# FINAL - DRAFT
# ENVIRONMENTAL ASSESSMENT (EA)
# FOR
# LAUNCH FACILITY D-02 DEWATERING SYSTEM UPGRADES

PREPARED FOR:

Malmstrom Air Force Base
341st Missile Wing

April 13, 2021

Letters or other written comments provided may be published in the Final EA. As required by law, substantive comments will be addressed in the Final EA and made available to the public. Any personal information provided will be kept confidential. Private addresses will be compiled to develop a mailing list for those requesting copies of the Final EA. However, only the names of the individuals making comments and their specific comments will be disclosed. Personal home addresses and phone numbers will not be published in the Final EA.

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# DRAFT - FINDING OF NO SIGNIFICANT IMPACT (FONSI)

## LAUNCH FACILITY D-02 DEWATERING SYSTEM UPGRADES

## Malmstrom AFB, Montana

Pursuant to provisions of the National Environmental Policy Act (NEPA), Title 42 United States Code (USC) Sections 4321 to 4347, implemented by Council on Environmental Quality (CEQ) Regulations, Title 40, Code of Federal Regulations (CFR) §1500-1508, and CFR §989, Environmental Impact Process, the U.S. Air Force (Air Force) assessed the potential environmental consequences associated with the upgrading the dewatering system at Launch Facility (LF) Delta 02 (D-02), which will prevent surface and groundwater from entering the launch support building (LSB) and the missile silo.

The purpose of this project is to assess the potential environmental consequences of installing a new dewatering system at D-02. The Proposed Action would install an interceptor trench around the perimeter of the facility to divert surface and groundwater from entering the site and reaching the LSB and silo. To facilitate dewatering, captured water would be transported south across adjacent agricultural lands via a subsurface pipeline and discharged to a nearby ephemeral drainage.

The project is needed to ensure operational readiness at D-02 by replacing the existing dewatering system, which does not effectively dewater the LSB or silo. Groundwater infiltration in the LSB is a chronic problem that the current system does not effectively address. The sump pump on the current system is not adequate to handle the volume of water entering the site and site structures and the location of the discharge is too close to the facility structures, resulting in re-infiltration and recapture of the same water. The existing system also requires considerable maintenance and is unreliable during freezing conditions.

The Environmental Assessment (EA), incorporated by reference into this finding, analyzes the potential environmental consequences of activities associated with construction and installation of dewatering system upgrades, and provides environmental protection measures to avoid or reduce adverse environmental impacts.

TD&H Engineering completed a Type A Engineering Report in 2017 to determine potential options to facilitate the dewatering system upgrades and assess the feasibility of those options. The engineering report concluded that upgrades are feasible and identified several alternatives. Two of the three alternatives identified in the EA satisfied all the selection factors and met the purpose and need of the Proposed Action. Alternatives 1 & 2 were carried forward for full analysis. Alternative 3, although not carried forward for detailed analysis, was discussed with the rationale for eliminating it from further consideration. The EA considered all potential impacts of the proposed

dewatering alternatives carried forward for analysis, including the No Action Alternative (Alternative 4). The EA also considered cumulative environmental impacts with other projects in the Region of Influence.

**Alternative 1 (Preferred Alternative)**

Alternative 1 would install an interceptor trench around the perimeter of the site to dewater the silo and subsurface structures at LF D-02, an additional toe drain would be installed along the base of the LSB for added protection from surface drainage or precipitation, as well as any groundwater that may circumvent the interceptor trench. The sump pump discharge lines would be tied into the new toe drain to eliminate the need for the existing surface discharge location. The toe drain and sump pump discharge lines would be connected to the lateral pipe associated with the interceptor trench. Fugitive water would be collected from the interceptor trench, toe drain, and sump pump then transported south across adjacent agricultural lands via a subsurface pipeline and discharged to a nearby ephemeral drainage. The lateral pipe would discharge water through a subsurface infiltration header that would run parallel to the top of the ephemeral drainage allowing the water to seep into the ground mimicking the natural infiltration process. Additionally, the existing monitoring wells will be abandoned upon completion of the project. All the above work will take place within USAF property boundaries or easements legally obtained by the USAF from existing landowners.

**Alternative 2**

This alternative is similar to Alternative 1 with one exception: instead of an infiltration header located at the outfall of the lateral pipe, groundwater would be directly discharged into the ephemeral drainage via daylighting the pipe to a rock riprap rundown. All other dewatering and water disposal methods noted in Alternative 1 would be completed.

**Alternative 4 (No Action)**

The No-Action Alternative would retain the existing dewatering system and continue to pump the water out of the structures to just outside the LF fence, discharging fugitive water onto the adjacent private land.

**Summary of Findings**

The analyses of the affected environment and environmental consequences of implementing the Preferred Alternative, presented in the EA, concluded that by implementing standard environmental protection measures and operational planning, the Air Force would be in compliance with all environmental laws, statutes, terms and conditions.

The Air Force has concluded that no significant adverse effects would result for the following resources as a result of the Preferred Alternative: water resources (surface and groundwater), air quality, land use, noise, safety and occupational health, hazardous materials/waste, biological/natural resources, cultural resources, and earth resources. No significant adverse cumulative impacts would result from activities associated with Alternative 1 (Preferred Alternative) when considered with past, present, or reasonably foreseeable future projects.

**Finding of No Significant Impact (FONSI)**

Based on my review of the facts and analyses contained in the attached EA, conducted under the provisions of NEPA, CEQ Regulations, and 32 CFR §989, I conclude that construction of the proposed dewatering system upgrades would not have a significant environmental impact, either by itself or cumulatively with other known projects. Accordingly, an Environmental Impact Statement is not required. The signing of this FONSI completes the environmental impact analysis process.

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Anita A. Feugate Opperman, Colonel, USAF Date
Commander, 341st Missile Wing

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# ACRONYMS

| | |
|---|---|
| ACAM | Air Force Conformity Applicability Model |
| AFB | Air Force Base |
| AFGSC | Air Force Global Strike Command |
| APE | Area of Potential Effect |
| AQCR | Air Quality Control Region |
| ARM | Administrative Rules of Montana |
| bgs | below ground surface |
| BMP | Best Management Practices |
| CAA | Clean Air Act |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| CO | Carbon Monoxide |
| Corps | U.S. Army Corps of Engineers |
| CWA | Clean Water Act |
| D-02 | Delta-02 |
| DEQ | Department of Environmental Quality |
| DNRC | Department of Natural Resources and Conservation |
| DoD | Department of Defense |
| EA | Environmental Assessment |
| EBS | Environmental Baseline Survey |
| EIAP | Environmental Impact Analysis Process |
| EIS | Environmental Impact Statement |
| EO | Executive Order |
| FEMA | Federal Emergency Management Agency |
| FIRM | Flood Insurance Rate Map |
| FONSI | Finding of No Significant Impact |
| GBSD | Ground Base Strategic Deterrent |
| GHG | Greenhouse Gasses |
| IICEP | Interagency / Intergovernmental Coordination for Environmental Planning |
| INRMP | Integrated Natural Resource Management Plan |
| IPaC | Information for Planning and Consulting System |
| ITLO | Installation Tribal Liaison Officer |
| JD | Jurisdictional Determination |
| LF | Launch Facility |
| LSB | Launch Support Building |
| MAF | Missile Alert Facility |
| MAFB | Malmstrom Air Force Base |
| MSGHCP | Montana Sage Grouse Habitat Conservation Program |
| MTFWP | Montana Fish, Wildlife and Parks |
| MTNHP | Montana Natural Heritage Plan |
| MWRF | Montana Wetlands and Riparian Framework |
| NAAQS | National Ambient Air Quality Standards |
| NEPA | National Environmental Policy Act |
| NHD | National Hydrography Dataset |

| | |
|---|---|
| NOA | Notice of Availability |
| NRCS | Natural Resources Conservation Service |
| NWI | National Wetland Inventory |
| OSHA | Occupational Safety and Health Administration |
| RCRA | Resource Conservation and Recovery Act |
| ROCA | Record of Conformity Analysis |
| ROI | Region of Influence |
| SIP | State Implementation Plan |
| SHPO | State Historic Preservation Office |
| SOC | Species of Concern |
| SWPPP | Storm Water Pollution Prevention Plan |
| T&E | Threatened and Endangered |
| THPO | Tribal Historic Preservation Officer |
| tpy | tone per year |
| UFC | Unified Facilities Criteria |
| USAF | U.S. Air Force |
| USDA | U.S. Department of Agriculture |
| USC | United States Codes |
| USFWS | U.S. Fish and Wildlife Service |
| WOTUS | Waters of the U.S. |

# 1.0 PURPOSE OF AND NEED FOR ACTION

## 1.1 Introduction

Malmstrom Air Force Base (MAFB) is proposing the completion of a military-construction (mil-con) project at Launch Facility (LF) Delta-02 (D-02). The proposed project is located in a rural area of Fergus County, within T21N, R15E, Section 35, approximately 18-miles north of Denton, Montana (Figures 1a & 1b). The Proposed Action would install an interceptor trench around the perimeter of the facility to divert surface and groundwater from entering the site and reaching the launch support building (LSB) and missile silo. To facilitate dewatering of the facility silo and subsurface structures, captured water would be transported south across adjacent agricultural lands via a subsurface pipeline and discharged to a nearby ephemeral drainage. The discharge location is approximately 0.2-miles from Falls Coulee, which is approximately 4.5-miles from Wolf Creek, a tributary to the Judith River.

This Environmental Assessment (EA) was prepared to evaluate the potential impacts of the proposed project in compliance with the National Environmental Policy Act of 1969 (NEPA), Title 42 United States Code (USC) Sections 4321 to 4347, implemented by Council on Environmental Quality (CEQ) Regulations, Title 40, Code of Federal Regulations (CFR) §1500-1508, and 32 CFR 989, Air Force Environmental Impact Assessment Process (EIAP).

## 1.2 Purpose of the Action

The purpose of the Proposed Action is to install a more effective dewatering system at D-02 which will prevent surface and groundwater from entering the LSB and the silo. The Proposed Action would replace the existing system which discharges captured water to the ground surface adjacent to the LSB and silo, allowing it to reinfiltrate. This results in capture and pumping of the same water through the system and does not effectively dewater the facility structures.

## 1.3 Need for the Action

The Proposed Action is needed to ensure operational readiness at D-02 by replacing the existing dewatering system, which does not effectively dewater the LSB or silo. Groundwater infiltration in the LSB is a chronic problem that the current system does not effectively address. This is caused by an inadequate sump pump and a discharge location that is too close to the facility structures, which results in re-infiltration and recapture of the same captured water. The existing system also requires considerable maintenance and is unreliable in freezing conditions.

## 1.4 Decision to be Made

The decision for this project is to evaluate the alternatives and provide input on potential impacts. The preferred alternative should effectively divert and/or capture surface and

groundwater before it infiltrates the LSB and silo, discharge captured water in a manner that does not result in re-infiltration and capture of the same water, reduce reliance on pumps and long-term maintenance, and provide dewatering efforts that do not result in a significant impact to the environment. The decision options are:

1. Continue with the current dewatering system, pumping water out of structures to just outside the LF (Alternative 4 - No Action Alternative).
2. Evaluate the alternatives and potential impacts and prepare a Finding of No Significant Impact (FONSI) for one of three proposed alternatives (Alternatives 1, 2, & 3) and any mitigation strategies as necessary; or
3. Prepare an Environmental Impact Statement (EIS) if the alternatives would result in significant impacts.

### 1.4.1 Resource Areas Addressed in Detail

Resource areas that could be affected by the Proposed Action or no-action alternative were identified in the contract statement of work. A full analysis of these resource areas, potential impacts, and any required mitigation measures will ensure compliance with the NEPA requirements established in 42 United States Code (USC) Sections 4321 to 4347 and any Air Force specific requirements found in 32 CFR Part 989. Specific resource areas considered in this EA include:

1) Water Resources (Surface and Groundwater)
2) Air Quality
3) Land Use
4) Noise
5) Safety and Occupational Health
6) Hazardous Materials / Waste
7) Biological Resources / Threatened and Endangered (T&E) Species / Wetlands and Floodplains
8) Cultural Resources
9) Earth Resources
10) Cumulative Impacts

Based on the scope of the Proposed Action, Environmental Justice and Socioeconomic Factors were identified through a preliminary screening process as factors with minimal or no impacts. Section 3.1 below describes the Scope of Analysis and details those resource areas not carried forward for a detailed analysis, along with the rational for their elimination.

## 1.5 Intergovernmental Coordination and Consultations

### 1.5.1 Interagency / Intergovernmental Coordination and Consultations

Federal, state, and local agencies with jurisdiction that could be affected by the alternative actions were notified and consulted during the development of this EA.

Appendix A contains the list of agencies consulted during this analysis along with copies of correspondence. Section 106 consultation with the State Historic Preservation Office (SHPO) has been completed and they concur with the findings that the Proposed Action will have no effect on historic properties. Consultation with the United States Fish and Wildlife Service (USFWS) has been completed and they acknowledge the No Effect determination for federally listed species.

### 1.5.2 Government to Government Consultations

EO 13175, Consultation and Coordination with Indian Tribal Governments (6 November 2000), directs Federal agencies to coordinate and consult with Federally Recognized Native American tribal governments whose interests might be directly and substantially affected by activities on federally administered lands. To comply with legal mandates, federally recognized tribes that are affiliated historically with the MAFB geographic region are invited to consult on all proposed undertakings that have a potential to affect properties of cultural, historical, or religious significance to the tribes. The tribal coordination process is distinct from NEPA consultation or the Interagency / Intergovernmental coordination for environmental planning (IICEP) processes and requires separate notification of all relevant tribes. The timelines for tribal consultation are also distinct from those of intergovernmental consultations.

The MAFB point of contact for government to government consultations with Native American tribes is the Installation Tribal Liaison Officer (ITLO), Mr. Tony Lucas. The MAFB point of contact for consultation with the Tribal Historic Preservation Officer (THPO) and the Advisory Council on Historic Preservation is the MAFB cultural resources manager, Ms. Candace Ellsworth.

The Native American tribal governments who were notified of the consultation process for the Proposed Action are listed in Section 6, Table 4. The tribes will be provided a copy of the EA to review during the public comment period and will have the opportunity to submit comments.

## 1.6 Public Review of the EA

A Notice of Availability (NOA) of the Draft EA and Finding of No Significant Impact (FONSI) was published in the *Great Falls Tribune* to announce the availability of the EA for review and comment by the public during a 30-day comment period. A printed copy of the draft EA and FONSI was made available for review at the Great Falls Public Library and the Arden G. Hill Memorial Library. The documents were also made available online at https://www.malmstrom.af.mil/About-Us/Environmental-Resources/. Comments and responses received during public review period will be included in Appendix A of the Final EA. Additionally, agency comments specific to an environmental resource are discussed in Section 4, Environmental Consequences under the applicable resource section.

# 2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

## 2.1 Proposed Action

The Proposed Action would result in the installation of an interceptor trench around the perimeter of the site to dewater the silo and subsurface structures at LF D-02. An additional toe drain would be installed along the base of the LSB for added protection from surface drainage and precipitation as well as any groundwater that may circumvent the interceptor trench. The sump pump discharge lines would be tied into the new toe drain to eliminate the need for the existing surface discharge location. The toe drain and sump pump discharge lines would be connected to the lateral pipe associated with the interceptor trench. Fugitive water would be collected from the interceptor trench, toe drain, and sump pump then transported south across adjacent agricultural lands via a subsurface pipeline (Alternatives 1 through 3). The proposed alternatives would result in discharge of captured water via a subsurface infiltration header that would run parallel to the top of the ephemeral drainage (Alternative 1), direct discharge to the ephemeral drainage onto a rock rip rap rundown (Alternative 2), or discharge along the county roadside ditch (Alternative 3). The existing monitoring wells would be abandoned at the completion of the project, in accordance with the Administrative Rules of Montana under all alternatives. Section 2.3 provides a detailed discussion of the screening criteria and Sections 2.4 & 2.5 provides a detailed description of all the alternatives considered.

## 2.2 Selection Factors

NEPA and the Council on Environmental Quality (CEQ) regulations mandate the consideration of reasonable alternatives for the Proposed Action. “Reasonable alternatives” are those that also could be utilized to meet the purpose of and need for the Proposed Action. Per the requirements of 32 CFR §989, selection factors are used to identify alternatives for meeting the purpose and need for the USAF action. The Proposed Action alternatives must comply with the following selection factors:

1) Mission
2) Constructability
3) Effectiveness
4) Aesthetics/Environmental Concerns

## 2.3 Screening of Alternatives

MAFB conducted an in-depth investigation of the site to determine the most feasible course of action at D-02 to prevent water from entering the LSB and silo (TD&H, 2017). The investigation concluded a dewatering system was feasible and identified the following three alternatives. The No Action Alternative (existing dewatering system) was also considered.

- **Alternative 1 (Preferred Alternative):** Install an interceptor trench around the perimeter of the site to dewater the silo and subsurface structures at LF D-02, an

additional toe drain would be installed along the base of the LSB for added protection from surface drainage and precipitation as well as any groundwater that may circumvent the interceptor trench. The sump pump discharge lines would be tied into the new toe drain to eliminate the need for the existing surface discharge location. The toe drain and sump pump discharge lines would be connected to the lateral pipe associated with the interceptor trench. Fugitive water would be collected from the interceptor trench, toe drain, and sump pump then transported south across adjacent agricultural lands via a subsurface pipeline and discharged to a nearby ephemeral drainage. The lateral pipe would discharge water through a subsurface infiltration header that would run parallel to the top of the ephemeral drainage allowing the water to seep into the ground, mimicking the natural infiltration process (Figure 2). The existing monitoring wells would be abandoned at the completion of the project, in accordance with the Administrative Rules of Montana.

- **Alternative 2:** This alternative is similar to Alternative 1 with one exception: instead of an infiltration header located at the outfall of the lateral pipe, groundwater would be directly discharged into the ephemeral drainage via daylighting the pipe to a rock riprap rundown. All other dewatering and water disposal methods noted in Alternative 1 would be completed (Figure 3).

- **Alternative 3:** This alternative is similar to Alternative 1, employing the same dewatering and disposal methods planned within the facility. However, the lateral pipe that conveys water off-site would direct groundwater discharge to the adjacent county roadside ditch. The outlet would daylight to a rock riprap rundown and water would flow south along the existing ditch line. Due to the shallow grades along the road, ditch water would likely infiltrate before traveling the approximate 1,000-feet length of the ditch which discharges into a natural vegetative swale. The discharge location is also associated with Falls Coulee (Figure 4).

- **Alternative 4:** No changes would be made to the current dewatering system under this alternative (No Action) (Figure 5).

To assess the viability of each alternative, the selection factors outlined in Section 2.2 were applied to each alternative (Table 1). Using the results from this evaluation, a determination was made as to which alternative(s) meet the mission-critical criteria and should be considered in the full EA analysis. The following sections detail these considerations.

**Table 1.** Alternative Screening Results

| Alternative | Selection Factors | | | |
|---|---|---|---|---|
| | Launch Facility Mission | Constructability | Effectiveness | Aesthetics and Environmental Concerns |
| **Alternative 1** | ✓ | ✓ | ✓ | ✓ |
| **Alternative 2** | ✓ | ✓ | ✓ | ✓ |
| **Alternative 3** | ✓ | ✓ | | ✓ |
| **Alternative 4 (No action)** | | ✓ | | ✓ |

## 2.4 Detailed Description of the Alternatives

Alternative 1 and Alternative 2, meet all of the selection criteria. They are analyzed in the detailed description of the alternatives below, along with the No-Action Alternative. Additional alternatives that were considered but eliminated are discussed in Section 2.5.

### 2.4.1 Alternative 1 (Preferred Alternative)

Alternative 1 would install an interceptor trench around the perimeter of the site to dewater the silo and subsurface structures at LF D-02. An additional toe drain would be installed along the base of the LSB for added protection from surface drainage and precipitation as well as any groundwater that may circumvent the interceptor trench. The sump pump discharge lines would be tied into the new toe drain to eliminate the need for the existing surface discharge location. The toe drain and sump pump discharge lines would be connected to the lateral pipe associated with the interceptor trench. Fugitive water would be collected from the interceptor trench, toe drain, and sump pump then transported south across adjacent agricultural lands via a subsurface pipeline and discharged to a nearby ephemeral drainage. The lateral pipe would discharge water through a subsurface infiltration header that would run parallel to the top of the ephemeral drainage allowing the water to seep into the ground, mimicking the natural infiltration process. Additionally, the existing monitoring wells will be abandoned upon completion of the project. All the above work will take place within USAF property boundaries or easements legally obtained by the USAF from existing landowners (Figure 2).

### 2.4.2 Alternative 2

This alternative is similar to Alternative 1 with one exception: instead of an infiltration header located at the outfall of the lateral pipe, groundwater would be directly discharged into the ephemeral drainage via daylighting the pipe to a rock riprap

rundown. All other dewatering and water disposal methods noted in Alternative 1 would be completed (Figure 3).

### 2.4.3 No-Action Alternative 4

The No-Action Alternative would retain the existing dewatering system and continue to pump the water out of the structures to just outside the LF fence, discharging fugitive water onto the adjacent private land (Figure 5).

CEQ regulations stipulate that the No Action Alternative be analyzed to assess environmental consequences that may occur if the Proposed Action is not implemented. Therefore, the No Action Alternative will be carried forward for analysis in the EA. The No Action Alternative provides a baseline against which the Proposed Action can be compared.

## 2.5 Alternatives Eliminated from Further Consideration

The following alternative has been eliminated from further consideration, as it does not meet the evaluation criteria outlined herein. This alternative is not carried forward for analysis in this EA.

**Alternative 3:** This alternative does not satisfy the effectiveness selection criteria. A review of the project area including topography, soils and existing land easements indicates redirecting groundwater discharge may infiltrate back into the project area causing a reoccurring issue of dewatering the LSB and missile silo. Whether fugitive water is surface discharged or infiltrated, it must be discharged several hundred feet downgradient of the site to avoid discharged water from reinfiltrating into the silo (TD&H, 2017). The proposed discharge location along the road within the current MAFB roadside easement is approximately 300 feet from the structures at LF D-02. The current easement does not allow for a discharge location within the roadside drainage ditch at a sufficient distance from the facility to prevent recharge from reinfiltrating the silo, thus the dewatering system would be cycling the same water. In addition, discharge to the roadside ditch would likely require an extensive permitting effort and could result in erosion to the ditch or other water quality discharge issues that would prevent the system from achieving the stated goals for the project.

# 3.0 Affected Environment

The Region of Influence (ROI) for the Proposed Action is detailed in Figures 1 through 5, unless otherwise specified below. The potential consequences to the affected environments are presented in Section 4. Cumulative effects are evaluated in Section 4.12.

## 3.1 Scope of the Analysis

This chapter describes the current conditions of the environmental resources, either man-made or natural, that would be affected by implementing the Preferred Alternative, Alternative 2, or the No Action Alternative. The following resources are described and evaluated:

- Water Resources (Surface and Groundwater)
- Air Quality
- Land Use
- Noise
- Safety and Occupational Health
- Hazardous Materials / Waste
- Biological Resources / T&E Species / Wetlands and Floodplains
- Cultural Resources
- Earth Resources
- Cumulative Impacts

Based on the scope of the Proposed Action, issues with minimal or no impact were identified through a preliminary screening process. The following describes those resource areas not carried forward for a detailed analysis, along with rationale for their elimination. Regardless of the alternative selected, the following resources would not be affected by the Proposed Action and are not discussed in detail in this EA.

### 3.1.1 Environmental Justice / Socioeconomic Factors

Environmental Justice addresses race, ethnicity, and the poverty status of populations in the ROI. Socioeconomics describes demographics associated with the human environment, such as employment, industry, income, population, housing, and schools.

The proposed project area is in a rural area of Fergus County, approximately 18 miles north of Denton, Montana. The project area is surrounded by agricultural land and is sparsely populated. LF D-02 and its mission are not accessible to the public therefore, the Proposed Action would have no impacts to resident minority, low-income or other populations. The Proposed Action would not expose the public to environmental health risks or safety risks during or after construction activities. The project would have little to no effect on the economy as the project would utilize temporary workers with no beneficial change in socioeconomic impacts at a local or regional scale. The Proposed

Action would not include changes to population, housing, industry, income, or education. As a result, MAFB anticipates no short or long-term adverse impacts and no significant impacts to environmental justice or socioeconomics. Based on this analysis, these resource areas were not carried forward for detailed analysis in the EA.

## 3.2 Water Resources (Surface and Groundwater)

Water resources analyzed in this EA include surface water, groundwater, and stormwater. This assessment discusses potential environmental effects on water resources from the proposed alternatives; however, the potential environmental effects discussed in this section assume the installation of the selected alternative is completed according to the appropriate site conditions and engineering design.

### 3.2.1 Surface Water

D-02 lies within the Judith River watershed, Hydrologic Unit Code (HUC) 10040103, which is part of the Missouri River system. Surface water resources in the vicinity of the facility include:

- the ephemeral drainage associated with the proposed discharge location,
- Falls Coulee, which is classified as an intermittent stream downstream of the discharge location,
- Wolf Creek, a perennial stream downstream of Falls Coulee, and
- The Judith River, a large perennial stream downstream of Wolf Creek.

Wolf Creek and the Judith River have been evaluated for water quality impairments through the Montana DEQ's assessment program with updated water quality information available in the 2020 Draft Water Quality Integrated Report (DEQ, 2020). Wolf Creek is listed as impaired for iron, selenium, and total dissolved solids. The Judith River is listed as impaired for alteration in stream-side or littoral vegetative covers and physical substrate habitat alterations.

### 3.2.2 Groundwater

There are twelve groundwater wells in the vicinity of D-02, which provide information regarding local groundwater resources (MBMG, 2021). Regional wells include one domestic supply well and eleven monitoring wells, including six wells installed in 2017 specifically for the purpose of investigating groundwater in the vicinity of D-02 (TD&H, 2017). The wells range in depth from 13.0 to 30.0 feet below ground surface (bgs), with average depths to groundwater ranging between 2.94 and 5.41 feet. Reports of shallow groundwater depths of approximately 0.7 feet bgs have been recorded following spring rain events.

The hydraulic conductivity of the groundwater aquifer was determined through site-specific slug testing. The conductivity was found to range between 0.15 ft/day and 1.9

ft/day which was higher than expected for the existing clay soil type, suggesting there is some interconnectivity with sand and gravel lenses in the area. The groundwater gradient across the facility is 1.17%. The groundwater recharge area was determined to be 14.5 acres, and recharge is primarily provided through significant rainfall events that lead to soil saturation and infiltration (TD&H, 2017).

Samples were collected from two wells in 2017 to evaluate groundwater quality in the immediate vicinity of D-02. The samples were analyzed for pH, specific conductance, primary metals species, and major cations and anions. Results were compared to standards for human health, stock water, and irrigation water. The results indicate the water can be classified as “very hard” with elevated concentrations of total dissolved solids, and major cations sodium, magnesium, and calcium. Sample results exceeded human health standards in at least one sample for selenium and nitrate+nitrite. Stock water standards were exceeded in one sample for selenium. Irrigation water standards were exceeded in both samples for specific conductance, selenium, and sodium absorption ratio.

### 3.2.3 Stormwater

Stormwater drainage at D-02 occurs primarily as sheet flow that originates from large precipitation events and snowmelt. During these events water becomes concentrated in natural swales that discharge to ephemeral channels. Topography in the vicinity of the facility is relatively flat and the surrounding land-use is cultivated cropland which undergoes alternating periods of crop production and fallow with limited runoff potential. Runoff originating from typical precipitation events is influenced by evaporation, infiltration, and interception from surrounding vegetation. Stormwater drainage is likely to occur only during major storm events or periods of soil saturation.

Regional meteorological data is available for Denton, MT, with a period of record from 1908 to 2015 (WRCC, 2021). The average annual precipitation for Denton is 15.02 inches with most precipitation occurring in the months of May and June (2.51 and 3.12 inches, respectively). The highest annual precipitation was recorded in 1993 (24.57 inches) and the month of greatest precipitation occurred in May 1953 (8.99 inches). A 24-hr rain event of 3.34 inches was recorded on May 29, 1953, which is consistent with the 50-yr, 24-hr storm event value of 3.4 inches reported by the National Oceanic and Atmospheric Administration (Miller et al, 1973).

## 3.3 Air Quality

The following sections outline air quality considerations related to the proposed dewatering system upgrades at D-02.

### 3.3.1 Non-Radiological Emissions

D-02 operates under emission threshold ceilings for air quality established by the Montana Department of Environmental Quality (DEQ) and has not triggered the requirements for air quality permits.

LF D-02 is in Fergus County and within the Great Falls Intrastate Air Quality Control Region (AQCR) 141. It is designated as an attainment or unclassifiable area for all National Ambient Air Quality Standards (NAAQS) criteria pollutants (40 CRF Part 52 Subpart BB). Based on this, the Montana State Implementation Plan (SIP) is not applicable to the Proposed Action. A maintenance area for Carbon Monoxide (CO) is located approximately 68 miles east of D-02, specifically within the city limits of Great Falls, Montana adjacent to I-15 and east of the boundary of the Great Falls International Airport.

### 3.3.2 Radiological Emissions

The D-02 mission could result in radiological emissions. However, there have been no reports of such emissions at the facility and the Proposed Action is not anticipated to produce radiologic emissions.

### 3.3.3 Greenhouse Gas Emissions

Greenhouse gases (GHG) have been recognized as pollutants under the Clean Air Act (CAA), and therefore are addressed under NEPA. Since the context for GHG emissions and their impact on climate is global and not local, GHG emissions are evaluated as a proxy for climate impacts and the context of emissions or regional emissions is not relevant to this evaluation. See Section 4.4 for a discussion of the emissions related to the Proposed Action.

## 3.4 Land Use

D-02 is located on approximately 1.6 acres of fenced property, containing facility infrastructure. The facility property falls within a quarter section of agricultural lands. To facilitate the dewatering system upgrades, MAFB would acquire a perpetual utility easement across the adjacent agricultural land. This easement would include a right of way that is approximately 1,360 feet long by 40 feet wide, totaling approximately 1.4 acres. The easement lands would include the noted agricultural lands and the head of an unnamed ephemeral drainage. The easement would provide the impacted landowner with compensation for the temporary loss of crop production during construction and compensation for any future disturbances associated with maintenance. The Proposed Action and associated easement conform with the Fergus County Land Use Policy (Fergus County, 2011).

## 3.5 Noise

Currently, noise levels around D-02 are related to rural agricultural practices and background ambient noise in addition to the occasional vehicle entering or leaving the

facility. Construction during installation of dewatering upgrades will temporarily impact adjacent lands. These impacts will result from additional vehicle traffic, construction, and infrastructure replacement activities. Noise levels will return to pre-project levels immediately following completion of the project.

## 3.6 Safety and Occupational Health

Safety and occupational health include risks to the public and onsite workers during system upgrades and normal operation and maintenance of the system once operational. Specific hazards include noise exposure, heavy equipment operation, vehicle traffic, and potential hazards associated with electrical and trenching during dewatering system installation and exposure to unsafe or unhealthful environments. These hazards and others associated with standard construction projects can be mitigated through proper health and safety planning, and implementation of health and safety protocols by the Air Force and their contractor(s) responsible for the work. The hazards commonly encountered on construction projects and industry standard mitigation practices used to ensure safe work are anticipated but project implementation can occur without any extraordinary measures. The D-02 project can proceed with the proper pre-planning.

## 3.7 Hazardous Materials / Waste

No hazardous waste is generated at the D-02 facility and no known hazardous waste sites are located within the ROI. Little to no solid waste is generated on-site as the facility is unmanned. Prior to acquiring an easement agreement to facilitate the facility dewatering upgrades, MAFB conducted an Environmental Baseline Survey (EBS) to evaluate and document the presence or potential presence of any hazardous or toxic substances or petroleum products (WET, 2021). The EBS was conducted in accordance with Air Force Work Instruction (AFI 32-7066 *Environmental Baseline Surveys in Real Estate Transactions*), and the corresponding D6008-96 Standard Practice for Conducting Environmental Baseline Surveys. According to the information acquired during the Phase I EBS, the site is classified as a Category 1 site – where no releases, or disposal of hazardous substances, petroleum products or their derivatives have occurred, and no migration of these substances has occurred from adjacent properties. A full analysis of hazardous materials / waste is included in the companion EBS for D-02 (WET 2021). Hazardous materials will not be generated as part of facility dewatering upgrades.

