Public Works Department (Daniel Karlin) - Stream Alteration – Ten mile, Seven mile Creek - (Lewis & Clark County)

Daniel Karlin
Lewis and Clark County Public Works Department
3402 Cooney Drive
Helena, Montana 59602

Dear Mr. Karlin:

We are responding to your request for comments regarding the above-referenced project. Specifically, you are proposing a containment project of Ten mile creek involving fill. The project is located on or near, within Section 31, Township 10 N, Range 4 W, Principal Meridian, Latitude 46.555334°, Longitude -112.146924°, Lewis and Clark County, Montana.

The mission of the U.S. Army Corps of Engineers (Corps) Regulatory Program is to protect the Nation's aquatic resources while allowing reasonable development through fair, flexible and balanced permit decisions. In particular, under Section 404 of the Clean Water Act, we work to protect the biological, physical, and chemical integrity of the Nation's aquatic resources. Projects are evaluated on a case-by-case basis to determine the potential benefits and detriments that may occur as a result of the proposal. In all cases an applicant must avoid and minimize impacts to aquatic resources to the greatest extent practicable.

Under the authority of Section 404 of the Clean Water Act (CWA), DA permits are required for the discharge of fill material into waters of the U.S. Waters of the U.S. include the area below the ordinary high water mark of stream channels and lakes or ponds connected to the tributary system, and wetlands adjacent to these waters. Isolated waters and wetlands, as well as man-made channels, may be waters of the U.S. in certain circumstances, which must be determined on a case-by-case basis.

Based on the information provided in your submittal, Ten mile, Seven Mile and Silver Creek are jurisdictional Waters of the United States. It appears that from your preliminary proposal the project will require review from this office, or otherwise requires authorization by a DA permit, please submit a Montana Joint Permit Application to this office prior to starting any work. After a review of the materials submitted we will determine what type of permit, if any, will be required. You can obtain a Montana Joint Permit Application Form at the following address: http://www.dnrc.mt.gov/licenses-and-permits/stream-permitting. A list of requirements for a complete Nationwide Permit application can be obtained at the following address: http://www.nwo.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/487708/pre-construction-notification. If you do not have internet access please contact our office at the address below to obtain more information.

Note that this letter is not a DA authorization to proceed. It only informs you of your need to obtain a DA permit if waters of the U.S. will be affected. If waters of the U.S. will not be affected by a jurisdictional activity a DA permit will not be required for the project.

Please refer to identification number NWO-2017-00338-MTH in any correspondence concerning this project. If you have any questions, please contact Timothy McNew at Helena Regulatory Office 10 West 15 Street, Suite 2200 Helena, Montana 59626, by email at Timothy.M.McNew@usace.army.mil, or telephone at (406) 441-1375.

Sincerely,

Timothy M. McNew
Regulatory Project Manager