## 3.8 Biological Resources / Threatened and Endangered (T&E) Species / Wetlands and Floodplains

The following sections summarize the biological and/or natural resources that may be impacted by the Proposed Action.

### 3.8.1 Floodplains

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) indicate the Proposed Action is within a Flood Zone D, meaning there are possible but undetermined flood hazards, as no analysis of flood hazards has been conducted. As a result, no portion of the project area is within a FEMA-defined 100-year or 500-year floodplain boundary.

### 3.8.2 Wetlands

According to the National Hydrography Dataset (NHD), Falls Coulee is classified as an intermittent stream, the ephemeral drainage which is associated with the proposed discharge location is unmapped and not classified (USGS, 2020). The Montana Wetlands and Riparian Framework (MWRF) contains mapped wetlands within Falls Coulee up and downgradient of the proposed project area, however, there are no mapped wetlands within the project area or ephemeral drainage (MTNHP, 2020). The National Wetland Inventory (NWI) classifies Falls Coulee as Palustrine, Emergent, Persistent, Temporarily Flooded (PEM1A) wetland in the upper reaches near the project area. The lower reaches of Falls Coulee are designated as a Riverine, Intermittent, Streambed, Temporary Flooded (R4SBA) stream. The ephemeral drainage is not classified within the NWI (USFWS, 2020).

An onsite wetland assessment was conducted on August 19, 2020 to identify any jurisdictional wetlands that may be impacted during construction of the proposed alternatives and to assess the potential effects of eliminating the current groundwater discharge point once the dewatering system upgrades are implemented. The area assessed included the ephemeral drainage that connects to Falls Coulee, the adjacent county roadside ditch, and the small depression associated with the current dewatering system discharge point. The wetland delineation report describes field activities, survey results, habitats encountered, and provides a *Request for U.S. Army Corps of Engineers (Corps) Jurisdictional Determination (JD)* form (Appendix B). The on-site delineation determined no jurisdictional wetlands will be impacted by any alternative associated with the proposed facility dewatering system.

Disturbances within the ephemeral drainage adjacent to the proposed project area will be minimized during construction, and best management practices (BMPs) will be implemented to protect it during the construction period. BMPs will include perimeter controls and sediment and erosion control structures which will be installed prior to construction commencing.

### 3.8.3 Land Cover

The Montana Land Cover/Land Use database was referenced to obtain information regarding natural biological communities, disturbances (e.g., invasive species, fire), and human activities within the project area (MTNHP, 2020a). The primary ecological systems within two miles of the project area are:

- 41% cultivated crops

- 17% Great Plains mixed grass prairie
- 13% Great Plains badlands
- 10% big sagebrush steppe

The remaining areas are classified as Great Plains sand prairie (6%), introduced upland vegetation – annual and biennial forbland (3%), Great Plains shrubland (3%), and pasture/hay (2%). The habitat includes dominant plant species of western wheatgrass (*Pascopyrum smithii*), thickspike wheatgrass (*Elymus lanceolatus*), green needlegrass (*Nassella viridula*), blue grama (*Bouteloua gracilis*), and needle and thread (*Hesperostipa comata*). There are also noxious weed populations of predominantly field bindweed (*Convolvulus arvensis*), leafy spurge (*Euphorbia virgata*), Canada thistle (*Cirsium arvense*), Russian knapweed (*Acroptilon repens*), spotted knapweed (*Centaurea stoebe*), whitetop (*Lepidium draba*), dalmatian toadflax (*Linaria dalmatica*), diffuse knapweed (*Centaurea diffusa*), and cheatgrass (*Bromus tectorum*) (MTNHP, 2020a).

### 3.8.4 Biological Resources

Biological resources include native plants and animals and the habitats in which they occur. Sensitive biological resources are defined as those plant and animal species listed as Threatened and Endangered (T&E) or Species of Concern (SOC) by the United States Fish and Wildlife Service (USFWS) or Montana Department of Fish, Wildlife, and Parks (MTFWP).

#### 3.8.4.1 Wildlife

The data included in the MAFB Integrated Natural Resource Management Plan (INRMP) was obtained from the Montana Natural Heritage Program (MTNHP) in 2017. A complete list of species that potentially occur within the entire Missile Complex is contained within the INRMP (MAFB, 2019). To refine the wildlife assessment for D-02, current data was obtained for lands within a 2-mile radius of the project area from MTNHP. The MTNHP serves as the state's information source for animals, plants, and plant communities with a focus on species and communities that are rare, threatened, and/or have declining trends and as a result are at risk or potentially at risk of extirpation in Montana.

According to the 2020 MTNHP data, 91 species have been documented, observed, or have the potential to occur within the vicinity of the project area. Of these, one has been scientifically documented and/or is known to occur within the project area, five species have been observed in the area, and 85 have the potential to occur within the area based on species-specific range, presence of associated habitats, or predictive distribution model outputs (MTNHP, 2020a). The following provides a summary of the current data.

***Mammals.***

There are 18 species of mammals that have the potential to occur within two miles of the project area. These include: porcupine (*Erethizon dorsatum*), hoary bat (*Lasiurus cinereus*), Merriam's shrew (*Sorex merriami*), Hayden's shrew (*Sorex haydeni*), little brown myotis (*Myotis lucifugus*), silver-haired bat (*Lasionycteris noctivagans*), Preble's shrew (*Sorex preblei*), black-tailed prairie dog (*Cynomys ludovicianus*), eastern red bat (*Lasiurus borealis*), white-footed mouse (*Peromyscus leucopus*), dwarf shrew (*Sorex nanus*), spotted bat (*Euderma maculatum*), Townsend's big-eared bat (*Corynorhinus townsendii*), swift fox (*Vulpes velox*), fringed myotis (*Myotis thysanodes*), black-footed ferret (*Mustela nigripes*), bison (*Bos bison*), and grizzly bear (*Ursus arctos*) (MTNHP, 2020a).

***Birds.***
A total of 44 species of songbirds, shorebirds, waterfowl, and raptors are found to be occurring, observed, or potential within two miles of the project area. The greater sage-grouse (*Centrocercus urophasianus)* is listed as an occurring species. The golden eagle (*Aquila chrysaetos*) and sharp-tailed grouse (*Tympanuchus phasianellus*) are listed as observed species. Potential birds include: short-eared owl (*Asio flammeus*), ferruginous hawk (*Buteo regalis*), long-billed curlew (*Numenius americanus*), loggerhead shrike (*Lanius ludovicianus*), Brewer's sparrow (*Spizella breweri*), bobolink (*Dolichonyx oryzivorus*), burrowing owl (*Athene cunicularia*), Baird's sparrow (*Centronyx bairdii*), Sprague's pipit (*Anthus spragueii*), chestnut-collared longspur (*Calcarius ornatus*), eastern bluebird (*Sialia sialis*), McCown's longspur (*Rhynchophanes mccownii*), green-tailed towhee (*Pipilo chlorurus*), mountain plover (*Charadrius montanus*), pinyon jay (*Gymnorhinus cyanocephalus*), and horned grebe (*Podiceps auratus*) (MTNHP, 2020a).

*Greater Sage-Grouse*
A status review conducted by the USFWS found that the greater sage grouse remains relatively abundant and well-distributed across the species' range and does not face the risk of extinction now or in the foreseeable future (USFWS, 2015). The USFWS decision follows an unprecedented conservation partnership across the western United States that has significantly reduced threats to the greater sage-grouse across the majority of the species' breeding habitat. The USFWS has determined that protection for the greater sage-grouse under the Endangered Species Act (ESA) is no longer warranted and is withdrawing the species from the candidate species list. In Montana, the species is managed by the State Department of Natural Resources and Conservation (DNRC) – Montana Sage Grouse Habitat Conservation Program (MSGHCP). The DNRC administers Montana Executive Order (EO)12-2015 and 21-2015 which sets forth the Montana sage grouse conservation strategy and the associated greater sage-grouse habitat designations. The proposed project will not require MSGHCP review and consultation because no jurisdiction habitat will be impacted by the Proposed Action. The nearest EO designated habitat is located approximately 1-mile west of the Proposed Action area.

***Reptiles and Amphibians.***
Five reptile and amphibian species have the potential to occur within two miles of the project area. Reptiles include the greater short-horned lizard (*Phrynosoma hernandesi*),

plains hog-nosed snake (*Heterodon nasicus*), and western milksnake (*Lampropeltis gentilis*). Amphibians include the Great Plains toad (*Anaxyrus cognatus*) and northern leopard frog (*Lithobates pipiens*) (MTNHP, 2020a).

***Fish.***
Three fish species have been observed within two miles of the project area. These include the northern redbelly dace (*Chrosomus eos*), plains minnow (*Hybognathus* placitus), and sauger (*Sander* canadensis) (MTNHP, 2020a).

***Invertebrates.***
There are 10 invertebrate species that have the potential to occur within two miles of the project area. These include: gray comma (*Polygonia progne*), vivid dancer (*Argia vivida*), prairie bluet (*Coenagrion angulatum*), alkali bluet (*Enallagma clausum*), plains clubtail (Gomphus externus), pronghorn clubtail (*Gomphus graslinellus*), red-spotted admiral (Limenitis arthemis), California darner (*Rhionaeschna californica*), blue-eyed darner (*Rhionaeschna multicolor*), and red-veined meadowhawk (*Sympetrum madidum*) (MTNHP 2020a).

***Vascular Plants.***
There are 11 vascular plant species that have the potential to occur within two miles of the project area. These include: Crawe's Sedge (*Carex crawei*), silver bladderpod (*Physaria ludoviciana*), Scribner's ragwort (*Senecio integerrimus var. scribneri*), smooth goosefoot (*Chenopodium subglabrum*), Schweinitz's flatsedge (*Cyperus schweinitzii*), long-sheath waterweed (*Elodea bifoliate*), double bladderpod (*Physaria brassicoides*), slim-pod Venus'-looking-glass (*Tiodanis leptocarpa*), Fendler cat's-eye (*Cryptantha fedleri*), chaffweed (*Centunculus minimus*), and desert groundsel (*Senecio eremophilus*) (MTNHP 2020a).

3.8.4.2 Threatened, Endangered, Proposed, and Species of Concern

According to the INRMP, D-02 does not occur within a designated critical habitat for any listed T&E species. Of the 91 species that have been documented, observed, or have the potential to occur within the vicinity of the project area, 44 have federal protection under the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (BGEPA), the Endangered Species Act (ESA) or are considered Birds of Conservation Concern (BCC). Federally protected species with potential to occur near or within LF D-02 are provide in the Table 2 (MTNHP, 2020a).

**Table 2.** Protected Species Observed or Occurring within Two Miles of D-02

| Common Name | Scientific Name | Listed Status* |
|---|---|---|
| American Bittern | Botaurus lentiginosus | MBTA; BCC |
| Baird's Sparrow | Centronyx bairdii | MBTA; BCC |
| Bald Eagle | Haliaeetus leucocephalus | DM; BGEPA; MBTA; BCC |

| Common Name | Scientific Name | Listed Status* |
|---|---|---|
| Black Tern | Chlidonias niger | MBTA; BCC |
| Black-billed Cuckoo | Coccyzus erythropthalmus | MBTA; BCC |
| Black-crowned Night-Heron | Nycticorax nycticorax | MBTA |
| Black-footed Ferret | Mustela nigripes | LE; XN |
| Black-necked Stilt | Himantopus mexicanus | MBTA |
| Bobolink | Dolichonyx oryzivorus | MBTA |
| Brewer's Sparrow | Spizella breweri | MBTA; BCC |
| Burrowing Owl | Athene cunicularia | MBTA; BCC |
| Caspian Tern | Hydroprogne caspia | MBTA |
| Cassin's Finch | Haemorhous cassinii | MBTA; BCC |
| Chestnut-collared Longspur | Calcarius ornatus | MBTA; BCC |
| Chimney Swift | Chaetura pelagica | MBTA |
| Common Poorwill | Phalaenoptilus nuttallii | MBTA |
| Common Tern | Sterna hirundo | MBTA |
| Eastern Bluebird | Sialia sialis | MBTA |
| Eastern Screech-Owl | Megascops asio | MBTA |
| Evening Grosbeak | Coccothraustes vespertinus | MBTA |
| Ferruginous Hawk | Buteo regalis | MBTA; BCC |
| Forster's Tern | Sterna forsteri | MBTA |
| Franklin's Gull | Leucophaeus pipixcan | MBTA |
| Golden Eagle | Aquila chrysaetos | BGEPA; MBTA; BCC |
| Great Blue Heron | Ardea herodias | MBTA |
| Green-tailed Towhee | Pipilo chlorurus | MBTA |
| Grizzly Bear | Ursus arctos | PS: LT; XN |
| Hooded Merganser | Lophodytes cucullatus | MBTA |
| Horned Grebe | Podiceps auritus | MBTA; BCC |
| Lewis's Woodpecker | Melanerpes lewis | MBTA; BCC |
| Loggerhead Shrike | Lanius ludovicianus | MBTA; BCC |
| Long-billed Curlew | Numenius americanus | MBTA; BCC |
| McCown's Longspur | Rhynchophanes mccownii | MBTA; BCC |
| Mountain Plover | Charadrius montanus | MBTA; BCC |
| Northern Goshawk | Accipiter gentilis | MBTA |
| Ovenbird | Seiurus aurocapilla | MBTA |
| Peregrine Falcon | Falco peregrinus | DM; MBTA; BCC |
| Pinyon Jay | Gymnorhinus cyanocephalus | MBTA; BCC |
| Red-headed Woodpecker | Melanerpes erythrocephalus | MBTA; BCC |
| Rufous Hummingbird | Selasphorus rufus | MBTA |
| Short-eared Owl | Asio flammeus | MBTA; BCC |
| Sprague's Pipit | Anthus spragueii | MBTA; BCC |

| Common Name | Scientific Name | Listed Status* |
|---|---|---|
| Veery | Catharus fuscescens | MBTA |
| White-faced Ibis | Plegadis chihi | MBTA |
| **Source**: MNHP 2020<br>**Notes**: Listed Status*<br>MBTA (Migratory Bird Treaty Act), BCC (Birds of Conservation Concern), BGEPA (Bald and Golden Eagle Protection Act), LE (Listed Endangered), LT (Listed Threatened), DM (Delisted, Monitor), XN (Experimental Population, Non-Essential), PS (Partial Status) | | |

Additionally, the USFWS Information for Planning and Consultation (IPaC) system was consulted to determine if any federally listed, proposed, or candidate species or their habitats could potentially occur in the project vicinity. According to the USFWS – IPaC system, there are no threatened or endangered species expected to occur within the D-02 project area (IPac, 2020).

## 3.9 Cultural Resources

The following sections summarize the archaeological/historic resources that may be impacted by the Proposed Action.

### 3.9.1 Archaeological/Historic Resources

The project area lies in the Great Plains physiographic province and is bordered by the Northern Rockies immediately to the west. The Great Plains are an enormous grass covered region covering much of central North America, while the Northern Rockies are a series of glaciated mountains running from Montana north to Alaska. The project area is considered part of the Northwestern Great Plains level 3 ecoregion. The ecoregion covers an area spanning the Missouri Plateau south to portions of Wyoming and South Dakota; and extends from the Rockies east to the Dakotas. It features a semi-arid continental climate, resulting in extreme cold in the winter and heat in the summer (Enthnotech, 2020).

The area is underlain primarily by Cretaceous sedimentary formations with a few igneous intrusions making up island-like mountain ranges within the open plains such as the Highwood Mountains just west of the D-02 site. During the Cretaceous, portions of the Pacific Ocean intruded into the center of North America, leaving behind the sedimentary formations and the dinosaur fossils that are found within them. More specifically, the project is located near Denton, Montana in the Missouri River Breaks. The regional topography is characterized by undulating flat plains, badlands and buttes, and numerous steep and deeply incised drainages leading to the Missouri River. The Missouri has incised several hundred feet into the plains in some areas, exposing the glacial sediments and large deposits of glacial lake deposited clay beneath those sediments. The D-02 site lies between two south to north trending tributaries of the Missouri River, the Judith River to the east and the Arrow Creek Coulee to the west

(Enthnotech, 2020). The prehistory of the Northwestern Plains is summarized in seven chronologies:

- Paleoindian Period, 11,000 years before present (BP) to 8,000 BP,
- Early Archaic Period, 8,000 BP to 5,000 BP,
- Middle Archaic Period, 5,000 BP to 3,000 BP,
- Late Archaic Perion, 3,000 BP to 1,500 BP,
- Late Precontact Period, 1,500 BP to 300 BP,
- Protohistoric, 300 BP to 200 BP, and
- Historic Era, 200 BP to present day.

A detailed description of these chronologies is provided in the Class III Pedestrian Archaeological Survey completed in 2020 (Appendix C). No cultural resources were noted during the survey. The Area of Potential Effect (APE) is entirely within an agricultural field that has been tilled seasonally over decades, severely limiting its potential for undisturbed cultural resources (Ethnotech 2020).

A cultural survey within the MAFB missile deployment area was conducted in the 1980's and focused on 235 miles of existing gravel roads used to access missile facilities. The Cultural Resource Sample Survey Malmstrom AFB Deployment Area, Region of Influence (ROI) included survey sites within Fergus County, near D-02 (Greiser, 1988). The reconnaissance level survey did not include testing of cultural resource sites. As a result, this survey did not fully satisfy section 106 of the National Historic Preservation Act (NHPA). The study was designed as a preliminary identification effort; thus, further testing and evaluation of sites required additional site-specific surveys. None of the cultural sites identified during this survey were near D-02.

An intensive survey for cultural and paleontological resources adjacent to 137 LFs in Malmstrom AFB Deployment Area was conducted under the direction of T. Weber Greiser in 1987 (Greiser, 1989). The survey was undertaken as part of the data update activities that occurred in support of the Environmental Impact Statement (EIS) on the deployment of the Small Intercontinental Ballistic Missile (ICBM) at Minuteman facilities in Montana. D-02 was one of the LFs surveyed with no cultural or paleontological resources reported. It was noted during the survey that the area associated with D-02 was plowed.

## 3.10 Earth Resources

The following sections describe the general environmental setting of the proposed project area.

### 3.10.1 Geology

The areas occupying the Proposed Action are within an alluvium of braided plains (QTab) geologic unit, which consists of light brown to light gray, crudely to well-

stratified, and moderately to well-sorted sand and gravel that is older than alluvium of active stream channels (Qal). This geology occurs as remnants of braided-plain alluvial deposits and dissected deposits of coarse sediment derived from coalesced alluvial fans adjacent to the Highwood Mountains (dominantly volcanic clasts), Little Belt Mountains (dominantly limestone clasts), Square Butte and Round Butte (dominantly shonkinite and syenite clasts), or from reworked older alluvium. This area underlies at least five different topographic surfaces of different ages. On all but lowest surfaces, the upper part of deposit is mainly cemented by calcium carbonate, the geologic unit is covered by loess as much as 4 feet thick on all but the very lowest (youngest) surfaces and the thickness ranges from 20 inches to 100 feet (MBMG 2020).

### 3.10.2 Soils

According to the United States Department of Agriculture (USDA) – Natural Resources Conservation Service (NRCS) National Cooperative Soil Survey Map (NRCS 2020) the Proposed Action intersects three soil types:

- 55 – Danvers clay loam, 0 to 2 percent slopes,
- 221 – Tamaneen – Judith clay loams, 2 to 4 percent slopes, and
- 275 – Winifred-Windham-Eltsac complex, 15 to 45 percent slopes.

The soils associated with the agricultural field within the Proposed Action area consists of a Danvers clay loam. These soils are found on terraces with minimal slopes. The parent material consists of clayey alluvium derived from limestone and the natural drainage class is well drained. This soil is not flooded or ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This soil has a slow infiltration rate when thoroughly wet and contains a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. This soil has a slow rate of water transmission. This map unit and soil does not meet the Hydric Soil Criteria.

The soils upgradient and adjacent to the ephemeral drainage consist of a Tamaneen – Judith clay loam. These soils are found on stream terraces and alluvial fans with minimal slopes. The parent material consists of alluvium derived from limestone and the natural drainage class is well drained. This soil is not flooded or ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. The Judith component has a moderate infiltration rate when thoroughly wet and contains moderately deep or deep, moderately well drained, or well drained soils that have moderately fine texture to moderately coarse texture. This soil has a moderate to slow rate of water transmission. This map unit and soil does not meet Hydric Soil Criteria.

The soils within the ephemeral drainage consist of a Winifred-Windham-Eltsac complex. These soils are found on hills and sedimentary plains with moderate to steep slopes. The parent material consists of alluvium and residuum over semi-consolidated shale

and the natural drainage class is well drained. This soil is not flooded or ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. The Winifred and Eltsac soil components have a very slow infiltration rate (high runoff potential) when thoroughly wet and contain mainly clays that have a high shrink-swell potential, soils that have a high-water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. This soil has a very slow rate of water transmission. This map unit and soil does not meet Hydric Soil Criteria.

### 3.10.3 Topography

The Proposed Action area is located on the Everson Bench, a rural area of Fergus County approximately 18-miles north of Denton, Montana. This region of north central Montana is considered a part of the Judith Basin Grassland ecoregion, a subclass of the northwestern Great Plains region and is located adjacent to the Missouri River Breaks. This region is characterized by broad, gently sloping grasslands, foothills, and bluffs, with steep incised drainages. The Proposed Action area is relatively flat, comprising minimal slopes (0 to 4 percent) and is approximately 3,530 feet above mean sea level. The proposed discharge location within an unnamed ephemeral drainage is located 0.2-miles from Falls Coulee, which is approximately 4.5-miles from Wolf Creek, which is approximately 9-miles from the Judith River, a tributary of the Upper Missouri River (USGS, 2021).

# 4.0 Environmental Consequences

The following sections provide an analysis of environmental consequences related to the Proposed Action.

## 4.1 Introduction

This EA was developed to determine the significance of environmental impacts associated with a Proposed Action and Alternatives. The CEQ regulations (40 CFR §§1500-1508), direct that the analysis considers two variables: “context” and “intensity”. This chapter describes the potential environmental consequences that are likely to occur as a result of implementation of alternatives retained for complete analysis. Impacts described in this chapter are evaluated in terms of:

- Type (positive / beneficial or adverse),
- Context (setting or location),
- Intensity (none, negligible, minor, moderate, severe), and
- Duration (short-term/temporary or long-term/permanent).

Unless otherwise noted, short-term impacts are those related to the construction phase of the project and would end upon the project completion. Long-term impacts are generally those resulting from the activation and operation following the completion of upgrades as defined herein.

## 4.2 Water Resources (Surface and Groundwater)

The following sections outline the potential consequences for water resources relating to the Proposed Action.

### 4.2.1 Alternative 1 (Preferred Alternative)

Alternative 1 is the Preferred Alternative. It would include the construction of perimeter drains and a dewatering pipeline that will discharge to a subsurface infiltration system in a nearby ephemeral drainage. The infiltration system is designed to mimic natural infiltration by allowing captured water to discharge into the subsurface. This approach is considered to have negligible long-term and short-term effects on water resources, including surface water, groundwater, and stormwater.

The ephemeral channel that will receive discharge from the dewatering system could see a minor increase in surface water flows as soils near the head of the ephemeral channel become saturated from the infiltration system. Surface flows are likely to infiltrate, evaporate, or be intercepted by vegetation within the ephemeral channel before discharging to Falls Coulee, which is 0.2-miles downstream. The increased surface water flows resulting from saturated soils would mimic natural stormwater

conditions. As a result, no adverse effects are anticipated due to the water quantity or quality in the ephemeral channel or downstream waters.

The infiltration system would create short-term and long-term increases in the quantity of groundwater infiltration near the head of the ephemeral channel. The perimeter drain system is designed to capture infiltrating groundwater at and around the D-02 LSB and silo and transport it to a discharge location at the head of the ephemeral channel. The system upgrades will result in no net change in the quantity of groundwater movement through the area, as groundwater drains this direction naturally. Based on this, there would be no adverse effects on the groundwater quantity in the project area. The water discharged from the infiltration system is natural groundwater and would have no adverse effects on water quality. Groundwater quality at D-02 is classified as very hard water with high potential for scaling. As a result, routine maintenance and/or replacement of system components will likely be required during system operations. The hard water containing significant dissolved solids could also exacerbate the potential for saline seeps near the infiltration system, thus impacting surrounding surface soils.

Stormwater events occur at and around D-02 following periods of significant precipitation or snowmelt. These events lead to short-term increases in groundwater infiltration across the area, including in the ephemeral drainage. Because the proposed system upgrades will discharge here as well, infiltration will be affected following a significant event. Under these conditions, soils will become saturated in the discharge area, potentially resulting in increased surface water flows. The effect from the system discharge is considered negligible. Any additive effect from a stormwater event would not be considered an adverse effect, as they are naturally occurring phenomenon.

Short-term impacts to stormwater during construction of the system would be addressed through the development of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP will comply with the requirements outlined in the *General Permit for Storm Water Discharges Associated with Construction Activity* (DEQ Permit MTR100000). The SWPPP will define the steps and measures that will be implemented to ensure stormwater is properly controlled during the construction phase of the project. These will included BMPs designed to promote erosion control and limit the quantity of sediment from migrating off site. The project will create the potential for minor short-term adverse effects of increased sediment-ladened stormwater during construction. The provisions of the SWPPP are designed to mitigate these. Potential long-term effects would be mitigated through the implementation of a regrading and revegetation plan following construction.

### 4.2.2 Alternative 2

Alternative 2 mirrors the design of Alternative 1. They differ in how captured water is discharged. Both would include the construction of a dewatering pipeline and associated perimeter drains. However, the water collected under Alternative 2 would be

discharged through a rock rip-rap outfall in the ephemeral drainage rather than a subsurface infiltration header.

The majority of captured water discharged into the outfall would be expected to infiltrate, evaporate, or be intercepted by natural vegetation. However, the potential exists for surface water flows to extend beyond the riprap outfall into the ephemeral channel and downstream to Falls Coulee during a significant storm or snow melt event. It is unlikely that discharge would reach Wolf Creek or the Judith River at 4.5-miles and 9-miles downstream, respectively. If it were to travel this distance, the large storm event that caused the flow, would highly dilute the discharge to an unmeasurable level, due to the differences in water quantity. Any increased surface water flow in the ephemeral drainage would not be considered a beneficial effect, except during periods of drought and water demand. Increased surface water flow in the ephemeral drainage would not create adverse water quality effects as it would either infiltrate into the soil or be highly diluted by precipitation in both the short-term and long-term.

The groundwater in the vicinity of D-02 is classified as very hard and has a high potential for scaling, which in the long-term could limit infiltration into the native soil due to mineral deposition on the soil surface. Due to the very hard water chemistry, the potential for scale development also exists in the subsurface infiltration system proposed in Alternative 1, which could lead to elevated maintenance or replacement costs. For this reason, Alternative 2 could offer a long-term cost benefit when compared to Alternative 1 due to the reduced need for maintenance or system replacement from scaling due to hard water from the capture system.

The designed capture system will produce similar short and long-term increases in the volume of stormwater captured in Alternative 2. However, the discharge mechanism is different which will result in a higher potential for periodic surface water flows in the ephemeral drainage. Additional permitting may be required to discharge the captured water under Alternative 2.

Montana regulations state that:

> “Discharge to surface water of ground water that is not altered from its ambient quality does not constitute a discharge requiring a permit under this part if:
> (i) the discharge does not contain industrial waste, sewage, or other wastes;
> (ii) the water discharged does not cause the receiving waters to exceed applicable standards for any parameters; and
> (iii) to the extent that the receiving waters in their ambient state exceed standards for any parameters, the discharge does not increase the concentration of the parameters.” (MCA 75-5-401 (b))

As with Alternative 1, short-term stormwater impacts during the construction period would be mitigated through implementation of a SWPPP, associated BMPs, and the appropriate permit coverage.

#### 4.2.3 Alternative 4 (No Action Alternative)

The No Action Alternative would retain the existing dewatering system and continue to pump the water out of the structures to an area just outside the D-02 perimeter fence. Under the current system, discharge of captured water takes place onto the adjacent private land. The no action alternative would not result in changes to water resources from current conditions.

## 4.3 Air Quality

The following sections outline the potential air quality consequences relating to the Proposed Action. D-02 has little to no emissions associated with its operation, as it is unmanned. As a result, it does not require air quality permits under the ARM.

#### 4.3.1 Alternative 1 (Preferred Alternative)

Alternative 1 would include the use of heavy equipment, soil excavation, and stockpiling and regrading of cover soil. Construction activities may create minor short-term air quality issues. Upon completion of the installation, there will be no sources of air pollution. As a result, the net effect of the project is considered negligible and unlikely to impact air quality.

During construction, increased emissions in the form of dust are anticipated. This could extend to dust released and resuspended from travel on unpaved road surfaces and from activities such as demolition, excavation, grading, and materials transfer. Other short-term emissions will likely include criteria pollutants emitted from diesel and gasoline engines. The engineering design can mitigate the dust related emissions, by specifying industry standard dust suppression practices as part of the construction bid package. Absent any dust suppression measures, dust issues relating to construction could present both emission and worker safety issues for this project. Their inclusion in the project specifications would ensure no significant local impacts on air quality due to construction-related activity. The project footprint is relatively small, and the planned 6-month duration indicates the project is unlikely to result in long-term emissions of concern. As a result, no regional impact on emissions is expected.

Per the Environmental Impact Analysis Process (EIAP, 32 CFR §989.30, “Air quality”), all EIAP documents must address applicable conformity requirements and the status of compliance. The Preferred Alternative is not located within or adjacent to any nonattainment or maintenance area. Therefore, the Air Force Conformity Applicability Model (ACAM) indicates conformity with the State Implementation Plan (Appendix D).

##### 4.3.1.1 Radiological Emissions

Alternative 1 is not expected to result in any radiological emissions.

#### 4.3.1.2 Greenhouse Gas Emissions

The construction of a dewatering pipeline and associated perimeter drains would not result in any ongoing GHG emissions from facility operations. During construction, energy would be used for transporting materials to and from the work site and from heavy equipment operating on the work site. Both would result in GHG emissions. In addition, construction materials used to complete the project will have emissions associated with extraction, production, processing, transport, and disposal. According to the EIAP (§989.31, "*Pollution Prevention*"):

> *"The environmental document must discuss potential pollution prevention measures when such measures are feasible for incorporation into the proposal or alternatives, and where pollution cannot be prevented, the environmental analysis and proposed mitigation measures should include, wherever possible, recycling, energy recovery, both of which would reduce GHG emissions."*

Since detailed design information is not presently available, precise estimates of GHG emissions are not possible. However, the ACAM model estimates CO2e to ensure compliance with the EIAP guidance. ACAM has estimated the CO2e for construction related materials for this project to be up to 836.9 tons during construction and 0 tons per year steady state (Appendix D).

### 4.3.2 Alternative 2

Alternative 2 would also include the construction of a dewatering pipeline and associated perimeter drains with the addition of a rock riprap rundown outfall instead of an infiltration header. Upon completion of the installation, there will be no sources of air pollution. As a result, the net effect of the project is considered negligible and unlikely to impact air quality.

During construction, increased emissions in the form of dust are anticipated. This could extend to dust released and resuspended from travel on unpaved surfaces and from activities such as demolition, excavation, grading, and materials transfer. Other short-term emissions will likely include criteria pollutants emitted from diesel and gasoline engines. The engineering design can mitigate the dust related emissions, by specifying industry standard dust suppression practices as part of the construction bid package.

Absent any dust suppression measures, dust issues relating to construction could present both emission and worker safety issues for this project. Their inclusion in the project specifications would ensure no significant local impacts on air quality due to construction-related activity. The project footprint is relatively small and the planned 6-month duration indicate the project is unlikely to result in long-term emissions of concern. As a result, no regional impact on emissions is expected.

Per the Environmental Impact Analysis Process (EIAP, 32 CFR §989.30, “Air quality”), all EIAP documents must address applicable conformity requirements and the status of compliance. The Preferred Alternative is not located within or adjacent to any nonattainment or maintenance area. Therefore, the Air Force Conformity Applicability Model (ACAM) indicates conformity with the State Implementation Plan (Appendix D).

#### 4.3.2.1 Radiological Emissions

Alternative 2 is not expected to result in any radiological emissions.

#### 4.3.2.2 Greenhouse Gas Emissions

The construction of a dewatering pipeline and associated perimeter drains should not result in any ongoing GHG emissions from facility operations.

During construction, energy would be used for transporting materials to and from the work site and from heavy equipment operating on the work site. Both would result in GHG emissions. In addition, construction materials used to complete the project will have emissions associated with extraction, production, processing, transport, and disposal. According to the EIAP (§989.31, “*Pollution Prevention*”):

> *“The environmental document must discuss potential pollution prevention measures when such measures are feasible for incorporation into the proposal or alternatives, and where pollution cannot be prevented, the environmental analysis and proposed mitigation measures should include, wherever possible, recycling, energy recovery, both of which would reduce GHG emissions.”*

Since detailed design information is not presently available, precise estimates of GHG emissions are not possible. However, the ACAM model estimates CO2e to ensure compliance with the EIAP guidance. ACAM has estimated the CO2e for construction related materials for this project to be up to 836.7 tons during construction and 0 tons per year steady state (Appendix D).

### 4.3.3 Alternative Comparison

The following provides a comparison of Alternatives 1, 2, and the no action alternative relative to greenhouse gas emissions.

#### 4.3.3.1 Relative Significance Indicator

A comparison of GHG annual emissions for each action or alternative is required to establish the relative significance of each. Alternatives 1 and 2 are nearly identical in terms of air emissions. The only difference lies in the discharge to a subsurface drain, versus daylighting the discharge pipe and to a rock riprap rundown. Alternative 1 represents the highest level of disturbance, vehicle movements, and materials with

respect to GHG emissions, although Alternative 2 would be very similar other than not needing to trench and regrade the subsurface infiltration header associated with Alternative 1. The difference between the two alternatives is likely not measurable and would not be considered a significant difference. When the two alternatives are compared with the No Action alternative, emissions would be higher.

#### 4.3.3.2 De Minimis Significance Indicator

The Air Force Air Quality EIAP Guide proposes emissions of 75,000 tons per year (tpy) CO2e of GHG emissions as de minimis (too trivial or minor to merit consideration) and not significant enough to warrant further NEPA analysis. Based on the above estimate, it is highly unlikely the worst-case year during construction would exceed that level. However, given the high uncertainties in the analysis, if we assume the total emissions might exceed the de minimis level, the next step of the analysis is to consider only the stationary combustion sources of emissions. In this case, there will be no stationary combustion sources. As a result, this indicator is considered negligible and should not impact moving forward with the project.

#### 4.3.3.3 Cumulative Analysis

The cumulative analysis addresses the potential for the Proposed Action to result in significant emissions facility-wide. As noted, there will be no permanent sources of air emissions following the completion of construction of this project, resulting in a carbon neutral outcome for the installation.

Total combined direct and indirect emissions associated with the action were estimated through Air Conformity Applicability Model (ACAM) on a calendar-year basis for the “worst-case” and “steady state” (net gain/loss upon action fully implemented) emissions (Appendix D). The relative emissions of the two active alternatives are very similar. The ACAM findings include the following:

- Annual emissions during construction would include up to 836.9 tons CO2e per year, and
- Annual emissions during steady-state operations would be 0 tons CO2e per year.

Based on these results, the Proposed Action will not result in an exceedance of the *de minimis* emissions level of 75,000 tons of CO2e, as determined by the ACAM Report Record of Conformity Analysis (ROCA) Air Conformity Applicability Model. Therefore, no additional analysis is required for alternatives evaluation. Nonetheless, since design details are not available at this time, under the EIAP §989.31, “*Pollution Prevention*”, energy and materials conservation options should be considered when detailed design is completed.

### 4.3.4 Alternative 4 (No Action Alternative)

The No-Action Alternative would retain the existing dewatering system and continue to pump the water out of the structures to just outside the LF fence, discharging capture water onto the adjacent private land. Therefore, there would be no changes to air quality.

## 4.4 Land Use

The following summarizes the assessment of potential consequences relating to land use.

### 4.4.1 Alternative 1 (Preferred Alternative)

The Preferred Alternative would not affect the current agricultural land use. Short-term effects from construction disturbances, will result in a temporary loss of crop production. The loss would be compensated through the perpetual easement with the landowner. Following construction, the area would be reestablished as an agricultural field. The long-term effects from the land easement would be an additional utility encumbrance on the parcel which future land development would have to consider, however, future development is unlikely given the location and current land use of the parcel. The perpetual easement configuration will differ slightly near the discharge location depending on which alternative is selected; however, this difference will not affect land use resources and is considered insignificant.

### 4.4.2 Alternative 2

Alternative 2 impacts to land use would be similar to Alternative 1.

### 4.4.3 Alternative 4 (No Action Alternative)

The No-Action Alternative would retain the existing dewatering system and continue to pump the water out of the structures to just outside the LF fence, discharging capture water onto the adjacent private land. Therefore, there would be no changes to land use.

## 4.5 Noise

The following summarizes the assessment of potential consequences relating to noise impacts.

### 4.5.1 Alternative 1 (Preferred Alternative)

The dewatering project at D-02 will temporarily impact the current location. Currently, noise levels around D-02 are related to rural agricultural and background ambient noise in addition to the occasional vehicle entering or leaving the facility. Noise related to the dewatering project will be the result of additional vehicle traffic, construction, demolition, and infrastructure installation activities. The minor increase of noise in the area will be

temporary during construction and will return to pre-project levels immediately following completion of the project.

#### 4.5.2 Alternative 2

Alternative 2 impacts from noise mirror those outlined above for Alternative 1.

#### 4.5.3 Alternative 4 (No Action Alternative)

The No-Action Alternative would retain the existing dewatering system. As no system upgrades are proposed under Alternative 4, there would be no changes to current noise levels at the site.

### 4.6 Safety and Occupational Health

The following sections outline potential occupational safety and health related consequences for the Proposed Action.

#### 4.6.1 Alternative 1 (Preferred Alternative)

Dewatering construction activities present typical site risk such as trips, slips, and falls, repetitive motion injuries, heavy lifting, use of large equipment, environmental factors such as heat or cold stress, increased noise, and dust exposure. The engineering design and contractor bid package will include provisions mandating the general contractor to plan for and implement measures to mitigate project-related hazards.

During construction, the contractor would be responsible for ensuring the health and safety of their staff, compliance with all Occupational Safety and Health Administration (OSHA) and USAF standards, and must maintain a health and safety plan and other related elements. The plan will reflect the construction-related activities to reduce risks to workers, USAF and civilian personnel, and ensure compliance with all regulations. With proper planning and oversight, proper mitigation steps can be implemented to ensure the project is completed in a safe manner.

#### 4.6.2 Alternative 2

Occupational safety and health considerations for Alternative 2 mirror those described above for Alternative 1.

#### 4.6.3 Alternative 4 (No Action Alternative)

The No-Action Alternative would retain the existing dewatering system. Therefore, there would be no changes to occupational safety and health considerations.

### 4.7 Hazardous Materials / Waste

The following sections outline potential consequences relating to hazardous materials / waste for the Proposed Action.

### 4.7.1 Alternative 1 (Preferred Alternative)

The proposed Action will not result in the generation of any hazardous materials / waste. As a companion to the EA, MAFB conducted an EBS to evaluate and document the presence or potential presence of any hazardous or toxic substances or petroleum products. According to the information acquired during the Phase I EBS there is no evidence of past contamination or hazardous materials / waste within or adjacent to the Proposed Action.

Non-hazardous inert wastes may be generated during the removal of the existing system, including piping and other metal debris. These materials can be recycled or disposed of in a municipal landfill cell without special management or disposal considerations. There would be a minor short-term increase of construction related non-hazardous wastes.

### 4.7.2 Alternative 2

Similar to Alternative 1, Alternative 2 will not result in the generation of hazardous materials / waste. Inert, non-hazardous wastes generated under Alternative 2 mirror those described above for Alternative 1.

### 4.7.3 Alternative 4 (No Action Alternative)

The No-Action Alternative would retain the existing dewatering system. There would be no potential for generating hazardous waste or inert waste under this alternative.

## 4.8 Biological Resources / T&E Species / Wetlands and Floodplains

The following sections outline the potential consequences relating to biological resources, T&E species, wetlands, and floodplains related to the Proposed Action. There are no designated floodplains within the proposed project area.

### 4.8.1 Alternative 1 (Preferred Alternative)

Wetland resources are subject to federal and state regulations including the federal Clean Water Act (CWA), the Rivers and Harbors Act, and the Montana Water Quality Act. In addition, Executive Order (EO) 11990 requires federal agencies to minimize the destruction, loss, or degradation of jurisdictional wetlands from construction activities. The objective of the Clean Water Act (CWA) is to restore and maintain the integrity of the Nation’s waters. Toward achievement of this goal, the CWA prohibits the discharge of dredged or fill material into Water of the United States (WOTUS) unless approved through U.S. Army Corps of Engineers (Corps) permitting requirements. For every

authorized discharge, the adverse impacts to wetlands, streams, and other aquatic resources must be avoided and minimized to the extent practicable.

The 2020 on-site wetland assessment concluded that one area contains the appropriate vegetation, soils, and hydrology to be classified as a wetland. This wetland area is associated with an ephemeral drainage that connects to Falls Coulee (Appendix B). According to the *Navigable Waters Protection Rule: Definition of "Waters of the United States"* ephemeral drainages (i.e., drainages where surface water flows or pools only in direct response to precipitation (e.g., rain or snow fall)) are considered non-jurisdictional waters and include ephemeral streams, swales, gullies, rills, and pools. For the associated wetlands within the ephemeral drainage to be considered "*adjacent wetlands*" (i.e., jurisdictional wetlands) they need to abut or be inundated by flooding from a jurisdictional water, which is not the case.

The Preferred Alternative would directly impact the head of the non-jurisdictional ephemeral drainage during construction. Approximately 0.07-acres of the ephemeral drainage would be disturbed during construction of the infiltration header. Construction impacts would be temporary and would include increased erosion potential, sedimentation, and fugitive dust. These impacts would be mitigated through structural erosion / sediment controls and dust suppression.

Following construction, surface soils would be recontoured to preexisting conditions and disturbances would be seeded to return the area to pre-construction conditions. The long-term impacts would result from introducing capture water discharge to the head of the ephemeral drainage. This would have the potential to increase erosion within the drainage; however, the engineered design will ensure seepage flow rates do not exceed soil erosivity thresholds. The increase in discharge may positively impact wetland functions within the drainage by creating more consistent flow for longer periods of the growing season thus increasing the drainage's side slope wetland potential. In a correspondence dated February 5, 2021, the Corps was unable to ascertain if regulated activities are proposed or if jurisdictional WOTUS are present within the project area and requested that a Montana Joint Permit Application be submitted if the final design includes placement of fill material in any jurisdictional waters (Appendix A). To initiate the permitting process a *Request for Corps Jurisdictional Determination (JD)* form should be submitted to the Corps for review and approval (Appendix B).

Land cover that would be impacted by the 1.4-acre utility easement is almost entirely cultivated crops. However, these impacts would be mitigated through recontouring surface soils to return the area to preexisting conditions for crop production. Therefore, there are no long-term impacts expected to land cover.

Wildlife including mammals, birds, reptiles, and amphibians, including wetland and ground nesting birds, have the potential to occur within the project area and may be displaced during excavating and construction activities. Design measures would minimize displacement effects by implementing construction activities outside the typical breeding season (springtime for most species). The open drainage pipe could

potentially cause an entrapment issue for burrowing wildlife; however, the probability is low, especially since the discharge would deter animals from sheltering within the pipe. The temporary habitat loss would not significantly affect wildlife or their populations due to the project's proximity to existing cultivation disturbance; therefore, the Preferred Alternative would not result in a significant impact to wildlife, including threatened, endangered, proposed, and special species of concern or their habitat. In a correspondence dated February 9, 2021 USFWS commented on the Proposed Action and alternatives and acknowledged the "no effect" determination for federally listed species (Appendix A).

### 4.8.2 Alternative 2

Under Alternative 2 floodplains will not be affected and impacts to wetland habitats will be similar in to Alternative 1. Alternative 2 proposed the same facility dewatering upgrades with one exception; instead of an infiltration header located at the outfall of the lateral pipe, captured water would be directly discharged into the ephemeral drainage by daylighting the pipe to a rock riprap rundown. Approximately 0.05-acres of the ephemeral drainage would be disturbed during construction of the proposed discharge location. Similar to Alternative 1, a *Request for Corps Jurisdictional Determination (JD)* form should be submitted to the Corps for review and approval (Appendix B). Short-term impacts from construction would be similar to Alternative 1 and mitigated as mentioned above. The long-term impacts would result from introducing direct discharge to the head of the ephemeral drainage. The rock riprap rundown would permanently displace approximately 0.01 acres of native vegetation. The riprap would be appropriately sized for the anticipated peak flows; however, there would be a potential for erosion and scour beyond the riprap within the ephemeral drainage, which overtime could cause undesired channelization. The increased discharge may positively impact wetland functions within the drainage but in a different location than with Alternative 1. The surface discharge flows would likely travel through the riprap infiltrating into native soils near the bottom of the riprap creating an artificial wetland environment within the drainage bottom.

Alternative 2 impacts to land cover would be similar to Alternative 1. The rock riprap rundown would permanently displace approximately 0.01 acres of native vegetation. This permanent vegetation loss is insignificant; therefore, there are no long-term impacts expected to land cover.

Alternative 2 impacts to wildlife, including mammals, birds, reptiles, and amphibians would be similar to Alternative 1 and would not result in a significant impact to wildlife, including threatened, endangered, proposed, and special species of concern or their habitat.

### 4.8.3 Alternative 4 (No Action Alternative)

The No-Action Alternative would retain the existing dewatering system and continue to pump the water out of the structures to just outside the LF fence, discharging fugitive

water onto the adjacent private land. Therefore, there would be no changes to biological resources, T&E species, wetlands, and floodplains.

## 4.9 Cultural Resources

The following sections outline the potential consequences relating to cultural resources related to the Proposed Action.

### 4.9.1 Archaeological/Historic Resources

#### 4.9.1.1 Alternative 1 (Preferred Alternative)

There are three cultural resource studies relevant to D-02, two completed in 1980's, and the other in 2020 as part of this EA. The 1980's studies reviewed multiple sites within the MAFB Deployment area including areas near D-02 (Greiser, 1988 & Greiser, 1989). The 2020 report was completed to assess the project area currently proposed at D-02. The site-specific study concluded that no cultural resources were noted during the surveys and the site is entirely within an agricultural field that has likely been plowed seasonally over decades, severely limiting its potential for undisturbed cultural resources (Ethnotech 2020). In a correspondence dated March 1, 2021, the State Historic Preservation Office (SHPO) did not have any comments on the IICEP letter. However, following their review of the 2020 Ethnotech survey, SHPO concurred with the no effects determination in a correspondence dated March 3, 2021 (Appendix A).

#### 4.9.1.2 Alternative 2

Cultural resource issues relating to Alternative 2 mirror those described above for Alternative 1. Because no cultural resources were noted within the proposed project area, no effects are noted for the project under either active alternative.

#### 4.9.1.3 Alternative 4 (No Action Alternative)

The No-Action Alternative would retain the existing dewatering system. There would be no changes to cultural resources as a result of Alternative 4.

## 4.10 Earth Resources

The following summarizes considerations relating to earth resources and the Proposed Action.

### 4.10.1 Alternative 1 (Preferred Alternative)

The Preferred Alternative would require excavation and earth work to install the facility dewatering system. Soil handling and excavation management will include designated equipment staging and stockpiles areas, which would include perimeter controls to limit disturbance areas. Excavated material may be reused on-site to the extent possible

and off-site soil disposal would meet all applicable regulations and would not result in adverse impacts to geology, soils, or topology. A Storm Water Pollution Prevent Plan (SWPPP) associated with the General Construction Stormwater Permit will ensure appropriate stormwater control Best Management Practices (BMPs) are implemented during construction and inspected frequently to limit sediment migration and promote erosion control. There would be a minor short-term adverse effect of increased sediment laden stormwater and the long-term impacts would be mitigated by implementation of a revegetation plan.

The Preferred Alternative would discharge capture water through a subsurface infiltration header that would run parallel to the top of the ephemeral drainage allowing the water to seep into the ground, mimicking the natural infiltration process. This design would reduce the erosion potential to the ephemeral drainage, promote natural soil filtration while stabilizing discharged water temperatures.

The groundwater quality at D-02 is classified as very hard water with high potential for scaling and contains significant dissolved solids. Introducing this water to the surface soils near the infiltration system could potentially exacerbate the potential for saline seeps at the head of the ephemeral drainage, thus reducing soil productivity and depressing plant growth potential.

### 4.10.2 Alternative 2

Alternative 2 impacts to earth resources would be similar to Alternative 1. However, instead of an infiltration header located at the outfall of the discharge pipe, groundwater would be directly discharged into the ephemeral drainage via daylighting the pipe to a rock riprap rundown. All other dewatering and water disposal methods noted in Alternative 1 would be the same.

Similar to Alternative 1, construction stormwater management would require a General Construction Stormwater Permit and associated BMPs. The short and long-term impacts would be mitigated as stated in Alternative 1. However, there are several other potential long-term impacts associated with this design. While the rock riprap rundown would reduce the velocity of the discharged water, there would be the potential for erosion and scour beyond the riprap within the ephemeral drainage. The riprap itself would also be a long-term impact, permanently displacing vegetation with rock armor. The natural soil filtration and temperature stabilization processes associated with Alternative 1 would also not occur at the discharge location.

Similar to Alternative 1, introducing hard groundwater to surface soils within the drainage bottom could potentially increase surface scaling thus reducing water infiltration, soil productivity, and depressing plant growth potential.

### 4.10.3 Alternative 4 (No Action Alternative)

The No-Action Alternative would retain the existing dewatering system. There would be no changes to earth resources.

## 4.11 Other NEPA Considerations

The following summarizes other considerations when considering the potential consequences of the Proposed Action.

### 4.11.1 Unavoidable Adverse Effects

This EA identifies any unavoidable adverse impacts that might be encountered while implementing the Proposed Action, and the significance of the potential impacts to resources and issues. Title 40 CFR §1508.27 specifies that a determination of significance requires consideration of context and intensity. Installation of a more effective dewatering system at D-02 would impact the local project area at the LSB and the silo. Unavoidable short-term impacts associated with the Proposed Action would include:

- Temporary erosion and sedimentation from soil disturbances,
- Temporary increases in fugitive dust and air emissions during construction, and
- Intermittent noise.

These effects are considered temporary, minor and would be confined to the immediate project area during construction. Use of BMPs, safe work practices, and dust controls would aid in minimizing the potential impacts. Unavoidable impacts would occur within the adjacent agricultural field and the head of the ephemeral drainage. Up to 1.4-acres of land will be disturbed during construction. For the Proposed Action to be accomplished, the noted impacts are unavoidable. As a result, while undesirable, the impacts are manageable and do not represent significant short or long-term impacts to the base mission, environment, or the community.

### 4.11.2 Relationship of Short-Term Uses and Long-Term Productivity

The relationship between short-term uses and enhancement of long-term productivity was evaluated from the standpoint of short and long-term effects. Short-term effects would be those associated with the construction activities to install the dewatering system at D-02, including temporarily increasing noise, dust, erosion, sedimentation, and air emissions. The long-term enhancement of productivity includes those effects associated with the increased effectiveness of the proposed facility dewatering design and lower maintenance issues associated with the current dewatering system upon project completion.

The Proposed Action represents an enhancement of long-term productivity for the D-02 facility by increasing the effectiveness of the dewatering system at the LSB and the silo while decreasing current maintenance issues. The negative effects of short-term

operational changes during construction activities would be minor compared to the positive benefits realized from the upgrades to the dewatering system. Upon its completion, the project would result in immediate and long-term benefits for day-to-day operations that would extend through the life of the facility.

### 4.11.3 Irreversible and Irretrievable Commitments of Resources

This EA also identifies any irreversible and irretrievable commitments of resources that would be involved in the Proposed Action. Examples of irreversible effect would include:

- Use or destruction of resources that cannot be replaced within a reasonable time, (e.g., energy)
- Short-term but irreversible commitment of resources including planning and engineering costs,
- Use of building materials and supplies and their costs, or
- Loss of resources that cannot be restored as a result of the Proposed Action (e.g., endangered species, wetlands).

In general, these irreversible or irretrievable commitments are part of the normal course of doing business, whether it relates to the Proposed Action or other similar projects that have nothing to do with the upgrade of the dewatering system. Particularly the use of energy, building materials, and the expenditure of funds to ensure a proper engineering design is completed would be considered reasonable and in keeping with industry standard practices. The analysis of these factors has been completed in other studies relating to the project and none of have been found to represent significant consequences to the project.

The elements of the project are not as commonplace when considering the loss of habitat, T&E species, or other natural resources such as wetlands. Prior analysis in this EA has demonstrated there is little likelihood that T&E species will be impacted as a result of this project, as the D-02 facility is a fully developed industrial area already and adjacent lands are developed agricultural fields. Non-jurisdictional wetlands will likely be impacted if the Proposed Action is implemented. Avoidance and/or minimization measures can likely be incorporated into the engineering design to ensure the impact on these wetlands is limited. Similarly, the introduction of increased water to the ephemeral drainage is not considered a significant effect as the drainage is fully vegetated and has a low erosion potential. Based on these findings, no long-term irretrievable commitments of resources would result from the Proposed Action.

## 4.12 Cumulative Effects

This EA also considers the effects of cumulative impacts as required in 40 CFR 1508.7 and concurrent actions as required in 40 CFR 1508.25[1]. A cumulative impact, as defined by the CEQ (40 CFR 1508.7) is the “…impact on the environment which results from the incremental impact of the action when added to other past, present, and

reasonably foreseeable future actions regardless of which agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

Actions announced for the ROI for this project that could occur during the same period as the Proposed Action is limited to agricultural production of wheat in adjacent fields and other miscellaneous farming activities. MAFB is proposing upgrades to missile field facilities similar to LF D-02 in the same general area. These upgrades include remodeling the Missile Alert Facilities (MAFs), adding a second sewer lagoon to Missile Alert Facilities, and the installation of the Ground Base Strategic Deterrent (GBSD) system across the missile field.

For this EA analysis, these announced actions and potential effects are addressed from a cumulative perspective and are analyzed in this section. These announced future actions would be evaluated under separate NEPA actions conducted by the appropriate involved federal agency. Based on the best available information for these proposals by others, the AF cumulative impact analysis does consider them.

### 4.12.1 Water Resources (Surface and Groundwater)

The discharge of captured groundwater proposed by the Proposed Action has the potential to increase the quantity of surface, groundwater, and stormwater in the vicinity of the discharge location, which would not create significant cumulative adverse effects if the capture and infiltration system is designed appropriately. The increased quantity of water could lead to minor beneficial cumulative effects due to increased water availability. However, the discharge of captured groundwater could lead to adverse cumulative effects if the discharged water causes erosional issues in the drainage.

The proposed project would not have adverse cumulative effects to groundwater quantity or quality because it is a groundwater capture and infiltration system where the captured water is natural groundwater. However, the Proposed Action could have cumulative effects to regional surface waters if the captured groundwater were to discharge into perennial drainages. Because the discharge point is an ephemeral drainage and the nearest perennial surface water is 4.5-miles downstream, the potential for adverse impacts is highly unlikely. If surface water that contacted D-02 captured water discharge were to reach the nearest perennial stream, it would be as part of a large discharge event resulting from a storm or snow melt event. Any contribution from the D-02 discharge would be unmeasurable under these circumstances. Therefore, this does not represent an adverse effect.

The proposed project has potential to increase the volume of stormwater captured near the facility which would not have any adverse cumulative effects if discharged appropriately. Short-term impacts from construction disturbance would be mitigated through implementation of a SWPPP with no cumulative effects on water resources from the construction process.

### 4.12.2 Air Quality

The cumulative analysis addresses the potential for the Proposed Action to result in significant emissions facility-wide. As noted, there will be no permanent sources of air emissions following the completion of construction of this project, resulting in a carbon neutral outcome for the installation.

Total combined direct and indirect emissions associated with the action were estimated through Air Conformity Applicability Model (ACAM) on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions (Appendix D). The relative emissions of the two active alternatives are very similar. The ACAM findings include the following:

- Annual emissions during construction would include up to 836.9 tons CO2e per year, and
- Annual emissions during steady-state operations would be 0 tons CO2e per year.

Cumulative effects to air quality would be associated with ongoing and foreseeable activities at LF D-02 and the surrounding area. None of the past, present, or reasonably foreseeable projects would have substantial cumulative effects on air quality when combined with the Proposed Action. Therefore, cumulative effects on air quality would be minor. No significant impacts would occur.

### 4.12.3 Land Use

No significant adverse cumulative impacts to land use would occur because the Proposed Action would only temporarily impact land use and the area will revert to its original use.

### 4.12.4 Noise

Currently, noise levels around D-02 are related to rural agricultural and background ambient noise in addition to the occasional vehicle entering or leaving the facility. Noise related to the dewatering project will be the result of additional vehicle traffic, construction, excavation, and infrastructure upgrade activities. The minor increase of noise in the area will be temporary during construction and will return to pre-project levels immediately following completion of the project. Operational noise levels would not appreciably change beyond baseline noise levels in the area when combined with past, present, and reasonably foreseeable projects. This will result in no cumulative impacts on noise from the project.

### 4.12.5 Safety and Occupational Health

None of the past, present, or reasonably foreseeable projects that have been identified would have a substantial cumulative effect on safety and occupational health when

combined with the Proposed Action. Therefore, cumulative effects on safety and occupational health would not be significant.

### 4.12.6 Hazardous Materials / Waste

None of the past, present, or reasonably foreseeable projects that have been identified would have a substantial cumulative effect on hazardous materials / waste when combine with the Proposed Action. Therefore, cumulative effects on hazardous materials / waste would not be significant.

### 4.12.7 Biological Resources / T&E Species / Wetlands and Floodplains

The ephemeral drainage and the associated non-jurisdictional, isolated, wetlands that occur within the drainage would be impacted by the Proposed Action, the less than 0.10 acres of disturbance would have no cumulative impact on Waters of the United States (WOTUS) as defined by the *Navigable Waters Protection Rule* (Appendix B). The disturbance to this area would be mitigated through structural sediment / erosion controls and dust suppression. The area would be recontoured to preexisting conditions and revegetated. The Proposed Action would likely increase wetland potential within the drainage which would net a positive cumulative effect on wetland resources.

The 1.4 acres of land cover to be impacted would be mitigated through recontouring surface soils seeding to return the area to preexisting conditions. Therefore, there are no cumulative effects expected to land cover.

Wildlife with the ability to disperse from the project area would be temporarily displaced and habitat availability would decrease during active construction but would be expected to return to the area following project completion. Individuals unable to relocate from the project footprint would likely be lost. Losses are expected to be minor and will not significantly affect populations.

### 4.12.8 Cultural Resources

The 2020 D-02 assessment report concluded that no cultural resources are present within the proposed project area. This area lies entirely within an agricultural field that has likely been plowed seasonally over decades, severely limiting the potential for undisturbed cultural resources. None of the past, present, or reasonably foreseeable projects that have been identified would have a substantial cumulative effect on cultural resources when combined with the Proposed Action. Therefore, cumulative effects on cultural resources would not be significant.

### 4.12.9 Earth Resources

Construction activities occurring under the Proposed Action would result in a short-term increase in soil disturbance and fugitive dust. These impacts would fall off rapidly with

distance from the construction site and would last a short time during construction. These impacts would be managed through use of BMPs. Similar impacts would be expected for other foreseeable agricultural activities and projects identified in Section 4.12. Thus, the cumulative effects on earth resources would not be significant.

## 5.0 List of Preparers

This EA was prepared under the direction of MAFB. The individuals that contributed to the preparation of this EA are listed below.

**Table 3**. List of Preparers

| Name/Organization | Education | Resource Area | Years of Experience |
|---|---|---|---|
| Pat Seccomb | B.S. Chemistry | Cumulative Impacts / Hazardous Waste | 30 |
| Jocelyn Dodge | B.S. Recreation Management | Safety and Occupational Health | 29 |
| Jay Slocum | B.S. Wildlife Biology | Natural Resources / Wetlands / Floodplains | 15 |
| Stephen Coe | B.S. Environmental Engineering | Air Quality / Noise / Cultural Resources | 25 |
| John Babcock | B.S. Watershed Management | Water Resources | 20 |
| Janelle Garza | B.S. Wildlife Biology | Biological / Natural Resources | 6 |

## 6.0 Person & Agencies Consulted

**Table 4**. Persons and Agencies Consulted / Coordinated

| Agency/Group | Type | Contact Information |
|---|---|---|
| U.S. Environmental Protection Agency, Montana Operations Office | Federal | Philip Strobel<br>U.S. EPA Region 8<br>1595 Wynkoop Street<br>Denver, CO 80202-1129<br>Respondent: Laura Margason |
| U.S. Army Corps of Engineers, Omaha District | Federal | Allan Steinle<br>Helena Regulatory Office<br>10 West 15th Street, Suite 2200<br>Helena, MT 59626<br>Respondent: Jerin Borrego |
| U.S. Fish and Wildlife Service | Federal | Jodi Bush<br>Field Supervisor of Ecological Services<br>100 N. Park, Suite 320<br>Helena, MT 59601<br>Respondent: Jacob Martin |
| Montana State Historic Preservation Office | State | Pete Brown<br>Montana State Historic Preservation Officer<br>1301 East Lockey Avenue<br>P.O. Box 201202<br>Helena, MT 59620<br>Respondent: Laura Evilsizer |
| Montana Natural Heritage Program | State | Bryce Maxel<br>Program Coordinator<br>1515 East Sixth Ave.<br>Helena, MT 59620-1800<br>Respondent: Scott Blum |
| Montana Fish, Wildlife & Parks | State | Gary Bertellotti<br>Region 4 Supervisor<br>4600 Giant Springs Road<br>Great Falls, MT 59405 |
| Montana Department of Environmental Quality | State | Shaun McGrath<br>Director DEQ<br>1520 East Sixth Ave.<br>Helena, MT 59620-0901 |
| Montana Department of Natural Resources and Conservation | State | DNRC – Water Resource Division<br>District Administrator<br>1424 Ninth Ave.<br>P.O. Box 201601<br>Helena, MT 59620<br>Respondent: Scott Irvin |
| Fergus County Planning Office | County | Pamela J. Vosen<br>Planning Director<br>712 W. Main Street, Suite #101<br>Lewistown, MT 59457 |
| Fergus Conservation District | County | Shonny Nordlund<br>District Administrator<br>211 McKinley, Suite #3 |

| Agency/Group | Type | Contact Information |
|---|---|---|
| | | Lewistown, MT 59457 |
| Blackfeet Nation | Tribal | Timothy Davis, Chairman (John Murray, THPO)<br>Blackfeet Nation<br>P.O. Box 850<br>Browning, MT 59417 |
| Chippewa-Cree Indians of the Rock Boy's Reservation | Tribal | Harlan Gopher Baker, Chairman (Jonathan Windy Boy, THPO)<br>Chippewa-Cree Indians of the Rock Boy's Reservation<br>96 Clinic Road North, P.O. Box 544<br>Box Elder, MT 59521 |
| Crow Tribe | Tribal | Frank Whiteclay, Chairman (Adrian Bird Jr., THPO)<br>Crow Tribe<br>Bacheeitche Ave.<br>P.O. Box 159<br>Crow Agency, MT 59022 |
| Fort Peck Assiniboine and Sioux Tribes | Tribal | Floyd Azure, Chairman (Dyan Youpee, THPO)<br>Fort Peck Assiniboine and Sioux Tribes<br>501 Medicine Bear Road<br>P.O. Box 1027<br>Poplar, MT 59255-1027 |
| Fort Belknap Indian Community of the Fort Belknap Reservation | Tribal | Andrew Werk Jr., Chairman (Michael Black Wolf, THPO)<br>Fort Belknap Indian Community of the Fort Belknap Reservation<br>656 Agency Main Street<br>Harlem, MT 59526 |
| Little Shell Chippewa Tribe | Tribal | Gerald Gray, Chairman (Duane Reid, THPO)<br>Little Shell Chippewa Tribe<br>615 Central Ave. West<br>Great Falls, MT 59404 |
| Northern Cheyenne Tribal Council | Tribal | Donna Fisher, President, (Teanna Limpy, THPO)<br>Northern Cheyenne Tribal Council<br>P.O. Box 128<br>Lame Deer, MT 59043<br>Respondent: Gary LaFranier |
| Confederated Salish and Kootenai Tribes | Tribal | Shelly Fyant, Chairwoman, (Mike Durglo, THPO)<br>Confederated Salish and Kootenai Tribes<br>51383 Highway 93 North<br>P.O. Box 278<br>Pablo, MT 59855 |

## 7.0 References

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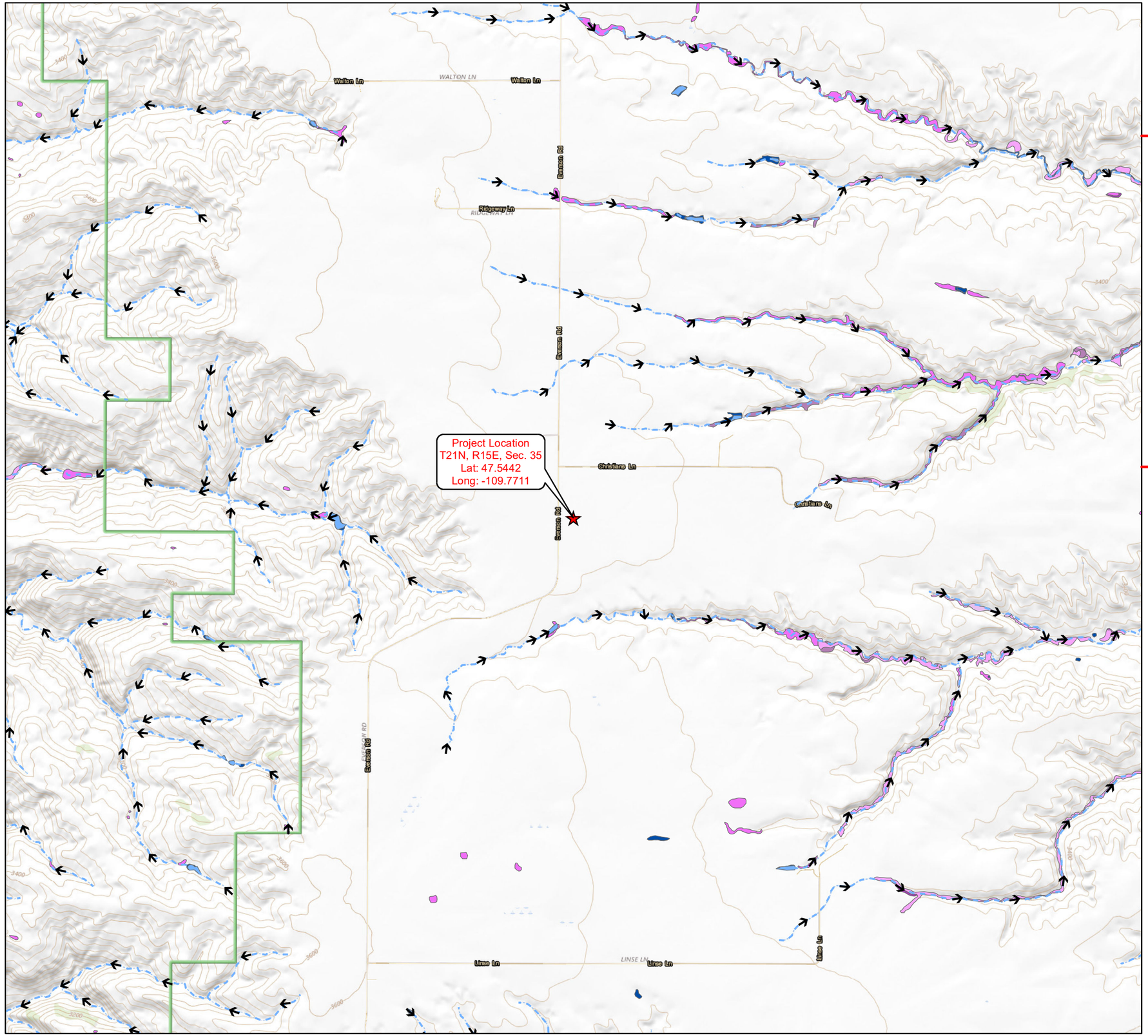
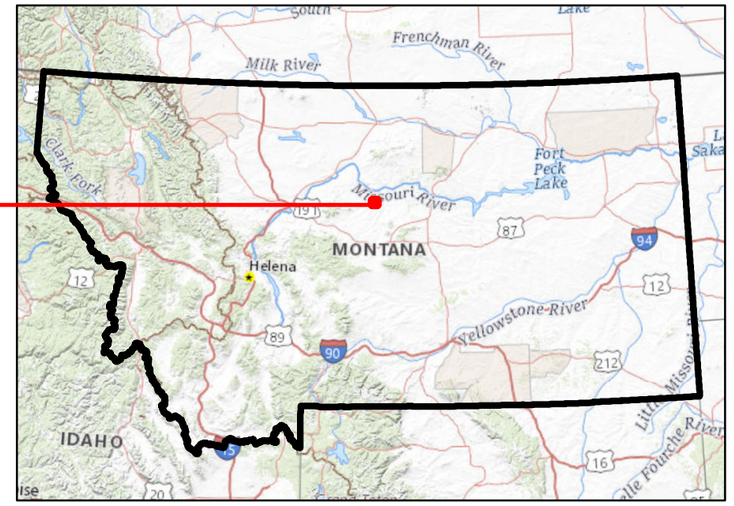
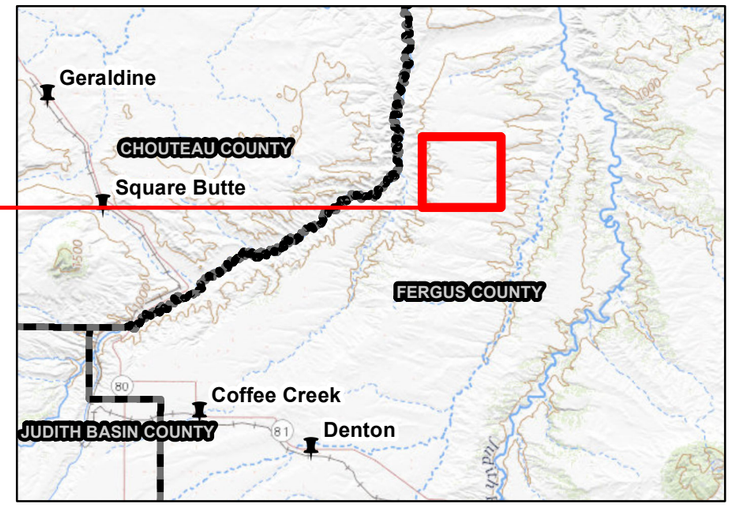
# FIGURES

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**Legend**

- Launch Facility (LF) Delta-02 (D-02)

**National Hydrography Dataset (NHD)**

- Intermittent Stream
- Flow
- Perennial Lake/Pond

**Montana Wetland Framework**

- Freshwater Emergent Wetland
- Freshwater Scrub-Shrub Wetland
- Riparian Emergent
- Riparian Forested
- Riparian Scrub-Shrub
- River
- Freshwater Pond

Water & Environmental TECHNOLOGIES

**Malmstrom Air Force Base**
**Environmental Assessment for LF - D-02**

***Site Location - USGS Topographic Map***
***Surface Water Bodies & Wetlands***

Job#: MAFBM06

Date: 10/30/2020

**FIGURE 1a**

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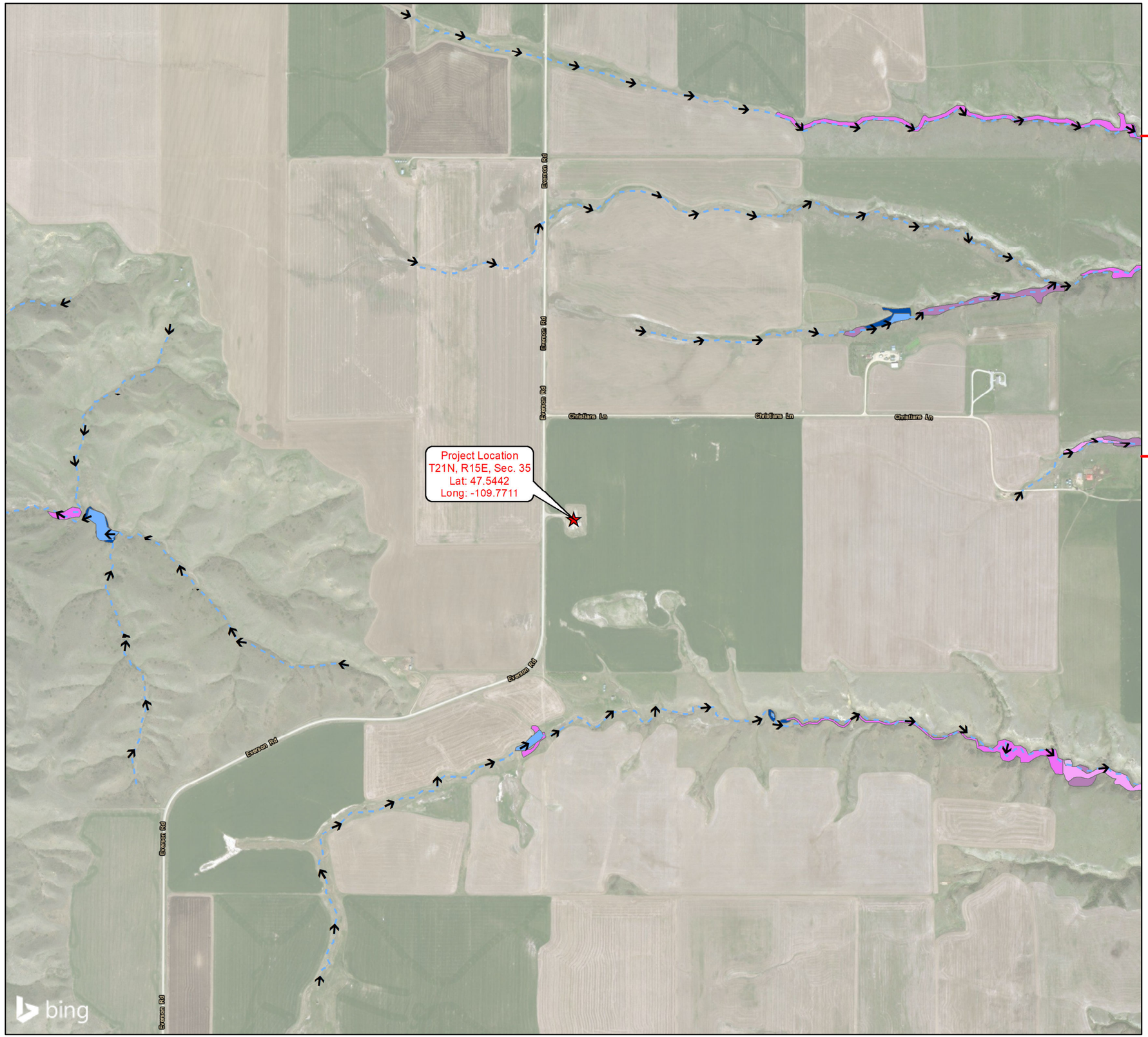


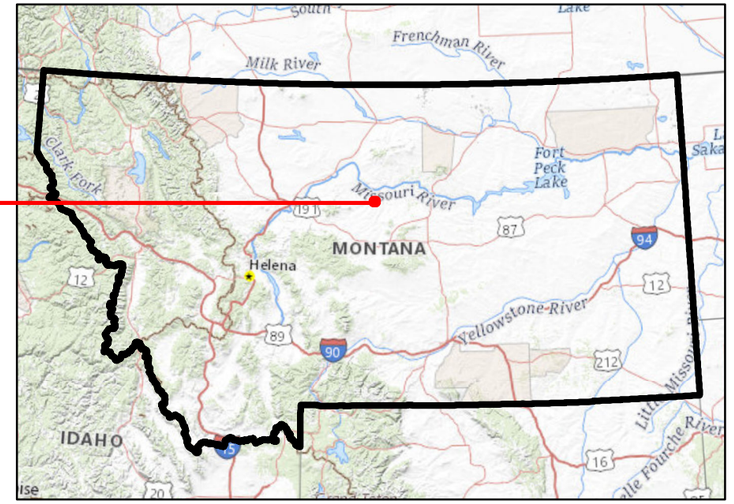


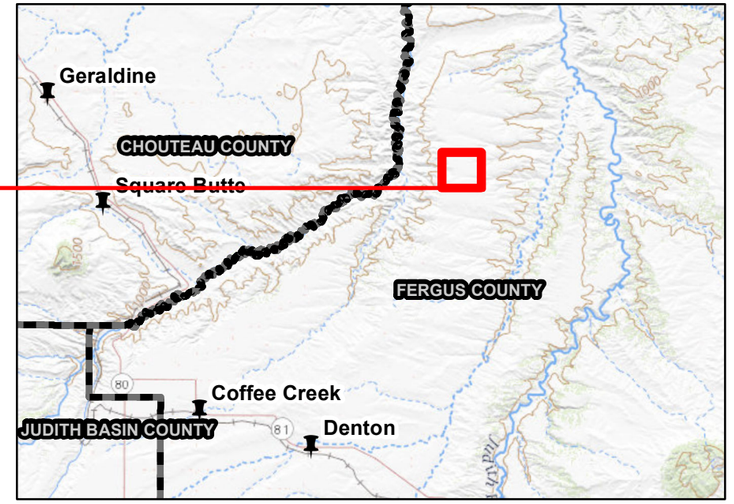


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**Legend**

- Launch Facility (LF) Delta-02 (D-02)

**National Hydrography Dataset (NHD)**

- Intermittent Stream
- Flow
- Perennial Lake/Pond

**Montana Wetland Framework**

- Freshwater Emergent Wetland
- Freshwater Scrub-Shrub Wetland
- Riparian Emergent
- Riparian Forested
- Riparian Scrub-Shrub
- River
- Freshwater Pond

Water & Environmental TECHNOLOGIES

**Malmstrom Air Force Base**
**Environmental Assessment for LF - D-02**

***Site Location - Bing Aerial Photo***
***Surface Water Bodies & Wetlands***

Job#: MAFBM06

Date: 10/30/2020

**FIGURE 1b**

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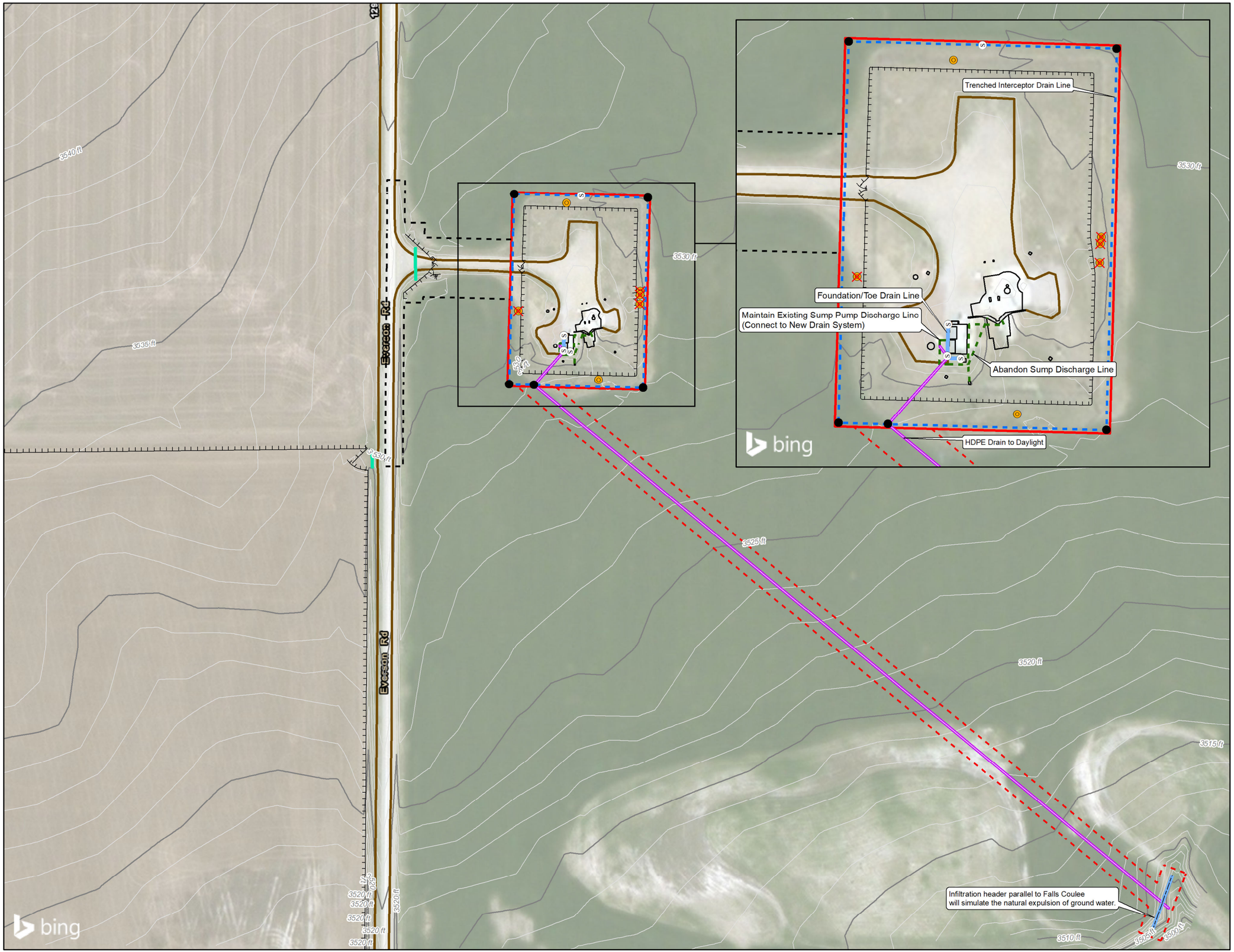


## Legend

**D-02 Facility Upgrades**

- Cleanout
- Manhole
- Retain Monitoring Well
- Abandon Monitoring Well
- Foundation/Toe Drain Line
- Trenched Interceptor Drain Line
- HDPE Drain to Daylight
- Infiltration Header

**Existing Stormwater Infrastructure**

- Maintain Existing Sump Pump Discharge Line
- Abandon Sump Discharge Line

**D-02 Launch Facility**

- Site Features
- Culvert
- Existing Easement
- Proposed Easement
- Fence
- Property Boundary
- Gravel Area

**Contours**

**1-Ft Surveyed Contours**

- Major Contour
- Minor Contour

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1 Inch = 150 Feet

0 75 150 225 300

Water & Environmental TECHNOLOGIES

**Malmstrom Air Force Base**
**Environmental Assessment for LF - D-02**

***Alternative 1 – Preferred Alternative –***
***Interceptor Drain Network - Seep - Falls Coulee***

Job#: MAFBM06

Date: 10/30/2020

**FIGURE 2**

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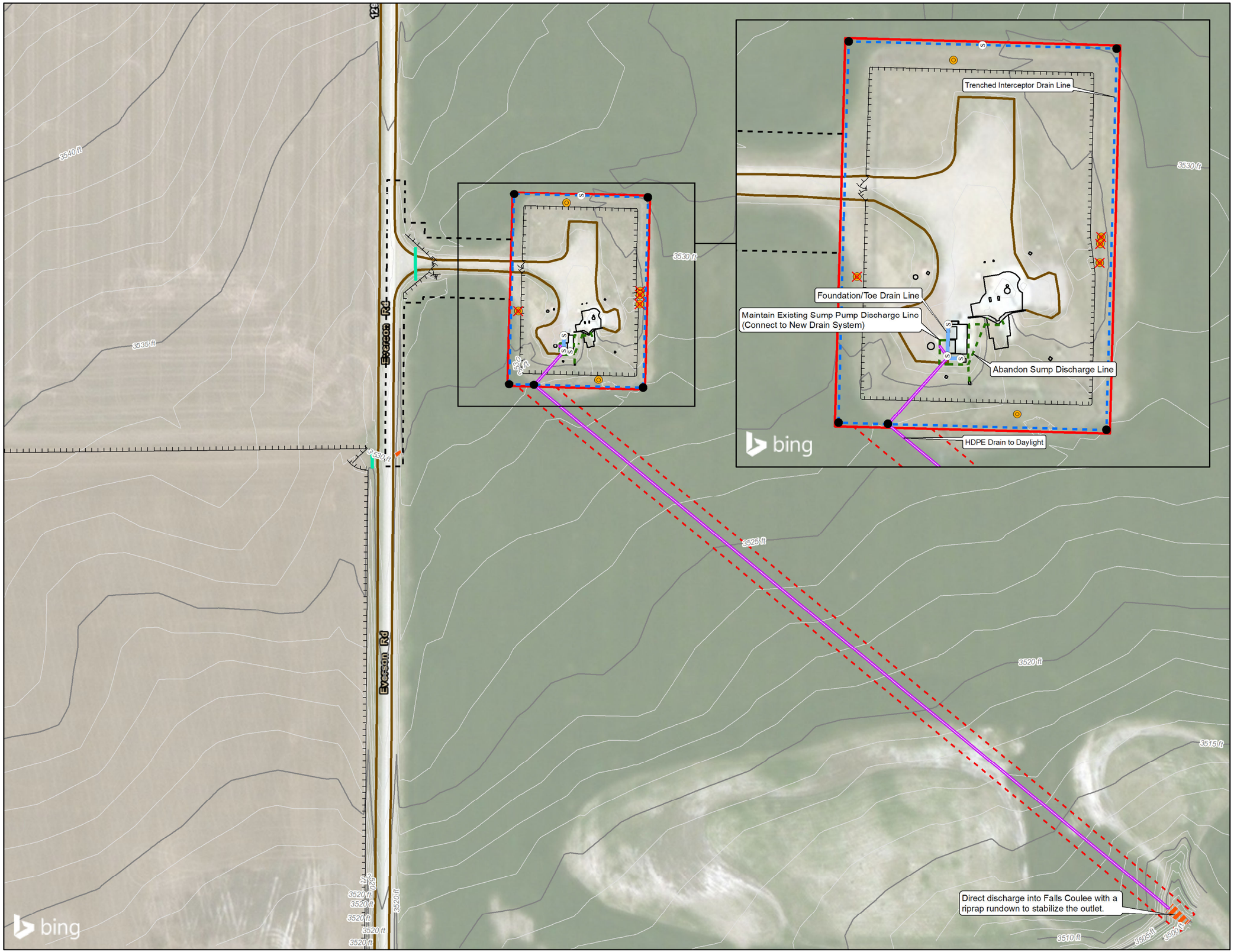


**Legend**

**D-02 Facility Upgrades**
- Cleanout
- Manhole
- Retain Monitoring Well
- Abandon Monitoring Well
- Foundation/Toe Drain Line
- Trenched Interceptor Drain Line
- HDPE Drain to Daylight
- Riprap – Rundown

**Existing Stormwater Infrastructure**
- Maintain Existing Sump Pump Discharge Line
- Abandon Sump Discharge Line

**D-02 Launch Facility**
- Site Features
- Culvert
- Existing Easement
- Proposed Easement
- Fence
- Property Boundary
- Gravel Area

**Contours**

**1-Ft Surveyed Contours**
- Major Contour
- Minor Contour

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1 Inch = 150 Feet

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Water & Environmental TECHNOLOGIES

**Malmstrom Air Force Base**
**Environmental Assessment for LF - D-02**

***Alternative 2 – Interceptor Drain Network – Direct Discharge - Falls Coulee***

Job#: MAFBM06

Date: 10/30/2020

**FIGURE 3**

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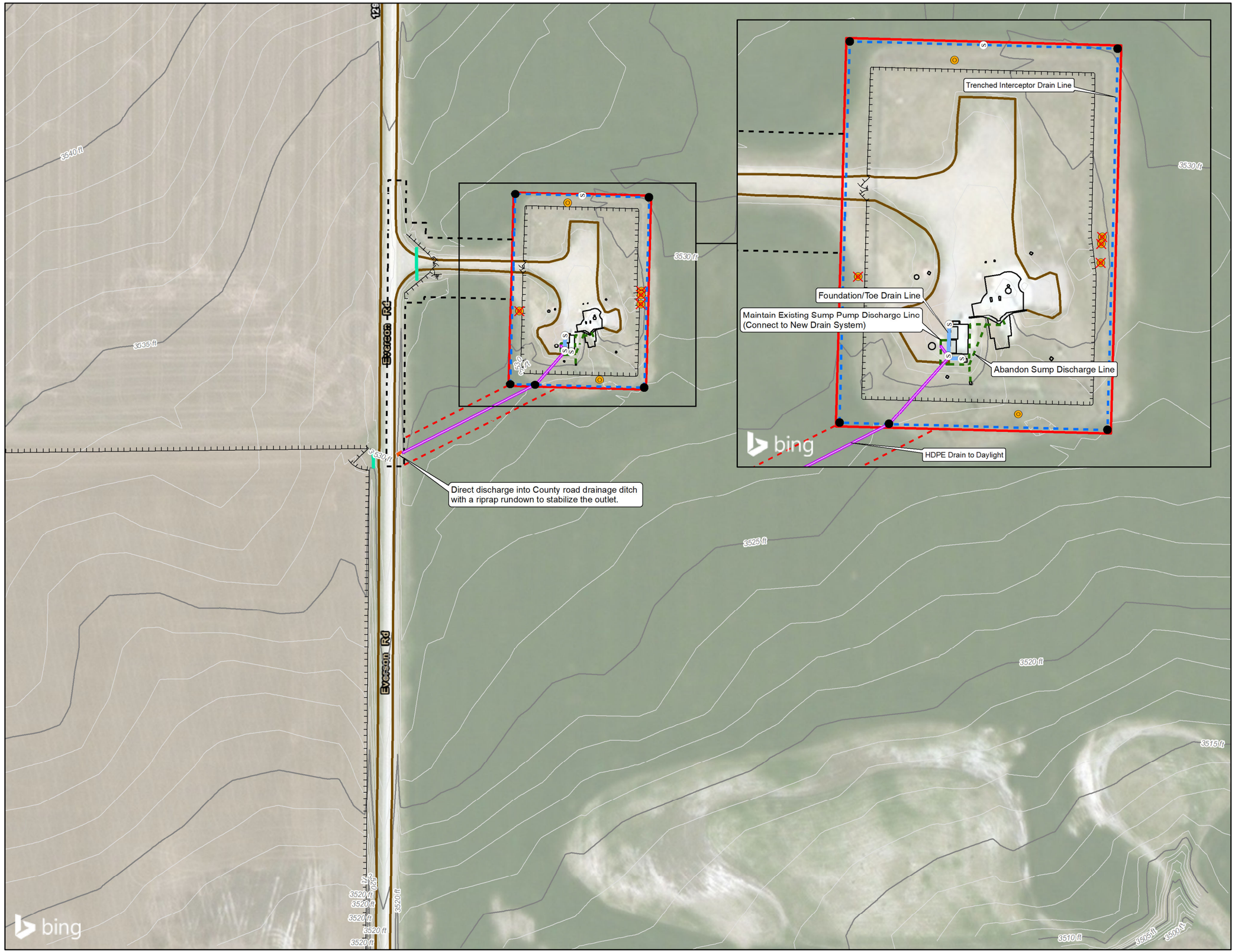


## Legend

**D-02 Facility Upgrades**

- Cleanout
- Manhole
- Retain Monitoring Well
- Abandon Monitoring Well
- Foundation/Toe Drain Line
- Trenched Interceptor Drain Line
- HDPE Drain to Daylight
- Riprap – Rundown

**Existing Stormwater Infrastructure**

- Maintain Existing Sump Pump Discharge Line
- Abandon Sump Discharge Line

**D-02 Launch Facility**

- Site Features
- Culvert
- Existing Easement
- Proposed Easement
- Fence
- Property Boundary
- Gravel Area

**Contours**

**1-Ft Surveyed Contours**

- Major Contour
- Minor Contour

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1 Inch = 150 Feet

0 75 150 225 300

Water & Environmental TECHNOLOGIES

**Malmstrom Air Force Base**
**Environmental Assessment for LF - D-02**

***Alternative 3 – Interceptor Drain Network – Direct Discharge - County Road Ditch***

Job#: MAFBM06

Date: 10/30/2020

**FIGURE 4**

Path: M:\MAFBM06 - Delta 02 EA\Figure_4_Alt3_Final.mxd, Author: jslocum


**Legend**

**D-02 Facility Wells**
- Monitoring Well

**Existing Stormwater Infrastructure**
- Existing Sump Pump Discharge Line

**D-02 Launch Facility**
- Site Features
- Culvert
- Existing Easement
- Fence
- Property Boundary
- Gravel Area

**Contours**

**1-Ft Surveyed Contours**
- Major Contour
- Minor Contour

N
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1 Inch = 150 Feet

0 75 150 225 300

Water & Environmental TECHNOLOGIES

**Malmstrom Air Force Base**
**Environmental Assessment for LF - D-02**

***Alternative 4 – No Action – Land Apply Discharge***

Job#: MAFBM06

Date: 10/30/2020

**FIGURE 5**

Path: M:\MAFBM06 - Delta 02 EA\Figure_5_Alt4_Final.mxd, Author: jslocum

# APPENDIX A

Interagency/Intergovernmental Coordination and Public Participation

## BROWN, ROBERT A GS-12 USAF AFGSC 341 CES/CENP

**From:** Martin, Jacob <jacob_martin@fws.gov>
**Sent:** Tuesday, February 9, 2021 9:51 AM
**To:** BROWN, ROBERT A GS-12 USAF AFGSC 341 CES/CENP
**Subject:** [Non-DoD Source] Military-construction (mil-con) project to facilitate dewatering of the Launch Facility (LF) Delta-02 (D-02)

Dear Mr. Brown:

Thank you for your February 8, 2021, letter, requesting U.S. Fish and Wildlife Service comment on the subject project. The proposed project would improve drainage at an existing launch facility in Fergus County, Montana.

The U.S. Fish and Wildlife Service reviewed the maps and project description. This email represents our official response to your inquiry for your records. We acknowledge your no effect determination for species listed under the Endangered Species Act of 1973, as amended. We have no comments or concerns regarding other trust species.

Thank you for the opportunity to comment. If you have any questions or comments about this correspondence please contact me via reply email or at the address or phone numbers, below.

Sincerely,

Jacob M. (Jake) Martin
Assistant Field Supervisor
Montana Ecological Services Office
585 Shephard Way, Suite 1
Helena, Montana 59601
(406) 422-8524 (cell, preferred I'm teleworking)
(406) 449-5225x215 (office)
jacob_martin@fws.gov

## BROWN, ROBERT A GS-12 USAF AFGSC 341 CES/CENP

**From:** Evilsizer, Laura <Laura.Evilsizer@mt.gov>
**Sent:** Monday, March 1, 2021 12:41 PM
**To:** BROWN, ROBERT A GS-12 USAF AFGSC 341 CES/CENP; Brown, Peter
**Cc:** ELLSWORTH, CANDACE CIV USAF AFGSC 341 CES/CEIE
**Subject:** [Non-DoD Source] RE: IICEP Letter LF D-02 EA

Rob,

Thank you for reaching out. We did receive the EA information for the undertaking at Launch Facility Delta-02 and do not have any comments at this time.

Laura Evilsizer, M.A.
Review and Compliance Officer
State Historic Preservation Office
Montana Historical Society
P.O. Box 201202/1301 E. Lockey Avenue
Helena, MT 59620-1201
Laura.Evilsizer@mt.gov
(406) 444-7719
www.montanahistoricalsociety.org

---

**From:** BROWN, ROBERT A GS-12 USAF AFGSC 341 CES/CENP <robert.brown.124@us.af.mil>
**Sent:** Monday, March 1, 2021 12:34 PM
**To:** Brown, Peter <pebrown@mt.gov>; Evilsizer, Laura <Laura.Evilsizer@mt.gov>
**Cc:** ELLSWORTH, CANDACE CIV USAF AFGSC 341 CES/CEIE <candace.ellsworth@us.af.mil>
**Subject:** [EXTERNAL] IICEP Letter LF D-02 EA

Pete/Laura
I just wanted to follow up on the IICEP letter I sent out on February 8 regarding an EA we are conducting at MAFB LF-D-02. I have not seen any response from you but since I am teleworking I don't get into the office frequently.

v/r

Rob Brown

Robert A Brown (Rob)
NEPA Manager
Malmstrom AFB, Montana
406-731-7099
DSN632-7099

Big Sky. Big Land. Big History.
**Montana Historical Society**

*Historic Preservation*
*Museum*
*Outreach & Interpretation*
*Publications*
*Research Center*

March 3, 2021

Tony Lucas
341 Civil Engineer Squadron
39 78th Street North
Malmstrom AFB MT 59402-7536

Re: No Effect Determination for Proposed action at Launch Facility (LF)-02 Drainage Project

Dear Mr. Lucas:

Thank you for your letter (received March 2, 2021) regarding the drainage project at Launch Facility D-02. We concur on your determination of No Historic Properties Affected.

If you have any questions or concerns, do not hesitate to contact me at (406) 444-7719 or Laura.Evilsizer@MT.gov. Thank you for consulting with us.

Sincerely,

Laura Evilsizer

Laura Evilsizer, M.A.
Review and Compliance Officer
Montana State Historic Preservation Office

RECEIVED
MAR 10 REC'D

FILE: DOD/Air Force – 2021 - 2021030208

225 North Roberts Street
P.O. Box 201201
Helena, MT 59620-1201
(406) 444-2694
(406) 444-2696 FAX
montanahistoricalsociety.org

## BROWN, ROBERT A GS-12 USAF AFGSC 341 CES/CENP

**From:** Irvin, Scott <sirvin@mt.gov>
**Sent:** Wednesday, February 3, 2021 1:53 PM
**To:** BROWN, ROBERT A GS-12 USAF AFGSC 341 CES/CENP
**Subject:** [Non-DoD Source] EA Comment - Delta-02

Mr. Brown,

I am in receipt of your letter requesting comments to your proposed military construction project at the Launch Facility Delta-02 site north of Denton. The project includes diverting surface water and groundwater from entering the site and reaching existing facilities. My understanding of both Alternative 1 and 2 is that any interaction with water would be for purposes of dewatering and transporting it away from the facility and discharging into a nearby ephemeral drainage. Since no water will be beneficially used in the activity, no water right is required. The mere act of dewatering does not require permitting or authorization by the Montana Department of Natural Resources and Conservation, Water Resources Division. My comments are only applicable to the jurisdictional authority of DNRC's Water Resources Division.

Scott Irvin, Regional Manager
DNRC – Lewistown Water Resources Regional Office
(406)538-7459

## BROWN, ROBERT A GS-12 USAF AFGSC 341 CES/CENP

**From:** Blum, Scott <SBlum@mt.gov>
**Sent:** Tuesday, February 2, 2021 9:58 AM
**To:** BROWN, ROBERT A GS-12 USAF AFGSC 341 CES/CENP
**Subject:** [Non-DoD Source] MTNHP Data Request: Launch Facility Delta-02

Howdy Robert Brown,
Thank you for your (well, John Hale's) recent request for data from the Montana Natural Heritage Program. I'm Scott and I am handling the response to this request. Feel free to pass along questions and comments about this request to me. Other staff may handle future requests.

We've changed how we provide access to request products from DropBox to a OneDrive link. If I have done this right (yup, this is my first attempt) you should be able to access and download the zipped folder containing those products via this link: 21DOD0004_LaunchFacilityDelta02. If I have failed or if you cannot connect through that link, please let me know. I've been told that other federal agencies have been able to use this type of link.

The area queried for this process is one mile around the launch facility and planned pipeline to the ephemeral drainage. I can easily expand that buffer if you are interested in grabbing more information.

Thank you for making use of our products.

**SCOTT BLUM**
Data Wrangler

Montana Natural Heritage Program

Montana State Library

(406) 444-0241
1515 W 6th Ave
Helena, MT
59620-1800

**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

February 5, 2021

Regulatory Branch
Montana State Program
Corps No. **NWO-2021-00217-MTH**

Subject: Department of the Air Force - Dewatering Launch Facility D-02

Department of the Air Force
Attn: Mr. Rob Brown, NEPA Program Manager
39 78th Street North
Malmstrom AFB, Montana 59406-7536

Dear Mr. Brown:

We are responding to your request for comments regarding the above-referenced project. Specifically, you are proposing a possible action and alternatives to facilitate dewatering of Launch Facility D-02. The proposed action and alternatives involve installing an interceptor trench around the perimeter of the facility to divert surface and groundwater from entering the site and reaching the launch support buildings and missile silo. The proposed possible action and alternatives vary in where and how the captured water would be relocated. The project is located at Launch Facility D-02 at Latitude 47.544141°, Longitude -109.771057°, within Section 35, Township 21 N, Range 15 E, approximately 18-miles north of Denton, Fergus County, Montana.

The mission of the U.S. Army Corps of Engineers (USACE) 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, we are unable to ascertain if regulated activities are proposed or if jurisdictional waters of the U.S. are present within the project area. If your final design includes the placement of fill material in any jurisdictional area described above, 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. 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-2021-00217-MTH in any correspondence concerning this project. If you have any questions, please contact Jerin Borrego at 10 W 15th Street, Suite 2200, Helena, MT 59626, by email at Jerin.E.Borrego@usace.army.mil, or telephone at 406-441-1364.

Sincerely,

Jerin E. Borrego
Regulatory Project Manager

## BROWN, ROBERT A GS-12 USAF AFGSC 341 CES/CENP

**From:** BROWN, ROBERT A GS-12 USAF AFGSC 341 CES/CENP
**Sent:** Monday, February 22, 2021 4:58 PM
**To:** Margason, Laura
**Subject:** RE: MT USAF Launch Facility D-02 Dewatering Project

Ms. Margason

Thank you for your reply. We will be sure to notify you went the Document goes out to Public Comment and you can review it at a listed website.

v/r

Rob Brown

Robert A Brown (Rob)
NEPA Manager
Malmstrom AFB, Montana
406-731-7099
DSN632-7099

---

**From:** Margason, Laura <Margason.Laura@epa.gov>
**Sent:** Monday, February 22, 2021 4:55 PM
**To:** BROWN, ROBERT A GS-12 USAF AFGSC 341 CES/CENP <robert.brown.124@us.af.mil>
**Subject:** [Non-DoD Source] MT USAF Launch Facility D-02 Dewatering Project

Good afternoon Mr. Brown,

My name is Laura Margason and I represent the Environmental Protection Agency (EPA), Region 8's NEPA Branch. I am writing in response to the January 23rd, 2020 scoping letter mailed to our office for the Malmstrom Air Force Base, Launch Facility D-02 dewatering project's Environmental Assessment.

We have reviewed the proposal and have no comments at this time. We want to thank you for involving the EPA in your NEPA process. We also appreciate that the project proposal includes water management designs that incorporate water resource protection measures and water quality best management practices.

We would like an opportunity to review the Draft Environmental Assessment when it is ready for public review. Since EPA Region 8 is still implementing work-at-home measures in response to COVID 19 restrictions, we would prefer to receive the document, or it's web location, electronically. These can be sent directly to the EPA Region 8 NEPA Branch Chief, Phil Strobel, at strobel.philip@epa.gov and to me at margason.laura@epa.gov.

Thank you,

Laura Margason

*Laura A Margason*

NEPA Branch
Office of the Regional Administrator
U.S. EPA, Region 8, ORA-N
1595 Wynkoop Street
Denver, CO 80202-1129
(303) 312-6665

## BROWN, ROBERT A GS-12 USAF AFGSC 341 CES/CENP

**From:** LUCAS, TONY P CIV USAF AFGSC 341 CES/CEIE
**Sent:** Friday, February 5, 2021 9:22 AM
**To:** Gary
**Cc:** BROWN, ROBERT A GS-12 USAF AFGSC 341 CES/CENP; ELLSWORTH, CANDACE CIV USAF AFGSC 341 CES/CEIE
**Subject:** RE: [Non-DoD Source] D-02 Facility Upgrades Request.

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

Gary

Thank You for your response to our initiation of this Consultation.

We will review our records and respond.

Tony P. Lucas, BAE, JD
Installation Tribal Liaison Officer
Chief, Environmental Element
341 CES/CEIE
Malmstrom AFB, MT
(406) 731-7794  DSN 632-7794

---

**From:** Gary <gary.lafranier@cheyennenation.com>
**Sent:** Friday, February 5, 2021 9:12 AM
**To:** LUCAS, TONY P CIV USAF AFGSC 341 CES/CEIE <tony.lucas@us.af.mil>
**Subject:** [Non-DoD Source] D-02 Facility Upgrades Request.
**Importance:** High

Good Morning,

After reviewing the letter, Northern Cheyenne is requesting a class I or III report if the agency has one. I want to make sure no sites are in direct and or near the construction area.

Thank You,

Gary LaFranier
FCC/ Section 106 Coordinator
Northern Cheyenne THPO
(406)477-8114
Lame Deer, MT. 59043

# Northern Cheyenne Tribal Historic Preservation

14 E. Medicine Lodge Drive | P.O Box 128| Lame Deer, MT. 59043

Ph: (406) 477- 4838/ 4839/ 8113/ 8114

## CONSULTATION REQUEST

CONSULTING AGENCY

341 CES/CEIE

ADDRESS

39 78th St. North

CITY/STATE/ZIP

Malmstrom AFB, MT. 59402

PHONE

(406) 731-7794

FAX

E-MAIL

candace.ellsworth@us.af.mil

AGENCY CONTACT

Candace Ellsworth

PROJECT CONTACT

| | |
|---|---|
| PROJECT TYPE | Malmstrom Air Force Base Launch Facility LF D-02 Drainage Project |
| FEDERAL AGENCY | Department of the Air Force |
| STATE / COUNTY | Montana/ Fergus |

| CORRESPONDENCE | |
|---|---|
| DATE RECEIVED | 3/30/2021 |
| REVIEW PERIOD | 30-DAY |
| DEADLINE | 4/30/2021 |

| DOCUMENTATION RECEIVED | |
|---|---|
| MAPS | YES |
| SURVEY | CLASS III |
| TRIBAL SURVEY | N/A |

| DETERMINATION | |
|---|---|
| FINDING | NO EFFECT |
| COMMENT | Your undertaking may proceed as planned |

**ADDITIONAL COMMENTS**

**If cultural resources are located during ground disturbance, please halt all activities and notify our office.**

PREPARED BY:

Gary LaFranier

Teanna Limpy

**Tribal Historic Preservation Officer**

**3/31/2021**

**DATE**

**LITTLEWOLF AND MORNING STAR- Out of Defeat and exile they led us back to Montana and won our Cheyenne Homeland that we will keep forever**


CONSULTING AGENCY

341 CES/CEIE

ADDRESS

39 78th St. North

CITY/STATE/ZIP

Malmstrom AFB, MT. 59402

PHONE

(406) 731-7794

FAX

E-MAIL

candace.ellsworth@us.af.mil

AGENCY CONTACT

Candace Ellsworth

PROJECT CONTACT

PREPARED BY:

Gary LaFranier

**LITTLEWOLF AN**
**our Cheyenne Hon**

# APPENDIX B

Wetland Delineation – Malmstrom Air Force Base (MAFB) Delta – 02 Launch Facility Dewatering – Fergus County, Montana

Water & Environmental
TECHNOLOGIES

November 30, 2020

Rob Brown
MAFB – Technical POC
Robert.brown.124@us.af.mil
406-731-7099

**Re: Wetland Delineation – Malmstrom Air Force Base (MAFB) Delta - 02 Launch Facility Dewatering – Fergus County, Montana.**

To Whom It May Concern:

Malmstrom Air Force Base (MAFB) is proposing the completion of a military-construction (mil-con) project at Launch Facility (LF) Delta-02 (D-02). The proposed project is located in a rural area of Fergus County, within T21N, R15E, Section 35, approximately 18-miles north of Denton, Montana as shown on **Figures 1a** & **1b**. The proposed project would install an interceptor trench around the perimeter of the facility to divert surface and groundwater from entering the site and reaching the launch support building (LSB) and missile silo. To facilitate dewatering of the facility silo and subsurface structures, captured water would be transported south across adjacent agricultural lands via a subsurface pipeline and discharged to a nearby ephemeral drainage.

Groundwater infiltration is a chronic problem in the LBS because the existing sump pump system is not sufficient to dewater the facility, requires considerable maintenance and is unreliable in freezing conditions. MAFB is in the process of preparing an Environmental Analysis (EA) to evaluate potential impacts of the proposed project.

The preferred alternative in the analysis would convey the discharge water south to a buried infiltration header that would run perpendicular to the top of the ephemeral drainage and allow water to seep into the ground mimicking the natural infiltration process as shown on **Figure 2**. Another alternative is to have the groundwater directly discharge to the ephemeral drainage via daylighting the pipe to a rock riprap rundown as shown on **Figure 3**. The adjacent county roadside ditch was also considered as a potential outlet for the conveyed groundwater as shown on **Figure 4**.

A wetland assessment was conducted to identify any jurisdictional wetlands that may be impacted during construction of these alternatives and to determine the potential effects of eliminating the current groundwater discharge point. Specifically, the ephemeral drainage that connects to Falls Coulee, the adjacent county roadside ditch, and the small depression associated with the current discharge point were assessed.

**Site Assessment**

To facilitate the wetland delineation, historic aerial photos, soils data, and NWI data were reviewed to assess the likelihood the proposed project area contained jurisdictional Waters of the United States (WOTUS).

Water and Environmental Technologies (WET) conducted a wetland assessment on August 19, 2020 to determine whether jurisdictional waters are present within the proposed project area. The site assessment was conducted in accordance with the U.S. Army Corps of Engineers (Corps) 1987 Wetland Delineation Manual for areas equal to or less than 5-acres in size. Locations of plant community types were identified and sketched on a field map. A representative observation point was selected to characterize the plant community type. The observation point was assessed for wetland indicators. A wetland Determination Data Form was completed to document the habitat type and plant community.

This memo describes field activities, survey results, and summarizes the habitat types encountered. The wetland assessment involved an ocular and photographic survey of the project area, as well as detailed vegetation, soil, and hydrology evaluations. The entire survey area was visually inspected for potential jurisdictional waters and wetland surveys were performed in suspected jurisdictional areas. Observation point locations, unique vegetation boundaries, and wetland boundaries were captured using a resource grade GPS unit.

**Soil Analysis and Research**

Soil components are mapped in the survey area as shown on the United States Department of Agriculture (USDA) – Natural Resources Conservation Service (NRCS) National Cooperative Soil Survey Map included in **Appendix A**. The proposed development area intersects three soil types:

- 55 – Danvers clay loam, 0 to 2 percent slopes,
- 221 – Tamaneen – Judith clay loams, 2 to 4 percent slopes, and
- 275 – Winifred-Windham-Eltsac complex, 15 to 45 percent slopes.

The following soil description summarize the drainage classification, hydrologic soil group, ponding and flooding frequency classes, organic matter content, and hydric soils classification.

*55 – Danvers clay loam, 0 to 2 percent slopes*

According to the Web Soil Survey, this soil is found on terraces with minimal slopes. The parent material consists of clayey alluvium derived from limestone and natural drainage class is well drained, this soil is not flooded or ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This soil has a slow infiltration rate when thoroughly wet and contains a layer that impedes the downward movement of water or soils of moderately fine texture

or fine texture. This soil has a slow rate of water transmission. This map unit and soil does not meet Hydric Soil Criteria.

*221 – Tamaneen – Judith clay loams, 2 to 4 percent slopes*

This soil type is found on stream terraces and alluvial fans with minimal slopes. The parent material consists of alluvium derived from limestone and the natural drainage class is well drained, this soil is not flooded or ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. The Judith component has a moderate infiltration rate when thoroughly wet and contains moderately deep or deep, moderately well drained, or well drained soils that have moderately fine texture to moderately coarse texture. This soil has a moderate to slow rate of water transmission. This map unit and soil does not meet Hydric Soil Criteria.

*275 – Winifred-Windham-Eltsac complex, 15 to 45 percent slopes*

This soil type is found on hills and sedimentary plains with moderate to steep slopes. The parent material consists of alluvium and residuum over semi-consolidated shale and the natural drainage class is well drained, this soil is not flooded or ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. The Winifred and Eltsac soil components have a very slow infiltration rate (high runoff potential) when thoroughly wet and contain mainly clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. This soil has a very slow rate of water transmission. This map unit and soil does not meet Hydric Soil Criteria.

Soil components classified by the USDA-NRCS are mapped at a large scale; therefore, a site-specific soil survey was conducted to determine the presence or absence of hydric soils.

**National Hydrography Dataset (NHD) / Montana Wetlands and Riparian Framework (MWRF) / National Wetland Inventory (NWI)**

According to the National Hydrography Dataset (NHD), Falls Coulee is classified as an intermittent stream, the ephemeral drainage associated with the proposed discharge location is unmapped and not classified as shown on **Figure 5**. The Montana Wetlands and Riparian Framework (MWRF) contains mapped wetlands within Falls Coulee above and below the proposed project area; however, there are no mapped wetlands within the ephemeral drainage associated with this project as shown on **Figure 5**. The National Wetland Inventory (NWI) classifies Falls Coulee as Palustrine, Emergent, Persistent, Temporarily Flooded (PEM1A) wetland within the upper reach of Falls Coulee near the project area. The lower reach of Falls Coulee is designated as a Riverine, Intermittent, Streambed, Temporary Flooded (R4SBA) stream. The ephemeral drainage associated with this project is not classified within the NWI as shown in **Appendix B**.

## Photographic Survey

Photographs were collected within the project area to document current site conditions. Vegetation communities, soil test pits, and hydraulic indicators were documented and are included in **Appendix C**. A project photo log with photo ID, direction, and description is included in **Appendix D**.

## Wetland Determination Forms

After visually inspecting the proposed project area for hydrophytic vegetation, hydrology and considering topographical restraints, observation points were selected within areas displaying wetland characteristics and areas proposed for development. Observation points were selected to represent the most likely jurisdictional wetland areas based on the site characteristics.

The observation points captured the habitat present and provided a method to assess the potential jurisdictional areas. Assessments of vegetation, soil, and hydrologic features were used to determine the presence/absence of jurisdictional WOTUS. For a wetland to be considered jurisdictional under Section 404 of the Federal Clean Water Act (CWA), three wetland characteristics are required: 1) hydrophytic vegetation, 2) hydric soils, and 3) wetland hydrology. Wetland areas must also meet the definition of a WOTUS. The locations of the observation points are shown on **Figure 5** and the wetland determination forms are included in **Appendix E**.

*Observation Point 1 – County Roadside Ditch*

As shown on **Figure 5** and detailed in **Appendix E**, Observation Point 1, located at the bottom of the county roadside ditch did not meet the three wetland criteria, the ditch line contained upland vegetation and lacked wetland hydrology indicators. There was no need for soil analysis within this area. The plant species in this area fail the dominance test for hydrophytic vegetation due to the high occurrence of facultative upland and upland plant species. No primary wetland hydrology indicators were observed with geomorphic position comprising the only secondary indicator.

*Observation Point 2 – Current Discharge Location*

Observation Point 2, located within the current groundwater discharge location did not meet the three wetland criteria, the area contained the appropriate hydrophytic vegetation but lacked hydric soils and wetland hydrology indicators. The plant species in this area pass the dominance test for hydrophytic vegetation due to the high occurrence of facultative wetland plant species. The soil profile consists of clay loam with redox features observed along plant roots and within the soil matrix within the surface horizon but not at depth. Redox features were not 2-inches thick within the upper 6-inch of the soil horizon; therefore, the soil did not meet the definition of a hydric soil. No primary wetland hydrology indicators were observed with drainage patterns comprising the only secondary indicator.

*Observation Point 3 – Proposed Discharge Location*

Observation Point 3, located adjacent to the proposed groundwater discharge location at the head of the ephemeral drainage did not meet the three wetland criteria, the area contained upland vegetation, and lacked hydric soils and wetland hydrology indicators. The plant species in this area fail the dominance test and prevalence index for hydrophytic vegetation due to the high occurrence of upland plant species. The soil profile consists of a clay loam surface horizon with no redox features or hydric soil indicators observed. No primary wetland hydrology indicators were observed with geomorphic position comprising the only secondary indicator.

*Observation Point 4 – Ephemeral Drainage*

Observation Point 4, located in the bottom of the ephemeral drainage met jurisdictional wetland requirements, containing the appropriate vegetation, soils, and hydrology to classify the area as wetlands. The plant species in this area pass the rapid test for hydrophytic vegetation because the monoculture ground cover has a facultative wetland indicator status. The soil profile consists of silty clay A-horizon surface layer to a depth of 16-inches. The low-chroma matrix contained a value coloration of 3 near the surface which continued to a value of 5 at depth. The soil contained redox concentrations of iron/manganese within the soil matrix which met the minimum thickness of 6-inches starting within 10 inches of the soil surface. The soil contained a depleted matrix. High water table and saturation are the primary hydrology indicators with saturation visible on aerial imagery and geomorphic position comprising the secondary indicators. This area contains wetland hydrology.

## Discussion

The on-site wetland assessment concluded that one area contains the appropriate vegetation, soils, and hydrology to be classified as wetlands as shown on **Figure 5**. This wetland area is associated with an ephemeral drainage that connects to Falls Coulee. According to the *Navigable Waters Protection Rule: Definition of "Waters of the United States"* ephemeral drainages (i.e., drainages where surface water flows or pools only in direct response to precipitation (e.g., rain or snow fall)) are considered non-jurisdictional waters and include ephemeral streams, swales, gullies, rills, and pools. For the associated wetlands within the ephemeral drainage to be considered *"adjacent wetlands"* (i.e., jurisdictional wetlands) they need to abut or be inundated by flooding from a jurisdictional water, which is not the case.

The U.S. Army Corps of Engineers (Corps) has ultimate authority over the jurisdictional determination process. This report's purpose is to inform the client on potential permitting procedures and serves as the wetland delineation required in the Pre-Construction Notification to the Corps.

To initiate the permitting process a *Request for Corps Jurisdictional Determination (JD)* form, included as **Appendix F**, should be submitted to the Corps for review and approval. If they concur with the findings in this report no permitting will be necessary, if they deem areas jurisdictional, a Corp permit may be required which needs to quantify specific

impacts to wetland areas that are unknown at this point. In Montana, the application is submitted through a *Joint Application for Proposed Work in Montana Streams, Wetlands, Floodplains, and Other Water Bodies.*

(http://dnrc.mt.gov/divisions/water/operations/floodplain-management/permitting-and-regulations/jointapplication6515.doc/view)

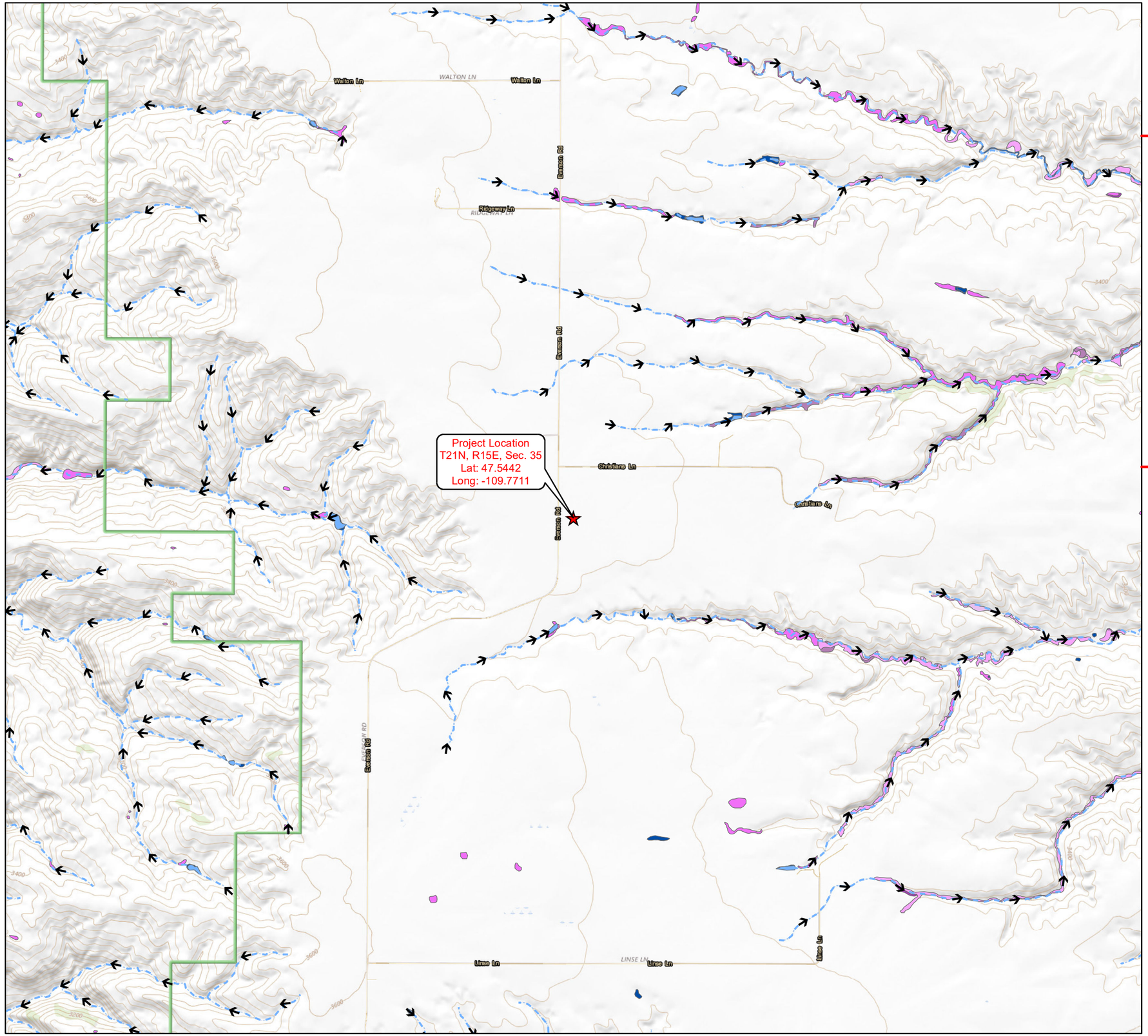
Sincerely,

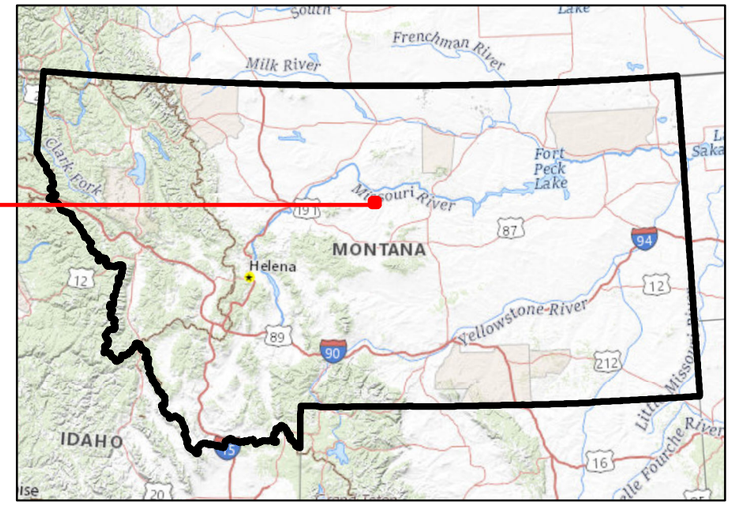
*Jay Slocum*

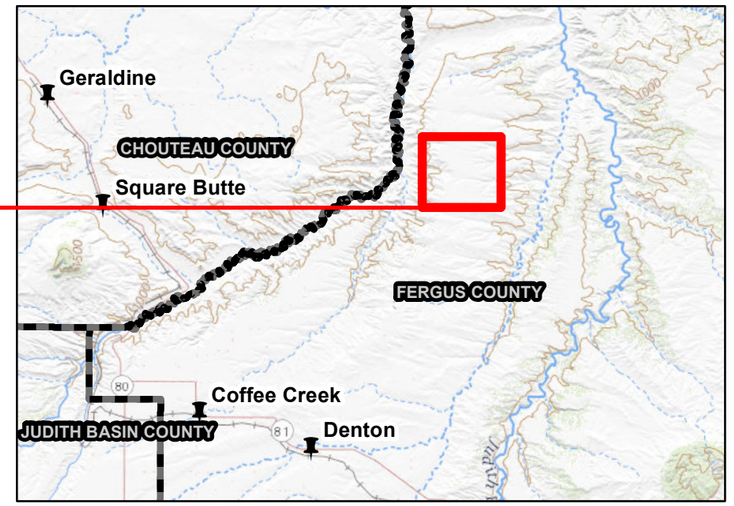
Senior Wildlife Biologist/GIS Specialist

Attachments.

# Figures:

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**Legend**

- Launch Facility (LF) Delta-02 (D-02)

**National Hydrography Dataset (NHD)**

- Intermittent Stream
- Flow
- Perennial Lake/Pond

**Montana Wetland Framework**

- Freshwater Emergent Wetland
- Freshwater Scrub-Shrub Wetland
- Riparian Emergent
- Riparian Forested
- Riparian Scrub-Shrub
- River
- Freshwater Pond

Water & Environmental TECHNOLOGIES

**Malmstrom Air Force Base**
**Environmental Assessment for LF - D-02**

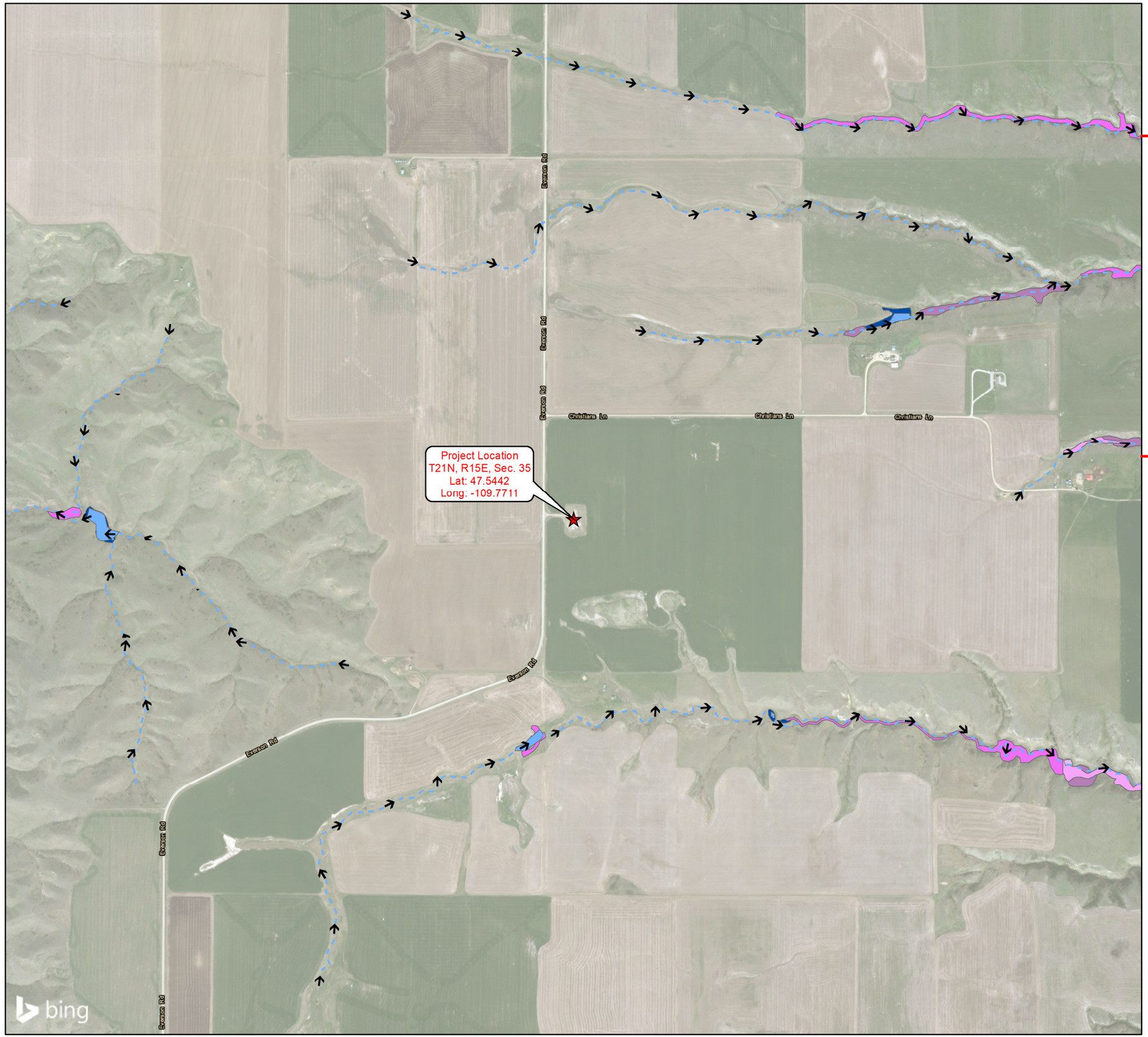
***Site Location - USGS Topographic Map***
***Surface Water Bodies & Wetlands***

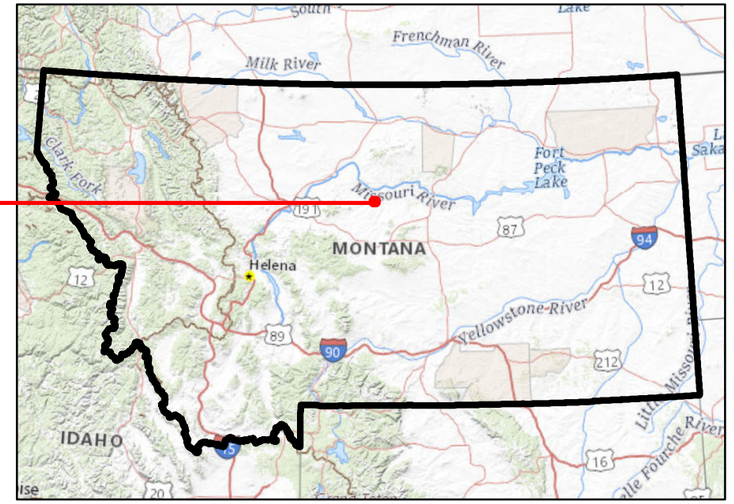
Job#: MAFBM06

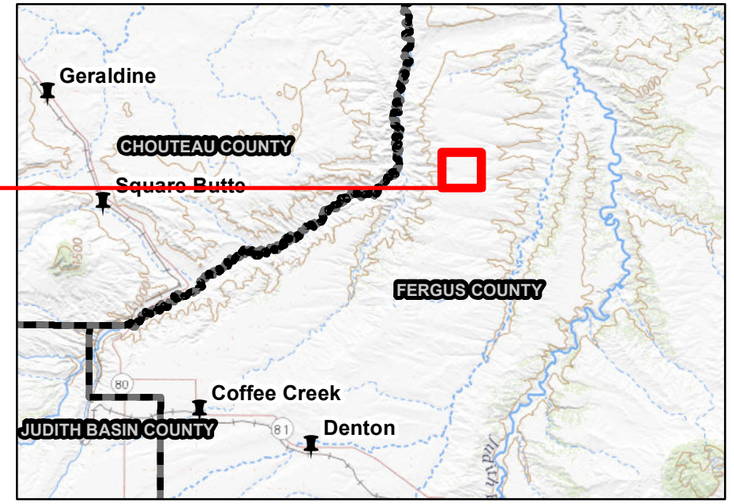
Date: 10/30/2020

**FIGURE 1a**

Path: M:\MAFBM06 - Delta 02 EA\Figure_1a_Site_Location_Topo.mxd, Author: jslocum

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**Legend**

- Launch Facility (LF) Delta-02 (D-02)

**National Hydrography Dataset (NHD)**

- Intermittent Stream
- Flow
- Perennial Lake/Pond

**Montana Wetland Framework**

- Freshwater Emergent Wetland
- Freshwater Scrub-Shrub Wetland
- Riparian Emergent
- Riparian Forested
- Riparian Scrub-Shrub
- River
- Freshwater Pond

Water & Environmental TECHNOLOGIES

**Malmstrom Air Force Base**
**Environmental Assessment for LF - D-02**

***Site Location - Bing Aerial Photo***
***Surface Water Bodies & Wetlands***

Job#: MAFBM06

Date: 10/30/2020

**FIGURE 1b**

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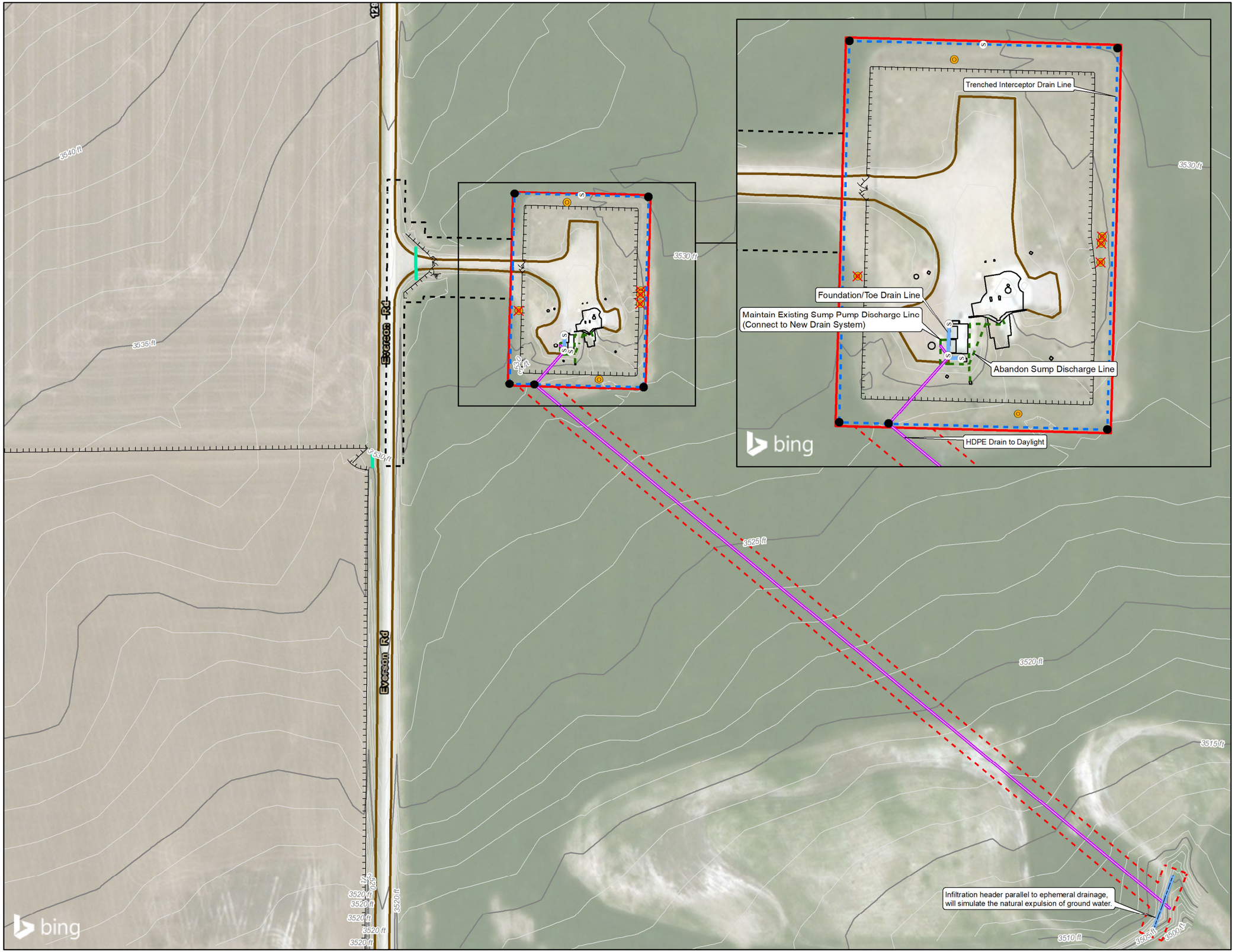


## Legend

**D-02 Facility Upgrades**

- Cleanout
- Manhole
- Retain Monitoring Well
- Abandon Monitoring Well
- Foundation/Toe Drain Line
- Trenched Interceptor Drain Line
- HDPE Drain to Daylight
- Infiltration Header

**Existing Stormwater Infrastructure**

- Maintain Existing Sump Pump Discharge Line
- Abandon Sump Discharge Line

**D-02 Launch Facility**

- Site Features
- Culvert
- Existing Easement
- Proposed Easement
- Fence
- Property Boundary
- Gravel Area

**Contours**

**1-Ft Surveyed Contours**

- Major Contour
- Minor Contour

N
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1 Inch = 150 Feet

0 75 150 225 300

Water & Environmental TECHNOLOGIES

**Malmstrom Air Force Base**
**Environmental Assessment for LF - D-02**

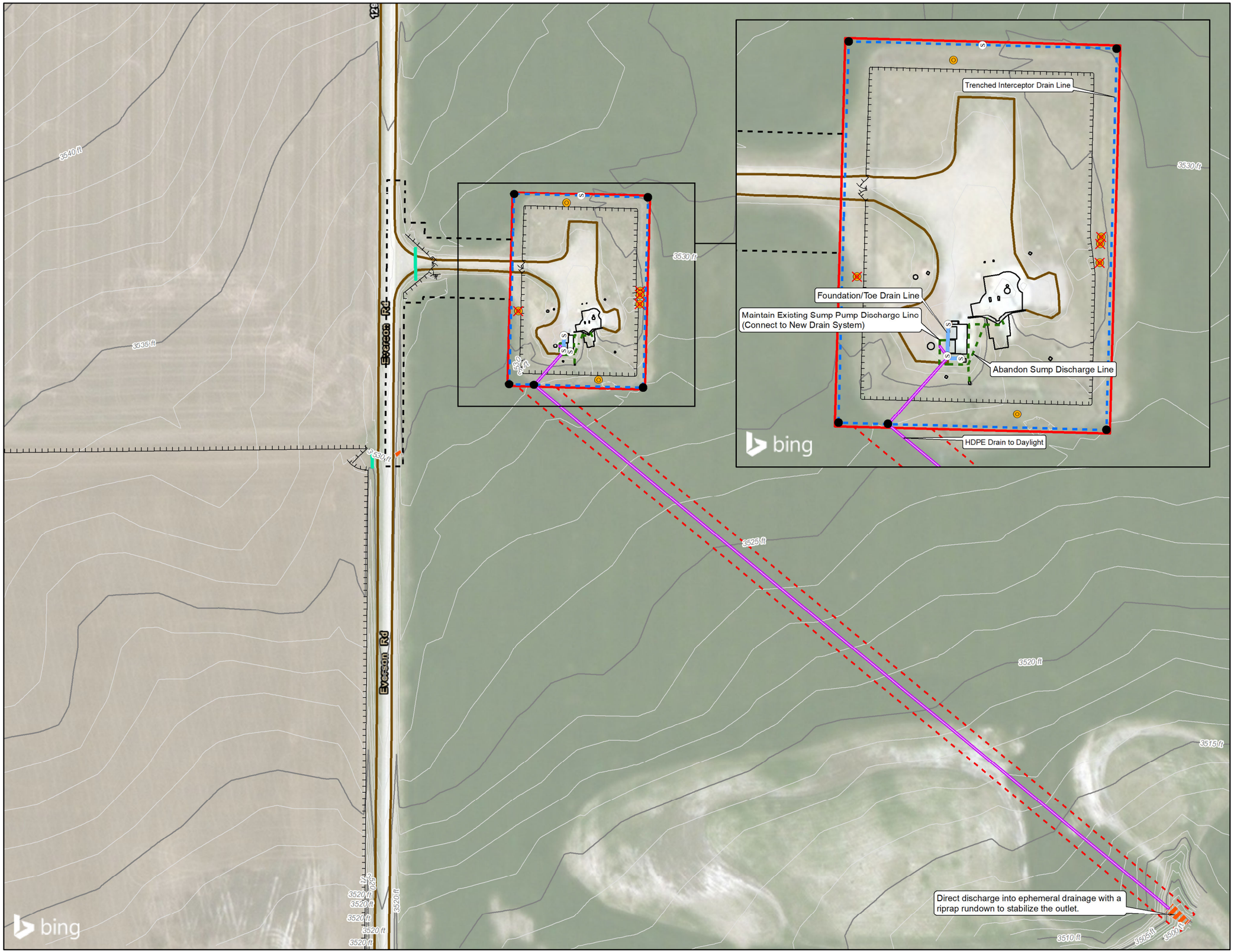
***Alternative 1 – Preferred Alternative –***
***Interceptor Drain Network - Seep - Falls Coulee***

Job#: MAFBM06

Date: 11/16/2020

**FIGURE 2**

Path: M:\MAFBM06 - Delta 02 EA\Figure_2_Alt1_Final.mxd, Author: jslocum




**Legend**

**D-02 Facility Upgrades**
- Cleanout
- Manhole
- Retain Monitoring Well
- Abandon Monitoring Well
- Foundation/Toe Drain Line
- Trenched Interceptor Drain Line
- HDPE Drain to Daylight
- Riprap – Rundown

**Existing Stormwater Infrastructure**
- Maintain Existing Sump Pump Discharge Line
- Abandon Sump Discharge Line

**D-02 Launch Facility**
- Site Features
- Culvert
- Existing Easement
- Proposed Easement
- Fence
- Property Boundary
- Gravel Area

**Contours**

**1-Ft Surveyed Contours**
- Major Contour
- Minor Contour

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1 Inch = 150 Feet

0 75 150 225 300

Water & Environmental TECHNOLOGIES

**Malmstrom Air Force Base**
**Environmental Assessment for LF - D-02**

***Alternative 2 – Interceptor Drain Network – Direct Discharge - Falls Coulee***

Job#: MAFBM06

Date: 11/16/2020

**FIGURE 3**

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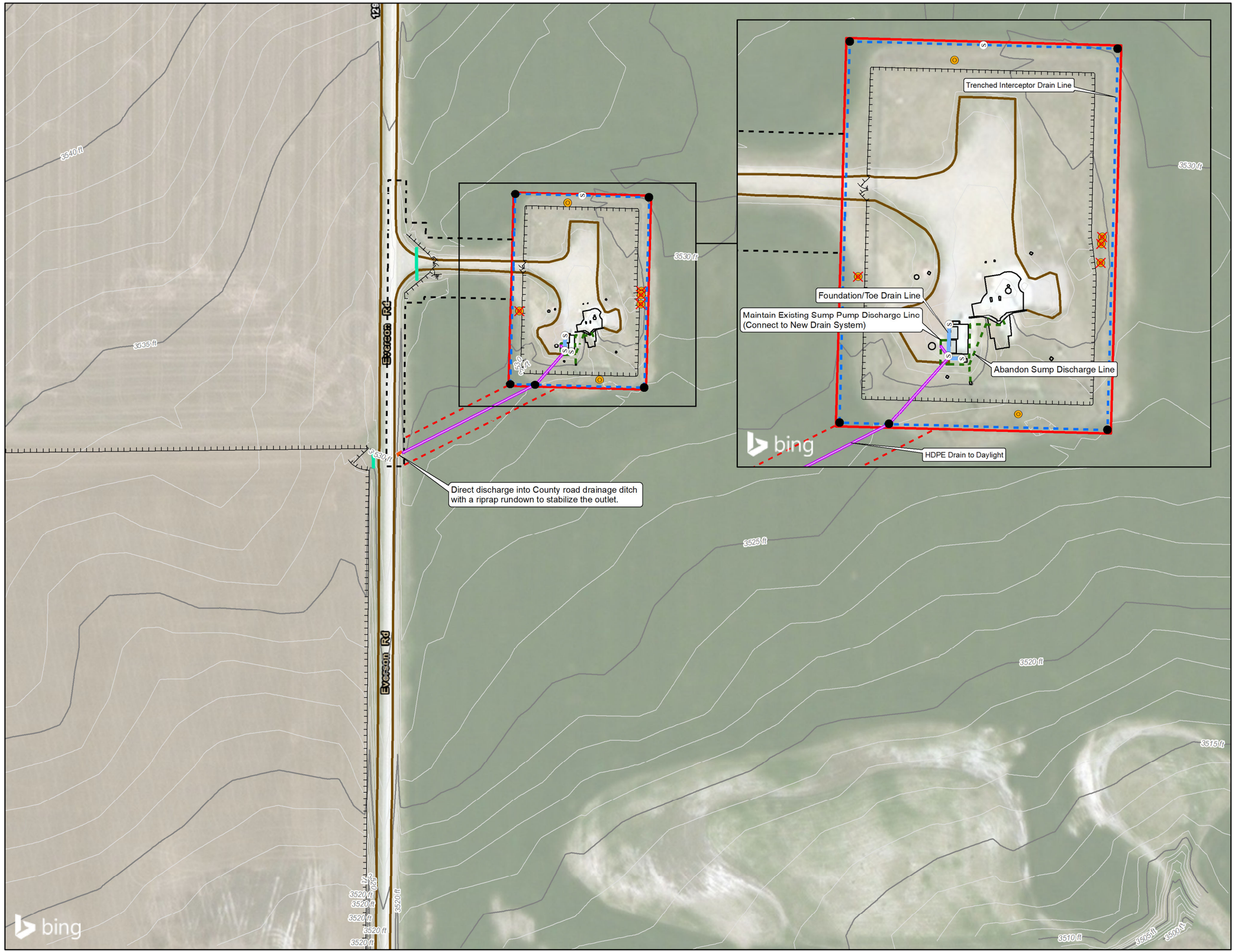



## Legend

**D-02 Facility Upgrades**

- Cleanout
- Manhole
- Retain Monitoring Well
- Abandon Monitoring Well
- Foundation/Toe Drain Line
- Trenched Interceptor Drain Line
- HDPE Drain to Daylight
- Riprap – Rundown

**Existing Stormwater Infrastructure**

- Maintain Existing Sump Pump Discharge Line
- Abandon Sump Discharge Line

**D-02 Launch Facility**

- Site Features
- Culvert
- Existing Easement
- Proposed Easement
- Fence
- Property Boundary
- Gravel Area

**Contours**

**1-Ft Surveyed Contours**

- Major Contour
- Minor Contour

N
W E
S

1 Inch = 150 Feet

0 75 150 225 300

Water & Environmental TECHNOLOGIES

**Malmstrom Air Force Base**
**Environmental Assessment for LF - D-02**

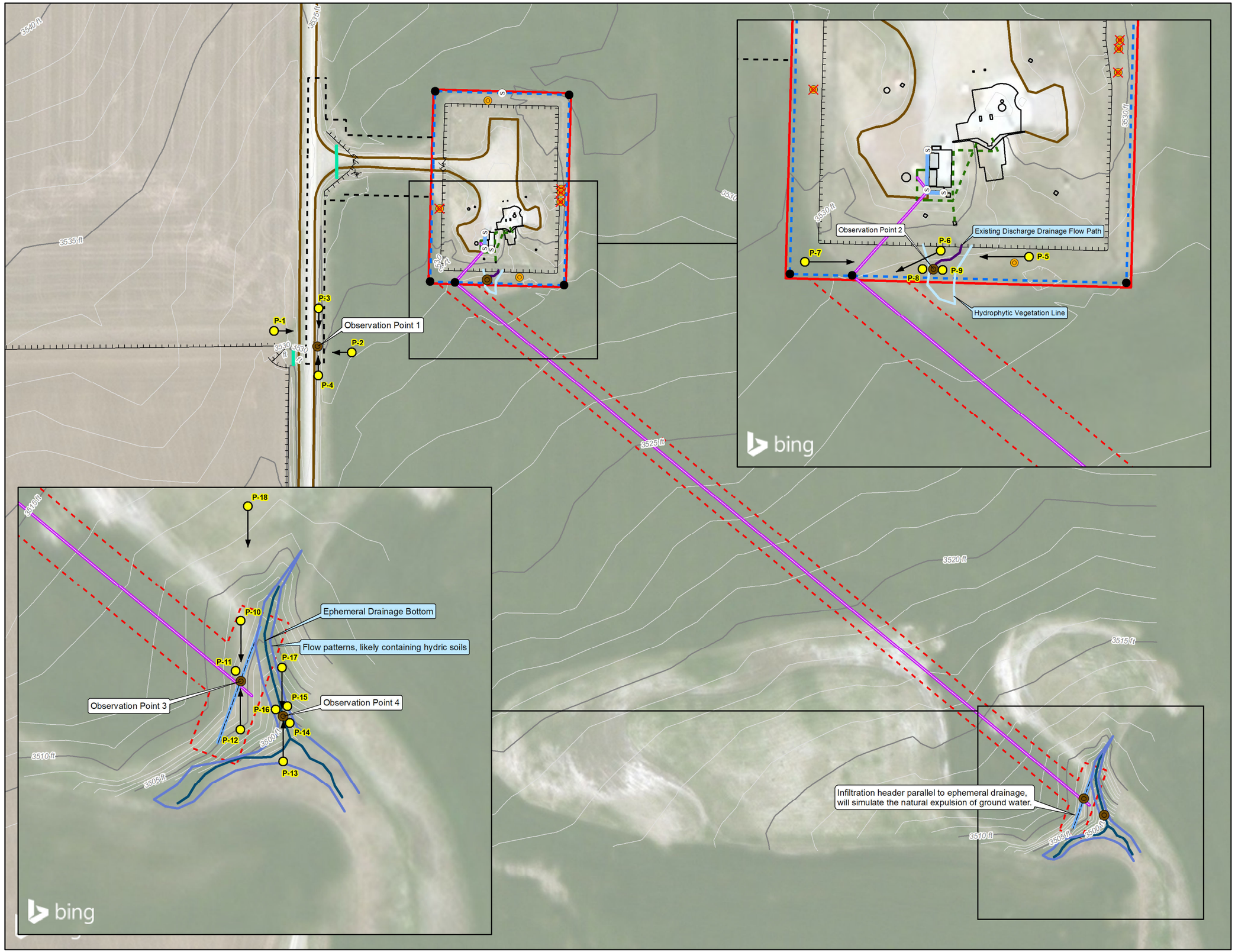
***Alternative 3 – Interceptor Drain Network – Direct Discharge - County Road Ditch***

Job#: MAFBM06

Date: 10/30/2020

**FIGURE 4**

Path: M:\MAFBM06 - Delta 02 EA\Figure_4_Alt3_Final.mxd, Author: jslocum




## Legend

**Wetland Survey Data**

- Observation Point
- Photo Points (Approx.)
- Photo Direction (Approx.)
- Ephemeral Drainage Bottom
- Flow patterns, likely containing hydric soils
- Existing Discharge Drainage Flow Path
- Hydrophytic Vegetation Line

**D-02 Facility Upgrades**

- Cleanout
- Manhole
- Retain Monitoring Well
- Abandon Monitoring Well
- Foundation/Toe Drain Line
- Trenched Interceptor Drain Line
- HDPE Drain to Daylight
- Infiltration Header

**Existing Stormwater Infrastructure**

- Maintain Existing Sump Pump Discharge Line
- Abandon Sump Discharge Line
- Site Features
- Culvert
- Existing Easement
- Proposed Easement
- Fence
- Property Boundary
- Gravel Area

**Contours**

**1-Ft Surveyed Contours**

- Major Contour
- Minor Contour

N
W E
S

1 Inch = 150 Feet

0 75 150 225 300

Water & Environmental TECHNOLOGIES

**Malmstrom Air Force Base**
**Environmental Assessment for LF - D-02**

***Wetland Delineation - On-site Assessment***

Job#: MAFBM06

Date: 2/23/2021

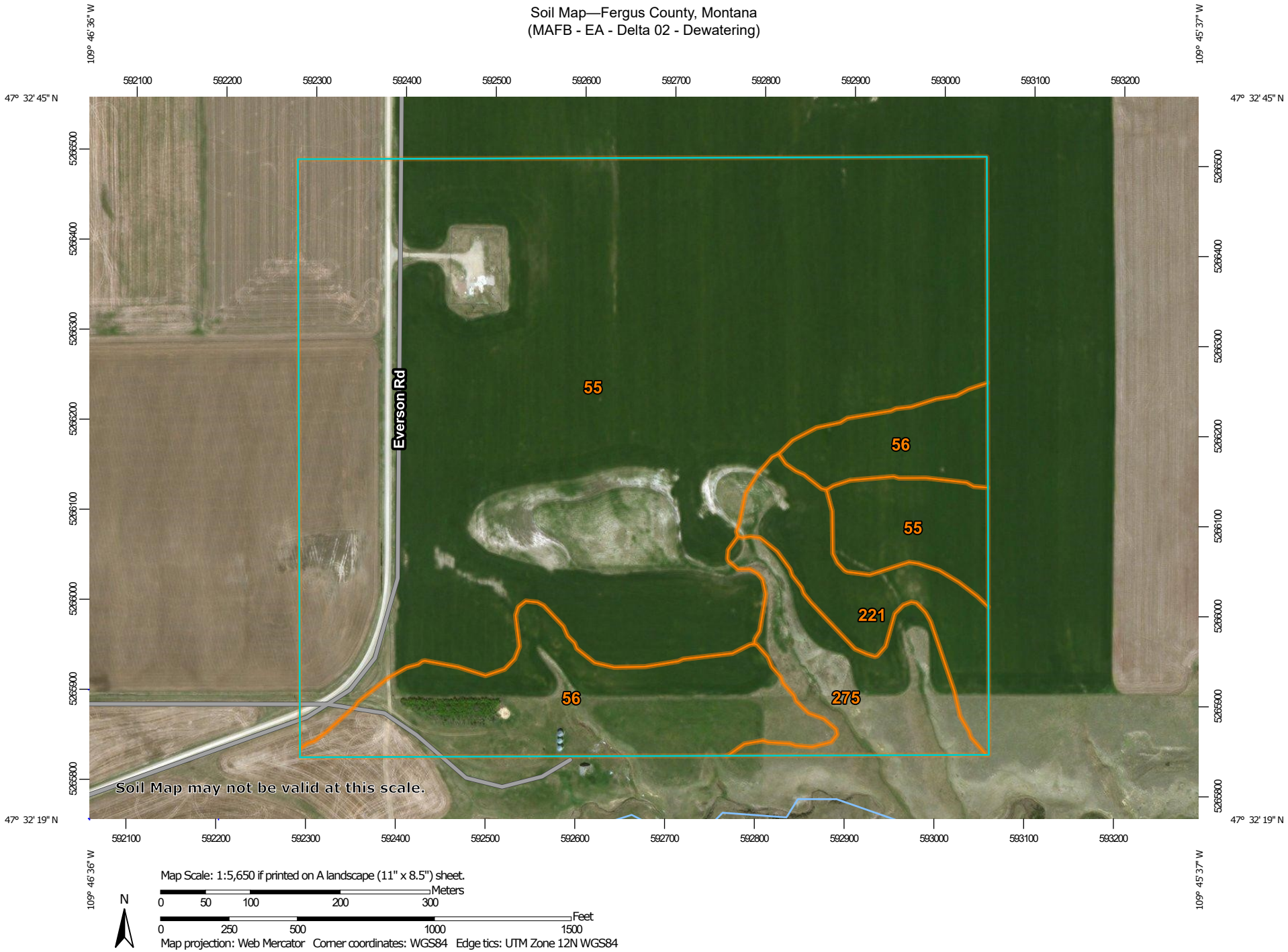
**FIGURE 5**

Path: M:\MAFBM06 - Delta 02 EA\Figure_2_Alt1 - Wetland.mxd, Author: jslocum

# Appendix A:

# USDA-NRCS Web Soil Survey

Soil Map—Fergus County, Montana
(MAFB - EA - Delta 02 - Dewatering)




Map Scale: 1:5,650 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

## MAP LEGEND

**Area of Interest (AOI)**
- Area of Interest (AOI)

**Soils**
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

**Special Point Features**
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

**Water Features**
- Streams and Canals

**Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**Background**
- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Fergus County, Montana
Survey Area Data: Version 21, Jun 4, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 28, 2014—Nov 7, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

# Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| 55 | Danvers clay loam, 0 to 2 percent slopes | 94.0 | 74.3% |
| 56 | Danvers clay loam, 2 to 8 percent slopes | 18.0 | 14.2% |
| 221 | Tamaneen-Judith clay loams, 2 to 4 percent slopes | 6.7 | 5.3% |
| 275 | Winifred-Windham-Eltsac complex, 15 to 45 percent slopes | 7.8 | 6.2% |
| **Totals for Area of Interest** | | **126.5** | **100.0%** |

# Map Unit Description (Brief, Generated)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, provide information on the composition of map units and properties of their components.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

The Map Unit Description (Brief, Generated) report displays a generated description of the major soils that occur in a map unit. Descriptions of non-soil (miscellaneous areas) and minor map unit components are not included. This description is generated from the underlying soil attribute data.

Additional information about the map units described in this report is available in other Soil Data Mart reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the Soil Data Mart reports define some of the properties included in the map unit descriptions.

# Report—Map Unit Description (Brief, Generated)

## Fergus County, Montana

**Map Unit:** 55—Danvers clay loam, 0 to 2 percent slopes

**Component:** Danvers (90%)

The Danvers component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on terraces. The parent material consists of clayey alluvium derived from limestone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R046XN247MT Draft Clayey (cy) Rru 46-n 13-19" P.z. ecological site. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 3e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 25 percent. There are no saline horizons within 30 inches of the soil surface.

**Component:** Fairfield (4%)

Generated brief soil descriptions are created for major soil components. The Fairfield soil is a minor component.

**Component:** Tamaneen (3%)

Generated brief soil descriptions are created for major soil components. The Tamaneen soil is a minor component.

**Component:** Judell (3%)

Generated brief soil descriptions are created for major soil components. The Judell soil is a minor component.

**Map Unit:** 56—Danvers clay loam, 2 to 8 percent slopes

**Component:** Danvers (90%)

The Danvers component makes up 90 percent of the map unit. Slopes are 2 to 8 percent. This component is on terraces. The parent material consists of clayey alluvium derived from limestone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R046XN247MT Draft Clayey (cy) Rru 46-n 13-19" P.z. ecological site. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 3e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 25 percent. There are no saline horizons within 30 inches of the soil surface.

**Component:** Fairfield (4%)

Generated brief soil descriptions are created for major soil components. The Fairfield soil is a minor component.

**Component:** Tamaneen (3%)

Generated brief soil descriptions are created for major soil components. The Tamaneen soil is a minor component.

**Component:** Judell (3%)

Generated brief soil descriptions are created for major soil components. The Judell soil is a minor component.

**Map Unit:** 221—Tamaneen-Judith clay loams, 2 to 4 percent slopes

**Component:** Tamaneen (50%)

The Tamaneen component makes up 50 percent of the map unit. Slopes are 2 to 4 percent. This component is on stream terraces, alluvial fans. The parent material consists of alluvium derived from limestone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the R046XN247MT Draft Clayey (cy) Rru 46-n 13-19" P.z. ecological site. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 2e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 33 percent. There are no saline horizons within 30 inches of the soil surface.

**Component:** Judith (40%)

The Judith component makes up 40 percent of the map unit. Slopes are 2 to 4 percent. This component is on alluvial fans, terraces. The parent material consists of alluvium derived from limestone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R046XN247MT Draft Clayey (cy) Rru 46-n 13-19" P.z. ecological site. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 50 percent. There are no saline horizons within 30 inches of the soil surface.

**Component:** Windham (10%)

Generated brief soil descriptions are created for major soil components. The Windham soil is a minor component.

**Map Unit:** 275—Winifred-Windham-Eltsac complex, 15 to 45 percent slopes

**Component:** Winifred (40%)

The Winifred component makes up 40 percent of the map unit. Slopes are 15 to 45 percent. This component is on hills, sedimentary plains. The parent material consists of alluvium and/or residuum over semiconsolidated shale. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the R046XN247MT Draft Clayey (cy) Rru 46-n 13-19" P.z., Upland Sagebrush Shrubland ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 10 percent. There are no saline horizons within 30 inches of the soil surface. The soil has a maximum sodium adsorption ratio of 3 within 30 inches of the soil surface.

**Component:** Windham (25%)

The Windham component makes up 25 percent of the map unit. Slopes are 15 to 45 percent. This component is on terraces. The parent material consists of alluvium derived from limestone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R044XC473MT Silty-limy (sily) 15-19" P.z. ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 50 percent. There are no saline horizons within 30 inches of the soil surface.

**Component:** Eltsac (25%)

The Eltsac component makes up 25 percent of the map unit. Slopes are 15 to 45 percent. This component is on hills, sedimentary plains. The parent material consists of clayey residuum over semiconsolidated shale. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the R046XN247MT Draft Clayey (cy) Rru 46-n 13-19" P.z., Upland Sagebrush Shrubland ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent. There are no saline horizons within 30 inches of the soil surface.

**Component:** Norbert (5%)

Generated brief soil descriptions are created for major soil components. The Norbert soil is a minor component.

**Component:** Lawther (5%)

Generated brief soil descriptions are created for major soil components. The Lawther soil is a minor component.

## Data Source Information

Soil Survey Area: Fergus County, Montana
Survey Area Data: Version 21, Jun 4, 2020

# Hydrologic Soil Group and Surface Runoff

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

*Hydrologic soil groups* are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

*Surface runoff* refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

# Report—Hydrologic Soil Group and Surface Runoff

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

| Hydrologic Soil Group and Surface Runoff–Fergus County, Montana | | | |
|---|---|---|---|
| **Map symbol and soil name** | **Pct. of map unit** | **Surface Runoff** | **Hydrologic Soil Group** |
| | | | |
| 55—Danvers clay loam, 0 to 2 percent slopes | | | |
| Danvers | 90 | — | C |

| Hydrologic Soil Group and Surface Runoff–Fergus County, Montana | | | |
|---|---|---|---|
| **Map symbol and soil name** | **Pct. of map unit** | **Surface Runoff** | **Hydrologic Soil Group** |
| 56—Danvers clay loam, 2 to 8 percent slopes | | | |
| Danvers | 90 | — | C |
| 221—Tamaneen-Judith clay loams, 2 to 4 percent slopes | | | |
| Tamaneen | 50 | — | C |
| Judith | 40 | — | B |
| 275—Winifred-Windham-Eltsac complex, 15 to 45 percent slopes | | | |
| Winifred | 40 | — | D |
| Eltsac | 25 | — | D |
| Windham | 25 | — | B |

## Data Source Information

Soil Survey Area: Fergus County, Montana
Survey Area Data: Version 21, Jun 4, 2020

# Hydric Soil List - All Components

This table lists the map unit components and their hydric status in the survey area. This list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council, 1995; Hurt and others, 2002).

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others, 1979; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). Criteria for all of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

Map units that are dominantly made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units dominantly made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

The criteria for hydric soils are represented by codes in the table (for example, 2). Definitions for the codes are as follows:

1. All Histels except for Folistels, and Histosols except for Folists.
2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, Pachic subgroups, or Cumulic subgroups that:
   A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
   B. Show evidence that the soil meets the definition of a hydric soil;
3. Soils that are frequently ponded for long or very long duration during the growing season.
   A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
   B. Show evidence that the soil meets the definition of a hydric soil;
4. Map unit components that are frequently flooded for long duration or very long duration during the growing season that:
   A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
   B. Show evidence that the soil meets the definition of a hydric soil;

Hydric Condition: Food Security Act information regarding the ability to grow a commodity crop without removing woody vegetation or manipulating hydrology.

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. Doc. 2012-4733 Filed 2-28-12. February, 28, 2012. Hydric soils of the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Vasilas, L.M., G.W. Hurt, and C.V. Noble, editors. Version 7.0, 2010. Field indicators of hydric soils in the United States.

# Report—Hydric Soil List - All Components

| Hydric Soil List - All Components–MT027-Fergus County, Montana | | | | | |
|---|---|---|---|---|---|
| **Map symbol and map unit name** | **Component/Local Phase** | **Comp. pct.** | **Landform** | **Hydric status** | **Hydric criteria met (code)** |
| 55: Danvers clay loam, 0 to 2 percent slopes | Danvers | 90 | Terraces | No | — |
| | Fairfield | 4 | Terraces | No | — |
| | Judell | 3 | Stream terraces,alluvial fans | No | — |
| | Tamaneen | 3 | Alluvial fans,stream terraces | No | — |
| 56: Danvers clay loam, 2 to 8 percent slopes | Danvers | 90 | Terraces | No | — |
| | Fairfield | 4 | Terraces | No | — |
| | Tamaneen | 3 | Stream terraces,alluvial fans | No | — |
| | Judell | 3 | Stream terraces,alluvial fans | No | — |
| 221: Tamaneen-Judith clay loams, 2 to 4 percent slopes | Tamaneen | 50 | Alluvial fans,stream terraces | No | — |
| | Judith | 40 | Alluvial fans,terraces | No | — |
| | Windham | 10 | Alluvial fans,terraces | No | — |
| 275: Winifred-Windham-Eltsac complex, 15 to 45 percent slopes | Winifred | 40 | Hills,plains | No | — |
| | Windham | 25 | Terraces | No | — |
| | Eltsac | 25 | Hills,plains | No | — |
| | Norbert | 5 | Hills,plains | No | — |
| | Lawther | 5 | Terraces,alluvial fans | No | — |

## Data Source Information

Soil Survey Area: Fergus County, Montana
Survey Area Data: Version 21, Jun 4, 2020

# Appendix B:

# Nation Wetland Inventory (NWI)

U.S. Fish and Wildlife Service
National Wetlands Inventory

# MAFB - EA - Delta 02 - Dewatering


September 17, 2020

**Wetlands**

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

# Appendix C:

# Site Photographs

Picture 1

Picture 2

Picture 3

Picture 4

Picture 5

Picture 6

Picture 7

Picture 8


Picture 9

Picture 10

Picture 11

Picture 12

Picture 13

Picture 14


Picture 15

Picture 16

Picture 17

Picture 18

# Appendix D:

# Survey Photo Log

| Appendix D - Survey Photo Log (Figure 5 Contains Approx. Photo Locations) - Wetland Delineation - Delta - 02 Launch Facility | | |
|---|---|---|
| **Photo ID** | **Direction** | **Comment** |
| P-1 | E | Observation Point 1, looking east toward Launch Facility. See Figure 5 for location. |
| P-2 | W | Observation Point 1, looking west toward County road. |
| P-3 | S | Observation Point 1, looking south along roadside ditch. |
| P-4 | N | Observation Point 1, looking north along roadside ditch. |
| P-5 | W | Observation Point 2, looking at flow patterns from current discharge location. |
| P-6 | SW | Observation Point 2, looking toward the proposed county road discharge location. |
| P-7 | E | Observation Point 2, looking east at flow patterns from current discharge location. |
| P-8 | Close-up | Observation Point 2, Soil Test Pit, See Figure 5 for location. |
| P-9 | Close-up | Redox features observed at Observation Point 2. |
| P-10 | S | Observation Point 3, looking at surround vegetation. |
| P-11 | Close-up | Observation Point 3, Soil Test Pit, See Figure 5 for location. |
| P-12 | N | Observation Point 3, looking north at cultivated fields. |
| P-13 | N | Observation Point 4, looking north up the ephemeral drainage. |
| P-14 | Close-up | Observation Point 4, Soil Test Pit, See Figure 5 for location. |
| P-15 | Close-up | Observation Point 4, Soil Test Pit, note the redox features observed. |
| P-16 | Close-up | Redox features observed at Observation Point 4. |
| P-17 | S | Ephemeral drainage looking south towards Falls Coulee. |
| P-18 | S | Ephemeral drainage looking south towards Falls Coulee at a higher elevation than P-17. |

# Appendix E:

# Wetland Determination Forms

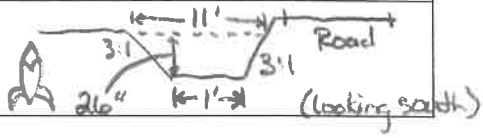
## WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: MAFB - EA - Delta-02 Dewatering City/County: Fergus County Sampling Date: 8/19/20
Applicant/Owner: Malmstrom Air Force Base (MAFB) State: MT Sampling Point: 1
Investigator(s): Jay Slocum Section, Township, Range: T21N, R15E, sec. 34
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1-2
Subregion (LRR): Western Great Plains (LRR G) Lat: 47.5435 Long: -109.7723 Datum: WGS 1984
Soil Map Unit Name: 55 - Danvers clay loam, 0 to 2 percent slopes NWI classification: Not Mapped
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes ____ No X | **Is the Sampled Area within a Wetland?** Yes ____ No X |
| Hydric Soil Present? | Yes ____ No ____ | |
| Wetland Hydrology Present? | Yes ____ No X | |

Remarks: Sample located within County roadside ditch.




### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30m) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. None | - | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | NA = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15m) | | | |
| 1. None | - | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | NA = Total Cover | | |
| **Herb Stratum** (Plot size: 5m) | | | |
| 1. Elymus lanceolatus | 30 | Yes | FACU |
| 2. Festuca idahoensis | 20 | Yes | UPL |
| 3. Bromus inermis | 20 | Yes | UPL |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| | 70 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30m) | | | |
| 1. None | - | | |
| 2. | | | |
| | NA = Total Cover | | |

% Bare Ground in Herb Stratum 30

**Dominance Test worksheet:**
Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): 0 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0/3 = 0% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species ____ | x 1 = ____ |
| FACW species ____ | x 2 = ____ |
| FAC species ____ | x 3 = ____ |
| FACU species ____ | x 4 = ____ |
| UPL species ____ | x 5 = ____ |
| Column Totals: ____ (A) | ____ (B) |

Prevalence Index = B/A = ____

**Hydrophytic Vegetation Indicators:**
___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes ____ No X

Remarks: Upland vegetation dominant.

## SOIL

Sampling Point: 1

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9) **(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) **(MLRA 72 & 73 of LRR H)**

**Indicators for Problematic Hydric Soils[3]:**

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks: No test pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes _____ No X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Ditch not seasonally inundated.

## WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: MAFB-EA-Delta-02-Dewatering City/County: Fergus County Sampling Date: 8/19/20
Applicant/Owner: Malmstrom Air Force Base (MAFB) State: MT Sampling Point: 2
Investigator(s): Jay Slocum Section, Township, Range: T21N, R15E, Sec. 35
Landform (hillslope, terrace, etc.): Plains Local relief (concave, convex, none): None Slope (%): 1
Subregion (LRR): Western Great Plains (LRR G) Lat: 47.5438 Long: -109.7711 Datum: WGS 1984
Soil Map Unit Name: 55- Danvers clay loam, 0 to 2 percent slopes NWI classification: Not Mapped
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes X | No _____ | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No X | |
| Wetland Hydrology Present? | Yes _____ | No X | |

Remarks: Sample location within area currently affected by groundwater discharge.

### VEGETATION – Use scientific names of plants.

| | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| **Tree Stratum** (Plot size: 30m) | | | |
| 1. None | – | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | NA = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15m) | | | |
| 1. None | – | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | NA = Total Cover | | |
| **Herb Stratum** (Plot size: 5m) | | | |
| 1. Hordeum jubatum | 50 | Yes | FACW |
| 2. Alopecurus pratensis | 30 | Yes | FACW |
| 3. Elymus lanceolatus | 10 | No | FACU |
| 4. Bromus inermis | 10 | No | UPL |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| | 100 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30m) | | | |
| 1. None | – | | |
| 2. | | | |
| | NA = Total Cover | | |

% Bare Ground in Herb Stratum 100

**Dominance Test worksheet:**
Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 2/2 = 100% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: | |
|---|---|---|
| OBL species | x 1 = | |
| FACW species | x 2 = | |
| FAC species | x 3 = | |
| FACU species | x 4 = | |
| UPL species | x 5 = | |
| Column Totals: (A) | | (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**
___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes X No _____

Remarks: Hydrophytic vegetation only present within discharge area.

## SOIL

Sampling Point: 2

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6 | 10YR 4/1 | 95 | 5YR 5/4 | 5 | D | PL | clay loam | |
| 6-15 | 10YR 4/1 | 100 | None | | | | clay loam | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9) **(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) **(MLRA 72 & 73 of LRR H)**

**Indicators for Problematic Hydric Soils[3]:**

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes _____ No X

Remarks: Redox observed along roots and within the matrix of the surface soils and not found at depth. The redox was not 2" thick within the upper 6 inches of the soil; therefore not classified as a depleted matrix.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

**Field Observations:**

Surface Water Present? Yes _____ No X Depth (inches): –

Water Table Present? Yes _____ No X Depth (inches): –

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): –

**Wetland Hydrology Present?** Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Flow patterns formed from discharge point to test pit location, no other hydrology indicators observed.

## WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: MAFB-EA-Delta-02-Dewatering City/County: Fergus County Sampling Date: 8/19/20

Applicant/Owner: Malmstrom Air Force Base (MAFB) State: MT Sampling Point: 3

Investigator(s): Jay Slocum Section, Township, Range: T21N, R15E, Sec. 35

Landform (hillslope, terrace, etc.): top of hillslope Local relief (concave, convex, none): Concave Slope (%): 5-10

Subregion (LRR): Western Great Plains (LRR G) Lat: 47.5414 Long: -109.7671 Datum: WGS-1984

Soil Map Unit Name: 275-Winfred-Windham-Eltsac complex 15-45% slope NWI classification: Not Mapped

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No X | |
| Wetland Hydrology Present? | Yes _____ | No X | |

Remarks: Sample location located at the top of the ephemeral drainage within the proposed disturbance footprint.

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30m) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. None | – | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | NA = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15m) | | | |
| 1. None | – | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | NA = Total Cover | | |
| **Herb Stratum** (Plot size: 5m) | | | |
| 1. Bromus inermis | 40 | Yes | UPL |
| 2. Alopecurus pratensis | 10 | Yes | FACW |
| 3. Elymus spicatus | 40 | No | NI |
| 4. Stipa viridula | 10 | No | NI |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| | 100 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30) | | | |
| 1. None | – | | |
| 2. | | | |
| | NA = Total Cover | | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 1/2 = 50% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | | x 1 = | |
| FACW species | 10 | x 2 = | 20 |
| FAC species | | x 3 = | |
| FACU species | | x 4 = | |
| UPL species | 40 | x 5 = | 200 |
| Column Totals: | 50 (A) | | 220 (B) |

Prevalence Index = B/A = 220/50 = 4.4

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks: Upland vegetation dominant.

## SOIL

Sampling Point: 3

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-15 | 10YR 3/1 | 100 | None | | | | Clay loam | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes _____ No X

Remarks: No hydric soil indicators observed.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

**Field Observations:**

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

**Wetland Hydrology Present?** Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Top of drainage with moderate slopes to the bottom of the ephemeral drainage. Side slopes of drainage have no wetland hydrology.

## WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: MAFB-EA-Delta-02-Dewatering City/County: Fergus County Sampling Date: 8/19/20
Applicant/Owner: Malmstrom Air Force Base (MAFB) State: MT Sampling Point: 4
Investigator(s): Jay Slocum Section, Township, Range: T21N, R15E, Sec. 35
Landform (hillslope, terrace, etc.): Drainage Local relief (concave, convex, none): concave Slope (%): 5
Subregion (LRR): Western Great Plains (LRR G) Lat: 47.5413 Long: -109.7669 Datum: WGS-1984
Soil Map Unit Name: 275-Winifred-Windham-Ethridge Complex 15-45% Slope NWI classification: Not Mapped
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes X | No ____ | **Is the Sampled Area within a Wetland?** Yes X No ____ |
| Hydric Soil Present? | Yes X | No ____ | |
| Wetland Hydrology Present? | Yes X | No ____ | |

Remarks: Sample located at the bottom of the ephemeral drainage, below and outside the proposed disturbance footprint.

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30m) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. None | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | NA = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15m) | | | |
| 1. None | - | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | NA = Total Cover | | |
| **Herb Stratum** (Plot size: 5m) | | | |
| 1. Alopecurus pratensis | 100 | Yes | FACW |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| | 100 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30m) | | | |
| 1. None | NA | | |
| 2. | | | |
| | - = Total Cover | | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**
Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): _____ (A)
Total Number of Dominant Species Across All Strata: _____ (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species ____ | x 1 = ____ |
| FACW species ____ | x 2 = ____ |
| FAC species ____ | x 3 = ____ |
| FACU species ____ | x 4 = ____ |
| UPL species ____ | x 5 = ____ |
| Column Totals: ____ (A) | ____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**
X 1 - Rapid Test for Hydrophytic Vegetation
__ 2 - Dominance Test is >50%
__ 3 - Prevalence Index is ≤3.0[1]
__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes X No ____

Remarks: Monoculture of meadow foxtail within drainage bottom.

## SOIL

Sampling Point: 4

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-14 | 10YR 3/1 | 80 | 2.5 YR 3/4 | 20 | D | M | Silty clay | |
| 14-16 | 10YR 5/1 | 95 | 2.5 YR 3/4 | 5 | RM | M | silty clay | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9) **(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) **(MLRA 72 & 73 of LRR H)**

**Indicators for Problematic Hydric Soils[3]:**

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes X No ___

Remarks: Soil saturated with redox features present.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

**Field Observations:**

Surface Water Present? Yes ___ No X Depth (inches): --

Water Table Present? Yes X No ___ Depth (inches): 14" BGS

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): Surface

**Wetland Hydrology Present?** Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Bottom of ephemeral drainage contains appropriate hydrology.

# Appendix F:

# Jurisdictional Determination Form

## Appendix 1 - REQUEST FOR CORPS JURISDICTIONAL DETERMINATION (JD)

To: District Name Here

- I am requesting a JD on property located at: Malmstrom Air Force Base (MAFB) - Delta 02 Launch Facility
  (Street Address)
  City/Township/Parish: Rural (Nearest town, Denton) County: Fergus State: MT
  Acreage of Parcel/Review Area for JD: 3 ac of easement
  Section: 35 Township: T21N Range: R15E
  Latitude (decimal degrees): 47.5442 Longitude (decimal degrees): -109.7711
  (For linear projects, please include the center point of the proposed alignment.)
- Please attach a survey/plat map and vicinity map identifying location and review area for the JD.
- ☐ I currently own this property. ☐ I plan to purchase this property.
  ☐ I am an agent/consultant acting on behalf of the requestor.
  ☐ Other (please explain): _____.
- Reason for request: (check as many as applicable)
  ☐ I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all aquatic resources.
  ☐ I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all jurisdictional aquatic resources under Corps authority.
  ☑ I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps, and the JD would be used to avoid and minimize impacts to jurisdictional aquatic resources and as an initial step in a future permitting process.
  ☐ I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps; this request is accompanied by my permit application and the JD is to be used in the permitting process.
  ☐ I intend to construct/develop a project or perform activities in a navigable water of the U.S. which is included on the district Section 10 list and/or is subject to the ebb and flow of the tide.
  ☐ A Corps JD is required in order to obtain my local/state authorization.
  ☐ I intend to contest jurisdiction over a particular aquatic resource and request the Corps confirm that jurisdiction does/does not exist over the aquatic resource on the parcel.
  ☐ I believe that the site may be comprised entirely of dry land.
  ☐ Other: _____
- Type of determination being requested:
  ☐ I am requesting an approved JD.
  ☐ I am requesting a preliminary JD.
  ☑ I am requesting a "no permit required" letter as I believe my proposed activity is not regulated.
  ☐ I am unclear as to which JD I would like to request and require additional information to inform my decision.

By signing below, you are indicating that you have the authority, or are acting as the duly authorized agent of a person or entity with such authority, to and do hereby grant Corps personnel right of entry to legally access the site if needed to perform the JD. Your signature shall be an affirmation that you possess the requisite property rights to request a JD on the subject property.

*Signature: _____ Date: _____

- Typed or printed name: _____
  Company name: _____
  Address: _____
  _____
  Daytime phone no.: _____
  Email address: _____

***Authorities:** Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Program of the U.S. Army Corps of Engineers; Final Rule for 33 CFR Parts 320-332.
**Principal Purpose:** The information that you provide will be used in evaluating your request to determine whether there are any aquatic resources within the project area subject to federal jurisdiction under the regulatory authorities referenced above.
**Routine Uses:** This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public, and may be made available as part of a public notice as required by federal law. Your name and property location where federal jurisdiction is to be determined will be included in the approved jurisdictional determination (AJD), which will be made available to the public on the District's website and on the Headquarters USACE website.
**Disclosure:** Submission of requested information is voluntary; however, if information is not provided, the request for an AJD cannot be evaluated nor can an AJD be issued.

# APPENDIX C

Class III Pedestrian Archaeological Survey for the Malmstrom Air Force Base Launch Facility LF D-02 Drainage Project in Fergus County, Montana

# Class III Pedestrian Archaeological Survey for the Malmstrom Air Force Base Launch Facility LF D-02 Drainage Project in Fergus County, Montana

*Prepared by Ethnotech LLC on behalf of WET ENGINEERING*

*The opinions expressed within are solely those of Ethnotech LLC*

Contains Sensitive Information – Not for Public Distribution. For Official Use Only. As per Section 304 of the National Historic Preservation Act [16 U.S.C. 470w-3], and Section 9 of the Archaeological Protection Act [16 U.S.C. 470aa-mm], the contents of this document are exempted from disclosure under the Freedom of Information Act [5 U.S.C. 552].

# Class III Pedestrian Archaeological Survey for the Malmstrom Air Force Base Launch Facility LF D-02 Drainage Project in Fergus County, Montana

*Prepared by Ethnotech LLC on behalf of WET Engineering*

*By Alex Schwab and David C. Schwab*

*The opinions expressed within are solely those of Ethnotech LLC*



September 2020

# Contents

# Executive Summary

Ethnotech LLC was contracted by WET Engineering to conduct a Class 3 pedestrian archaeological survey for the Malmstrom Air Force Base Launch Facility LF Delta 02 (LF-D02) Drainage Project, in order to fulfill the requirements of Section 106 of the National Historical Preservation Act and requirements of the National Environmental Policy Act. The purpose of the project is to prevent excess subsurface groundwater from entering the missile silo and subsurface structures at LF D-02. The proposed action is to install a series of shallow dewatering wells at the Launch Facility (LF) to drain excess water and channel it via subsurface piping to a nearby natural drainage. Other alternatives include out letting the drainage pipe directly into the drainage gully rather than ending it in the soil to seep into the drainage; piping to a nearby county road drainage ditch and allowing it to run along the ditch; or continuing to pump the water out of the structures to just outside the LF fence onto the neighboring farmer's field (No Action).

The Area of Potential Effect (APE) for the proposed action and its alternatives are shown below in Figures 1 -2. The APE is located in Township 21N Range 15E section 35. A file search with the Montana State Historic Preservation Office (SHPO) revealed no existing cultural resources have been documented within the Public Land Survey System (PLSS) section of the proposed action and only one prior cultural resource inventory was on record. In addition, a review of historic topographic maps, aerial photos, and General Land Office (GLO) maps showed no indications of potential historic properties. Field survey was conducted on August 19th, 2020 by David Schwab and Alex Schwab. Transect spacing was ten meters on average and surface visibility was good because the APE was in a recently harvested wheat field. A total of approximately four acres were intensively surveyed. No cultural resources were noted as a result of the survey. As a result, the proposed action and the alternatives will have no significant impact to cultural resources.

# Introduction

The following report by Ethnotech summarizes the results of a Class 3 pedestrian archaeological survey for the Malmstrom Air Force Base Launch Facility LF D-02 Drainage Project, coordinated by WET Engineering and sponsored by the US Air Force, in order to fulfill the requirements of Section 106 of the National Historical Preservation Act and the National Environmental Policy Act. The purpose of the project is to prevent excess subsurface groundwater from entering the missile silo and subsurface structures at LF D-02. The proposed action is to install a series of shallow dewatering wells at the Launch Facility (LF) to drain excess water and channel it via subsurface piping to a nearby natural drainage. A lateral segment of pipe would be placed underground across an agricultural field for a distance of approximately 426 meters from the LF D-02 facility to the drainage channel. Alternatives include 1) out letting the drainage pipe directly into the drainage gully; 2) piping underground 250 feet to a nearby county road drainage ditch and allowing overflow to run along the ditch; or 3) continuing to pump the water out of the structures to just outside the LF fence onto the neighboring farmers field (No Action Alternative).

The project is located in Township 21 North, Range 15 East, Section 35, primarily in the southwest (SW) quarter. The Area of Potential Effect (APE) for the proposed action includes a 30-meter buffer centered on the proposed buried drainage pipe. The alternative of piping excess water to the road drainage ditch rather than the natural drainage is also part of the APE. This too consists of a 30-meter buffer surrounding the proposed location of the drainage pipe (see Figures 1 and 2). The total acreage for the proposed action and all alternatives is four acres.

# Environmental Setting

The project area lies in the Great Plains physiographic province and is bordered by the Northern Rockies immediately to the west. The Great Plains are an enormous grass covered region covering much of central North America, while the Northern Rockies are a series of glaciated mountains running from Montana north to Alaska. The project area is considered part of the Northwestern Great Plains level 3 Ecoregion (Omerick 2014). The ecoregion covers an area spanning from the Missouri Plateau south to portions of Wyoming and South Dakota; and extends from the Rockies east to the Dakotas. It features a semi-arid continental climate, resulting in extreme cold and heat in the winter and summer. Spear grass, blue grama and wheatgrass dominate the vegetation cover in undeveloped portions of the area. Scrubby aspen, willow, cottonwood and box elder occur along riverine and riparian settings. Animals common to the region include grizzly bear, wolf, mountain lion, rabbit, red fox, mule deer, coyote, prairie dog, elk, pronghorn, badgers and bison.

The area is underlain primarily by Cretaceous sedimentary formations with a few igneous intrusions making up island like mountain ranges within the open plains such as the Highwood Mountains just west of the APE (Alt and Hyndman 1986). During the Cretaceous, portions of the Pacific Ocean intruded into the center of North America, leaving behind the sedimentary formations and the dinosaur fossils that are found within them. More specifically, the project is located near Denton, Montana in the Missouri River Breaks. The regional topography is characterized by undulating flat plains, badlands and buttes, and numerous steep and deeply incised drainages leading to the Missouri River. The Missouri has incised several hundred feet into the plains in some areas, exposing the glacial sediments and large deposits of glacial lake deposited clay beneath those sediments. The APE lies between two south to north trending tributaries of the Missouri River, the Judith River to the east and the Arrow Creek Coulee to the west.

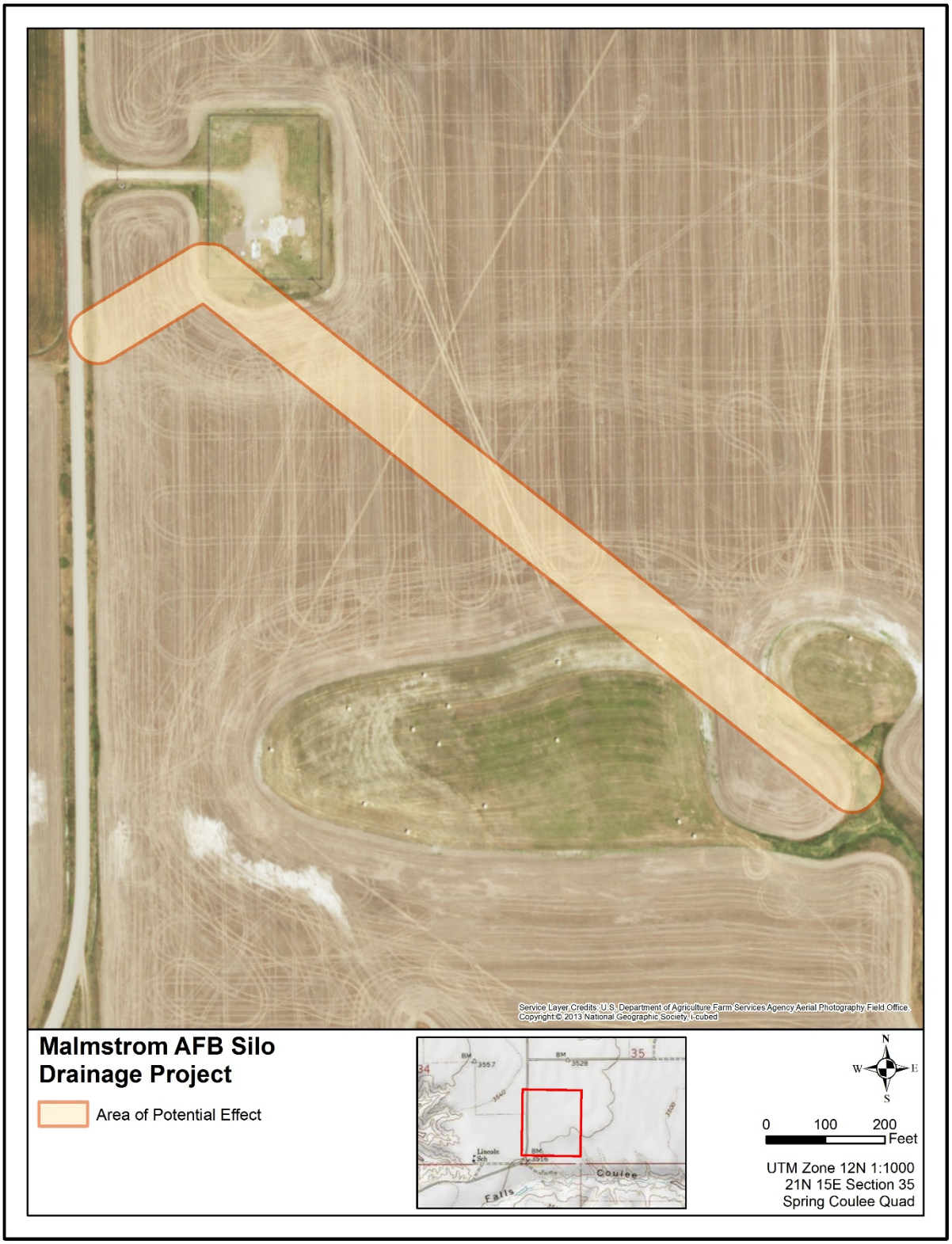



*Figure 1 Project APE showing environmental setting*

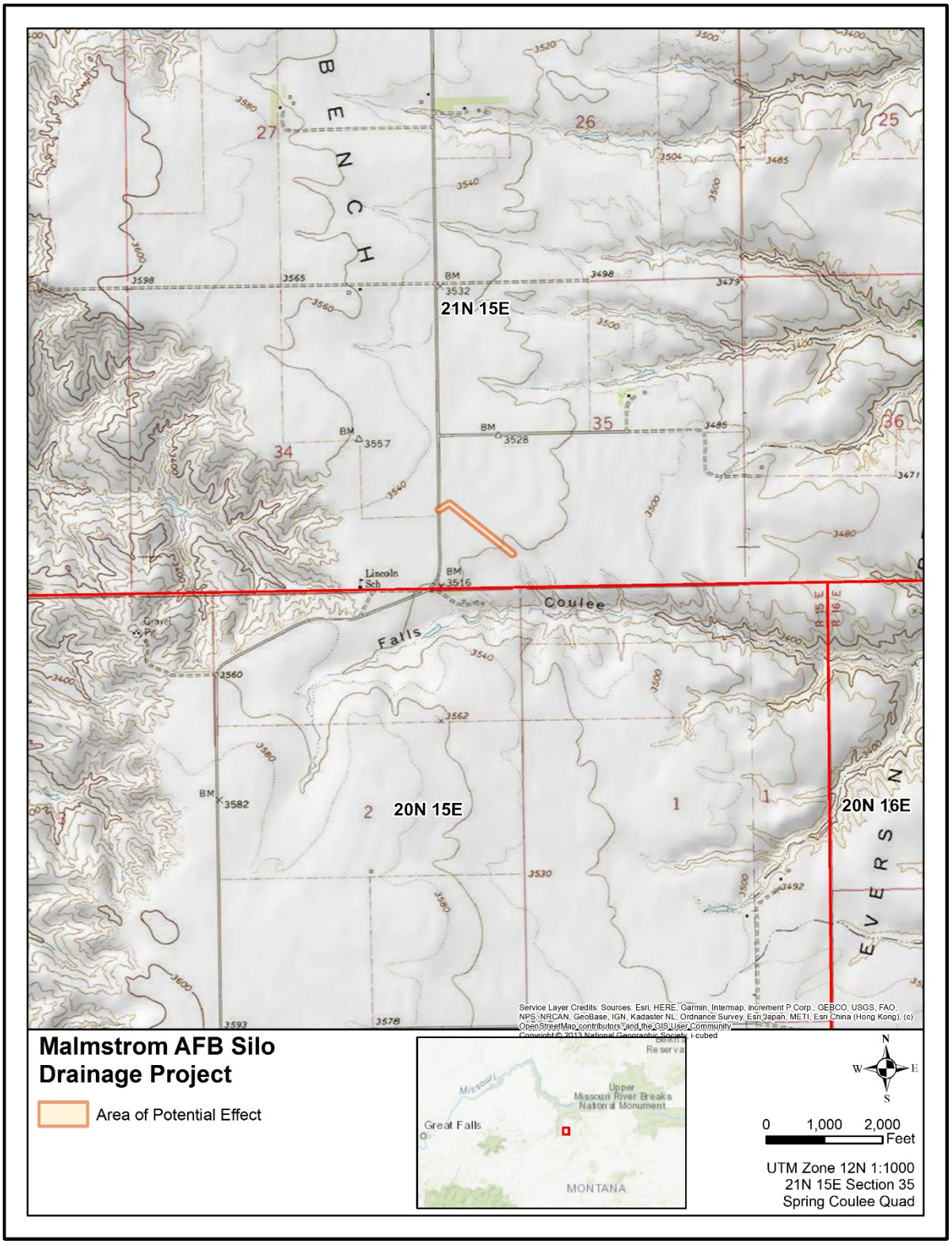



*Figure 2 Project APE on USGS Topo*

# Prehistoric Overview

The following prehistoric overview is based primarily on the chronologies developed for the Northwestern Plains by Kornfeld (2015) and Frison (2001). The primary evidence used by archaeologists to group precontact time periods comes from point styles and chronological changes in typology observed from several stratified sites in the region. What follows is an abbreviated summary of these sources

### *Paleoindian Period 11,000 Years Before Present (BP) to 8,000 BP*

The Paleoindian period is frequently subdivided into the Early (11,000 – 10,000) and Late (10,000-8,000) subperiods but will be discussed here as a single unit. The Paleoindian period begins with the northward retreat of the Cordilleran Ice Sheet from northern Montana, an event marking the transition from the Pleistocene to the Holocene. The transition was not a uniform and direct warming trend. Instead, the transition featured considerable variations in precipitation, temperature and seasonality operating on many time scales and producing different effects depending on the region. The climatic variability during this time results from the swift and dramatic effects that orbital, solar, atmospheric and oceanic forces exert on climate. These forces temporarily slowed down or accelerated the general warming trend marking the end of the ice age (Kornfeld et al. 2015:34–39). The resulting climate has no modern equivalent and major shifts in weather patterns occurred over relatively short time spans, in turn effecting the availability and distribution of critical resources for human populations. These conditions challenged early hunter gatherers and had a limiting effect on the achievable population growth.

The earliest identified people of this period are known as the Clovis Culture. Evidence suggests Clovis peoples and later Paleoindian peoples were highly mobile hunter gatherers who typically travelled in small groups and subsisted by practicing a broad spectrum of hunting and foraging activities. Clovis people in the foothills of the Rockies were known to hunt with characteristic fluted spear points that were frequently made from high quality and locally available lithic sources. By 10,900 BP, many megafaunas, including the mammoth, had become extinct. Reasons for the extinction are debated, but appear to be related to hunting pressure and the abrupt climate shift known as the Younger Dryas that occurred around 10,900 BP. However, other Bison species survived and even flourished on the enormous grasslands of the plains. As a result, Paleoindian peoples began to specialize in Bison hunting after 10,900 BP and their point technology changed to lanceolate and lanceolate stemmed style points. These point styles are interpreted to represent different cultural complexes of Paleoindians that followed and sometimes overlapped the Clovis culture. Goshen, Agate Basin, Folsom and Cody complexes are the most prominent in the region until about 8,000 BP. The Hell Gap site in Wyoming is particularly useful for Paleoindian chronology as it contains nearly all the above-mentioned cultural complexes in a well dated and stratified context. Other sites important for establishing Paleoindian chronology in the region include Pictograph Cave, Agate Basin, MacHaffie and the Anzick site.

### *Early Archaic Period (8,000 – 5,000 BP)*

Beginning around 8,000 BP a dramatic shift in global climate occurred. Referred to as the Altithermal or Holocene Climate Optimum, it resulted in warmer and drier conditions across much of the Northwestern Plains. The shift resulted from the final melting of the Pleistocene glaciers in the north and a massive influx of fresh water to the North Atlantic. These events disrupted major systems that influence climate and weather patterns such as atmospheric circulation patterns, ocean currents and ocean temperatures. Evidence for the warming and drying trend can be found in regional pollen records, lake sediment cores

and sand dune geomorphology (Kornfeld 2015:34-39). Pollen records show that floral species better adapted to drought and warmer temperatures began to replace previously existing vegetation. Lake sediment cores show increased dust accumulations attributed to increased aridity and soil erosion by wind. Finally, several dune fields in central Wyoming expanded at this time. With the shifting climate came the extinction of Bison antiquus and the emergence of the smaller Bison bison. While the general warming and drying trend is well documented, there is evidence to suggest that it varied in severity and overall impact to resource availability across the highly diverse environment of the Northwestern Plains.

The period is characterized by the emergence of side notched dart points used with the atlatl which appeared to abruptly replace older point forms (Frison 2001:135). The variety of side notched point types increases in this period compared to the stemmed points of the Paleoindian period. Subsistence strategies appear to have generally diversified across much of the Northwestern Plains during this period as well (Frison 2001: 131). While faunal remains from this period are scarce, they indicate a notable lack of bison except for a few bison kill sites in the Black Hills of Wyoming. This is likely because hotter and drier conditions negatively impacted the grasslands on which bison rely, thus their population was reduced and one species, Bison antiquus, even went extinct. Another hallmark of this period is the emergence of new more sophisticated vegetal processing tools such as manos and grinding slabs and the use of distinctive fire pits for the preparation of vegetable foods. Both technological changes are well represented at the Lookingbill site in Wyoming and provide evidence for the necessary diversification of subsistence strategies following the decline in bison.

Finally, the Early Archaic is when the first use of pit houses can be found in eastern Wyoming and southern Montana. These subterranean dwellings were likely positioned near known resource areas and functioned both to stay cool in the summer and keep warm in the winters. Their appearance suggests a different settlement pattern where residents were tethered to home territories and had limited travel ranges likely due to water scarcity (MacDonald 2017:74). The best documented site used to develop Early Archaic chronology is Mummy Cave in northern Wyoming. This site featured a range of point forms that span the entire period and are securely dated. Other prominent Early Archaic sites in the region include the Head Smashed In site and the Myers-Hyndmann site.

### *Middle Archaic Period (5,000 to 3,000 BP)*

The climate stabilized and became generally cooler and wetter during the Middle Archaic period. This has been called the Medithermal by climate researchers. The moister conditions restored the productivity of the grasslands of the plains and bison populations began to thrive once again. Hunter gatherers responded by intensifying bison hunting, though they maintained a broad spectrum of subsistence activities like those practiced in the Early Archaic. There is a marked increase in the number of sites regionally that feature a Middle Archaic component versus an Early Archaic component. This has been interpreted by some to represent a population increase, and data from state archives show a 25-50% increase in sites that would seem to support this conclusion (MacDonald 2017:74). However, others have attributed the increase to better site preservation during the Middle Archaic (due both to more favorable climate conditions and less time elapsing) as well as population migrations.

Point technology shifted once again during this time and most points feature a bifurcate form, meaning they have indented or concave bases. The most common points of this style are the Oxbow and McKean points, both of which have indented bases. Duncan and Hanna points are also common in this period, and there is still lively debate about relationships between, and significance of, these various point forms.

Pit houses became more common in the Middle Archaic as well in Eastern Montana. One of the best documented Middle Archaic sites in Montana is the Sun River site near Great Falls, MT. The has a continuous occupation throughout the Middle Archaic and captures the general shift toward bison hunting that begins during this period. The earliest components of the site (5,500 BP) indicate pronghorn were favored initially, though by 4,500 BP, bison became dominant in the faunal record. Oxbow points were the most common point form noted.

### *Late Archaic Period (3,000 to 1,500 BP)*

The climate of this period is essentially analogous to the modern-day climate. While subsistence strategies at this time still used a broad-spectrum approach, bison hunting was intensified. The emergence of large-scale buffalo jumps, complete with drivelines and cairns meant to funnel animals to a cliff, became more common and more intensively used during this period. Sites such as the Head Smashed In and Old Woman's Buffalo jump are prominent examples of these communal hunting areas, and both are within the aboriginal territory of the Blackfeet tribes. Oral traditions of the Blackfeet demonstrate a long-standing familiarity with these sites and the techniques used to execute the bison jumps (Zedeno 2017, 2014).

The most recognizable diagnostic artifacts from this period are the corner notched Pelican Lake point and the side notched Beasant point. Both were still used with the atlatl. With the increased mobility and accumulation of bison products came an opportunity for expanded trade that linked the Northwest Plains with faraway regions like the Ohio River Valley and Northwest Coast. For example, obsidian from Yellowstone and Knife River Flint from South Dakota begin to show up in sites as far away as Ohio. In addition, several Plateau tribes made yearly sojourns to buffalo country to hunt, socialize, exchange marriage partners and trade their own local goods for bison and other products (Malouf 1956).

### *Late Precontact Period (1,500 to 300 BP)*

Two major developments distinguish this period. First, bison hunting became the dominant subsistence activity on the Northwest Plains as evidenced by the increase in the number of buffalo jump sites and the frequency of their use. Second, the bow and arrow replaced the atlatl as the primary hunting technology. Both developments led to a population expansion at this time. With expanded population came increased territoriality, social complexity and the first examples of more permanent settlement strategies including the emergence of village sites (MacDonald 2012; Zedeno 2014). Villages were rare in Montana, with the exception of the Hagen site, but were more common in the surrounding regions of British Columbia and the Missouri River in the Dakotas.

In addition to intensified bison hunting, better techniques were developed to process and store the resources the communal hunts provided. Communal deer, sheep, and antelope game drive sites are also documented from this time period in the High Plains and Northern Rockies (Kornfeld, et al. 2010:291-340, Frison 1991:251-276). Plains hunters began to use dogs rigged with travois to help meet the increased need for mobility resulting from intensified bison hunting. They were particularly useful for transporting the tipi, a portable and resilient residential structure that became important to life on the Northwest Plains. Tipi rings are the most common and abundant site types in the region today, indicating their pervasive use.

Smaller corner and side notched Avonlea and Old Woman's phase points, used with the bow and arrow, replaced the Beasant and Pelican Lake forms during this period. Bow technology contributed to the

increased success of hunting and the adoption of this technology was as widespread across the region as it was abrupt. Some prominent sites from this period in Montana include a number of buffalo jumps such as the Madison River, First Peoples, Tongue River and Boarding School sites. The Old Woman's bison jump in Alberta is near the Head Smashed In jump and both are associated with Blackfeet peoples (Reeves 2003:37).

### *Protohistoric*

By the early 1700s, the horse had been introduced into western Montana and spilled out onto the Northern Plains unleashing a chain reaction of cultural and geopolitical changes. In about 1650, when the horse first arrived, the Shoshone, Salish, Pend d 'Oreille and Kootenai were numerous people who occupied intermountain valleys on both sides of the continental divide with several major camps located on the Eastern Rocky Mountain Front. Their influence extended across the Clark Fork River and Upper Missouri River plains. Some of the earliest historic records from the Northern Plains suggest that there was a rapid military expansion of these western Tribes onto the Northern Plains soon after the introduction of the horse. At some time during the early to mid-1700s, an alliance was formed among the Shoshone, Salish and Kootenai Tribes to oppose incursions of Algonquian speaking groups from the north. By the middle 1780s this western alliance controlled most of the Upper Missouri and extended north into the Saskatchewan River basin. In about 1800, David Thompson wrote: *All these Plains, which are now the hunting grounds of the Indians, were formerly in full possession of the Kooteanaes, northward; the next the Saleesh and their allies, the most southern, the Snake Indians…* (Thompson, 1962:240-241).

The Western alliance was not long lived and the balance of power shifted as horses rapidly percolated towards the Algonquian speaking bands and the Crow Indians. Starting about 1700, war parties of Plains Blackfeet began moving south from the Eagle Hills and Saskatchewan River into the Upper Missouri River country. The northern-most bands of Pend d 'Oreille and Kootenai felt the greatest brunt of the Blackfeet Confederacy made up of Piegan, Blackfeet, and Blood bands. A later alliance among the Blackfeet Confederacy, Assiniboine, Cree and Gros Ventres increased the military strength of the Plains Coalition against the Western Tribes. Blackfeet war parties rapidly expanded southward. They had superior numbers, perhaps as much as three times the population of the Salish and Kootenai by the 19th century. They fielded numerous small horse stealing parties into Salish and Kootenai territory, and often combined to form large military units of 200 or more warriors to attack Salish and Kootenai camps (Thompson, 1962:253).

In 1780, this already destabilized tribal world was further rocked when the Blackfeet began securing firearms through the Hudson's Bay Company (HBC) following the establishment of Buckingham House on the Saskatchewan River. By then, the Blackfeet had already dramatically expanded their range to the south and the west, pushing Kootenai, Salish, and Pend d 'Oreille winter camps west of the mountains. The acquisition of the gun by the Blackfeet turned the military tide on the plains. According to Odgen speaking about the Salish, " a few years anterior to the period of which I am writing, a fatal advantage obtained by the Blackfeet at length destroyed the balance of power, and told with murderous effect against the Flatheads. This was the acquisition of fire-arms; which implement of warfare the former obtained by traffic, through their proximity to the American frontiers, long before the more secluded Flatheads were acquainted with its use, save in its deadly effect upon the ranks of their most valued warriors. More recently, however, their intercourse with the Columbia traders had furnished the weaker party with the means of repelling the attacks of their oppressors, but not before their numbers had been reduced, through the causes alluded to, far beneath 20 that of the rivals (Ogden 1933:11-12)."

Saukamappee, an elderly Cree man who had lived most of his life among the Blackfeet, told David Thompson of the changes that took place in their wars with the western tribes after the Blackfeet had acquired European weapons: "...our wars have since been carried out by ambuscade and surprise, of small camps, in which we have greatly the advantage from the guns, arrows shod with irons, long knives, flat bayonets and axes from the Traders. While we have these weapons, the Indians have none, but what few they sometimes take from one of our small camps which they have destroyed (Thompson 1962:245)." At the time of Lewis and Clark's arrival in western Montana, Tribes had already been reduced in large numbers by intertribal warfare. But European-introduced diseases also took a heavy toll in the 18th and 19th centuries. A series of smallpox epidemics struck the Northern Plains from about 1760 to 1781. The 1780-81 smallpox epidemic was particularly devastating, and it is the best documented of these early scourges. It began in the American southwest among the Spanish settlers in Texas and spread to the Comanches, and then to New Mexico where 5000 Pueblo people died. Spreading north the disease attacked the Shoshone people and was thereby spread northward to the Salish, Pend d 'Oreille, Crees, Blackfeet, Crows, and Assiniboine.

David Thompson, who was on the plains shortly after the epidemic, estimated that from half to three fifths of the Native people of the Northern Plains and Rocky Mountains lost their lives (Thompson 1962:235-236). Bitterroot Salish and Pend d' Oreille bands were particularly hard hit by this epidemic, and entire villages were wiped out (Teit 1928:315). The death and suffering that occurred in the Rocky Mountains and the Plains from the various smallpox and other epidemics can never be fully determined, but it was clearly catastrophic. It is difficult to determine exactly, but populations may have been reduced by as much as from 45 to 90% during the period from 1750 to 1805 by disease (Boyd 1999). By the time the Lewis and Clark expedition had arrived in Western Montana, in 1805, the tribes' populations and their traditional lifeways had already been changed profoundly.

### *Historic Era*

With the purchase of the Louisiana Territory in 1803, westward expansion accelerated. Lewis and Clark passed through this area along the Missouri River north of the APE on their expedition into the West, followed shortly thereafter by early trappers, traders, and missionaries. Many travelers arrived by steamboat on the Missouri and reached the gateway to the West at Fort Benton. Some notable trappers, traders and military men who passed through the area include Prince Maximillian and Karl Bodmer, Ferdinand Hayden, General John Mullan, David Thompson, Father Pierre DeSmet and Granville Stuart. The journals, scientific documentation, vivid drawings and maps resulting from these expeditions provided the foundation for later colonization.

Gold was discovered in Montana Territory in the 1860's, leading to a series of booms and busts across many small towns in the region. The demand for transportation of people into the mines, coupled with potential profits for transportation of raw materials from the mines, attracted the attention of railroad magnates. This led to a significant change in the area beginning with the construction of the Montana Central Railroad and culminating with its merger with the St. Paul, Minneapolis and Manitoba Railroad across the Hi-Line in 1889, which led to the formation of the Great Northern Railway. This route ran west of nearby Lewistown on a northeast to southwest course connecting Butte and Havre. Early Euromerican Settlement was further facilitated by a series of Federal land acquisition laws. The earliest of those laws to impact settlement in the study area was the Land Act of May 1878 which led to the establishment of a handful of homesteads in the region. The land act with the greatest impact on Fergus County was the Enlarged Homestead Act of 1909. The act provided for homesteads of 320 acres of non-irrigable land,

one quarter of which was to be cultivated. Settlers came to the region in large numbers, facilitated by transportation and promotion from the railroads as the Great Northern Railroad arrived in Lewistown in 1903.

This onslaught was almost immediately halted by the dry summer of 1918 and extreme winter of 1919. The extreme conditions forced many to abandon their homesteads, especially those on poorer land. Many moved into nearby towns and cities, others moved west or back to their homelands in the east. A second wave of homesteaders followed in the early 1920s to take up lands abandoned by earlier settlers. Eventually, a core of individuals remained, and those families make up the historic fabric of the Fergus County community.

## Background Research

A search of the SHPO Cultural Resource Annotated Bibliography System (CRABS) and Cultural Resource Information System (CRIS) was conducted on August 17th, 2020 (SHPO Project #: 2020081705). The search area included all PLSS sections that the APE encompassed with a 500m buffer. Only one previous cultural resource survey was conducted nearby in the same section of the APE by John Brumley in 2014. The cultural investigation was in regard to a telephone wire project running through the area. Only a small amount of acreage surrounding the proposed route of the telephone line was surveyed within Township 21N R15E Section 35, and no cultural resources were noted. The GLO for Township 21N Range 15E similarly revealed no site leads within the project APE, nor did historic aerial imagery or USGS topo maps.

# Survey Methods

The Project APE was surveyed on August 19th, 2020 by David Schwab and Alex Schwab. Pedestrian survey transects were spaced at 10m, on average, and all four acres of the APE were inventoried. Surface visibility was ranged from 50 – 75% and was generally good as the agricultural field in which the proposed buried pipeline will be placed was recently harvested. No shovel tests were conducted in the project area due to the substantial prior agricultural disturbance along the buried pipeline route. Visibility was much lower in the active drainage area where the southeast end of the proposed drainage pipe would terminate since tall grasses dominate there. Transects were condensed to within 1-2 meters in the small segment of the drainage that was within the APE.

# Results

No cultural resources were noted during the survey. The APE is entirely within an agricultural field that has likely been plowed seasonally over decades, severely limiting its potential for undisturbed cultural resources. Photos showing the APE and survey conditions are provided below (Figures 3-6).

# Discussion and Conclusion

No cultural resources were identified within the project APE. The proposed action will have no significant impact to historic properties. Similarly, the proposed alternatives will have no impact to significant cultural resources.

*Figure 3 Overview of project area, taken from SW corner of Launch Facility facing SW showing route of alternative drainage pipe leading to road ditch*

*Figure 4 Project area from midpoint of main proposed action pipeline facing NW*

*Figure 5 Overview of natural drainage channel where drainage pipe will end, facing SE*

*Figure 6 Overview of survey conditions in recently harvested field, facing NE*

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# APPENDIX D

Air Conformity Applicability Model Report of Conformity Analysis (ROCA)

# AIR CONFORMITY APPLICABILITY MODEL REPORT
# RECORD OF AIR ANALYSIS (ROAA)

**1. General Information:** The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

**a. Action Location:**

**Base:** MALMSTROM AFB
**State:** Montana
**County(s):** Fergus
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**b. Action Title:** Launch Facility D-02 Dewatering Alternative 1

**c. Project Number/s (if applicable):** NA - Alternative 1

**d. Projected Action Start Date:** 2 / 2022

**e. Action Description:**

Alternative 1 (Preferred Alternative): Install an interceptor trench around the perimeter of the site to dewater the silo and subsurface structures at LF D-02, an additional toe drain would be installed along the base of the LSB for added protection from snow and rain as well as any groundwater that may circumvent the interceptor trench. The sump pump discharge lines would be tied into the new toe drain to eliminate the need for the existing surface discharge location. The toe drain and sump pump discharge lines would be connected to the lateral pipe associated with the interceptor trench. Fugitive water would be collected from the interceptor trench, toe drain, and sump pump then transported south across adjacent agricultural lands via a subsurface pipeline and discharged to a nearby ephemeral drainage. The lateral pipe would discharge water through a subsurface infiltration header that would run parallel to the top of the ephemeral drainage allowing the water to seep into the ground mimicking the natural infiltration process. The existing monitoring wells would be abandoned at the completion of the project, in accordance with the Administrative Rules of Montana.

**f. Point of Contact:**


**Name:** Stephen Coe
**Title:** Senior Engineer
**Organization:** Water & Environmental Technologies
**Email:** scoe@waterenvtech.com
**Phone Number:** 406-299-9858


**2. Air Impact Analysis:** Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving "steady state" (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the USAF Air Emissions Guide for Air Force Stationary Sources, the USAF Air Emissions Guide for Air Force Mobile Sources, and the USAF Air Emissions Guide for Air Force Transitory Sources.

# AIR CONFORMITY APPLICABILITY MODEL REPORT
# RECORD OF AIR ANALYSIS (ROAA)

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are "Clearly Attainment" (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are "Near Nonattainment" (i.e., within 5% of any NAAQS). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

The action's net emissions for every year through achieving steady state were compared against the Insignificance Indicator and are summarized below.

**Analysis Summary:**

**2022**

| Pollutant | Action Emissions (ton/yr) | INSIGNIFICANCE INDICATOR | |
|---|---|---|---|
| | | Indicator (ton/yr) | Exceedance (Yes or No) |
| NOT IN A REGULATORY AREA | | | |
| **VOC** | 0.514 | 250 | No |
| **NOx** | 3.064 | 250 | No |
| **CO** | 3.043 | 250 | No |
| **SOx** | 0.009 | 250 | No |
| **PM 10** | 4.615 | 250 | No |
| **PM 2.5** | 0.123 | 250 | No |
| **Pb** | 0.000 | 25 | No |
| **NH3** | 0.001 | 250 | No |
| **CO2e** | 836.9 | | |

**2023 - (Steady State)**

| Pollutant | Action Emissions (ton/yr) | INSIGNIFICANCE INDICATOR | |
|---|---|---|---|
| | | Indicator (ton/yr) | Exceedance (Yes or No) |
| NOT IN A REGULATORY AREA | | | |
| **VOC** | 0.000 | 250 | No |
| **NOx** | 0.000 | 250 | No |
| **CO** | 0.000 | 250 | No |
| **SOx** | 0.000 | 250 | No |
| **PM 10** | 0.000 | 250 | No |
| **PM 2.5** | 0.000 | 250 | No |
| **Pb** | 0.000 | 25 | No |
| **NH3** | 0.000 | 250 | No |
| **CO2e** | 0.0 | | |

None of estimated annual net emissions associated with this action are above the insignificance indicators, indicating no significant impact to air quality.Therefore, the action will not cause or contribute to an exceedance on one or more NAAQSs.No further air assessment is needed.

_____ _____

Stephen Coe, Senior Engineer DATE

# DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

## 1. General Information

**- Action Location**

**Base:** MALMSTROM AFB
**State:** Montana
**County(s):** Fergus
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Action Title:** Launch Facility D-02 Dewatering Alternative 1

**- Project Number/s (if applicable):** NA - Alternative 1

**- Projected Action Start Date:** 2 / 2022

**- Action Purpose and Need:**

Malmstrom Air Force Base (MAFB) is proposing the completion of a military-construction (mil-con) project at Launch Facility (LF) Delta-02 (D-02). The proposed project is located in a rural area of Fergus County, within T21N, R15E, Section 35, approximately 18-miles north of Denton, Montana (Figure 1a & 1b). The proposed action would install an interceptor trench around the perimeter of the facility to divert surface and groundwater from entering the site and reaching the launch support building (LSB) and missile silo. To facilitate dewatering of the facility silo and subsurface structures, captured water would be transported south across adjacent agricultural lands via a subsurface pipeline and discharged to a nearby ephemeral drainage. The discharge location is approximately 0.2-miles from Falls Coulee, which is approximately 4.5-miles from Wolf Creek, a tributary to the Judith River.

The purpose of the Proposed Action is to install a more effective dewatering system at D-02 which will prevent surface and groundwater from entering the LSB and the silo. The Proposed Action would replace the existing system which discharges captured water to the ground surface adjacent to the LSB and silo, allowing it to reinfiltrate. This results in capture and pumping of the same water through the system and does not effectively dewater the facility structures.

**- Action Description:**

Alternative 1 (Preferred Alternative): Install an interceptor trench around the perimeter of the site to dewater the silo and subsurface structures at LF D-02, an additional toe drain would be installed along the base of the LSB for added protection from snow and rain as well as any groundwater that may circumvent the interceptor trench. The sump pump discharge lines would be tied into the new toe drain to eliminate the need for the existing surface discharge location. The toe drain and sump pump discharge lines would be connected to the lateral pipe associated with the interceptor trench. Fugitive water would be collected from the interceptor trench, toe drain, and sump pump then transported south across adjacent agricultural lands via a subsurface pipeline and discharged to a nearby ephemeral drainage. The lateral pipe would discharge water through a subsurface infiltration header that would run parallel to the top of the ephemeral drainage allowing the water to seep into the ground mimicking the natural infiltration process. The existing monitoring wells would be abandoned at the completion of the project, in accordance with the Administrative Rules of Montana.

**- Point of Contact**


**Name:** Stephen Coe
**Title:** Senior Engineer
**Organization:** Water & Environmental Technologies
**Email:** scoe@waterenvtech.com
**Phone Number:** 406-299-9858

# DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

**- Activity List:**

| Activity Type | | Activity Title |
|---|---|---|
| 2. | Construction / Demolition | Dewatering Install |

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

## 2. Construction / Demolition

### 2.1 General Information & Timeline Assumptions

**- Activity Location**
**County:** Fergus
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** Dewatering Install

**- Activity Description:**
Excavation and installation of dewatering pipline, including regrading and stabilation.

**- Activity Start Date**
**Start Month:** 2
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 11
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.513710 |
| $SO_x$ | 0.008531 |
| $NO_x$ | 3.064069 |
| CO | 3.042754 |
| PM 10 | 4.615120 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.123488 |
| Pb | 0.000000 |
| $NH_3$ | 0.001091 |
| $CO_2e$ | 836.9 |
| | |

### 2.1 Site Grading Phase

#### 2.1.1 Site Grading Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 2
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 6
**Number of Days:** 0

#### 2.1.2 Site Grading Phase Assumptions

# DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

**- General Site Grading Information**

**Area of Site to be Graded ($ft^2$):** 37625
**Amount of Material to be Hauled On-Site ($yd^3$):** 0
**Amount of Material to be Hauled Off-Site ($yd^3$):** 0

**- Site Grading Default Settings**

**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Excavators Composite | 1 | 8 |
| Graders Composite | 1 | 6 |
| Other Construction Equipment Composite | 1 | 8 |
| Rubber Tired Dozers Composite | 1 | 6 |
| Scrapers Composite | 2 | 8 |
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**

**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**

**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

## 2.1.3 Site Grading Phase Emission Factor(s)

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| **Excavators Composite** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0648 | 0.0013 | 0.3170 | 0.5103 | 0.0136 | 0.0136 | 0.0058 | 119.72 |
| **Graders Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Scrapers Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.1723 | 0.0026 | 1.1176 | 0.7579 | 0.0447 | 0.0447 | 0.0155 | 262.87 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.343 | 000.002 | 000.257 | 003.756 | 000.010 | 000.009 | | 000.022 | 00313.875 |
| LDGT | 000.400 | 000.003 | 000.434 | 004.961 | 000.012 | 000.011 | | 000.024 | 00404.284 |
| HDGV | 000.657 | 000.005 | 001.065 | 014.900 | 000.026 | 000.023 | | 000.044 | 00740.723 |
| LDDV | 000.141 | 000.003 | 000.139 | 002.353 | 000.004 | 000.004 | | 000.008 | 00301.516 |
| LDDT | 000.270 | 000.004 | 000.389 | 003.971 | 000.007 | 000.006 | | 000.008 | 00428.585 |
| HDDV | 000.614 | 000.013 | 005.915 | 001.983 | 000.169 | 000.155 | | 000.030 | 01487.496 |
| MC | 002.246 | 000.003 | 000.875 | 013.744 | 000.028 | 000.025 | | 000.055 | 00398.991 |

### 2.1.4 Site Grading Phase Formula(s)

**- Fugitive Dust Emissions per Phase**

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**

$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

## 2.2 Trenching/Excavating Phase

### 2.2.1 Trenching / Excavating Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 2
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 6
**Number of Days:** 0

### 2.2.2 Trenching / Excavating Phase Assumptions

**- General Trenching/Excavating Information**
**Area of Site to be Trenched/Excavated ($ft^2$):** 37625
**Amount of Material to be Hauled On-Site ($yd^3$):** 5575
**Amount of Material to be Hauled Off-Site ($yd^3$):** 0

**- Trenching Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Excavators Composite | 2 | 8 |
| Other General Industrial Equipmen Composite | 1 | 8 |
| Tractors/Loaders/Backhoes Composite | 1 | 8 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**

**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

### 2.2.3 Trenching / Excavating Phase Emission Factor(s)

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| **Excavators Composite** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0648 | 0.0013 | 0.3170 | 0.5103 | 0.0136 | 0.0136 | 0.0058 | 119.72 |
| **Graders Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Scrapers Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.1723 | 0.0026 | 1.1176 | 0.7579 | 0.0447 | 0.0447 | 0.0155 | 262.87 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.343 | 000.002 | 000.257 | 003.756 | 000.010 | 000.009 | | 000.022 | 00313.875 |
| LDGT | 000.400 | 000.003 | 000.434 | 004.961 | 000.012 | 000.011 | | 000.024 | 00404.284 |
| HDGV | 000.657 | 000.005 | 001.065 | 014.900 | 000.026 | 000.023 | | 000.044 | 00740.723 |
| LDDV | 000.141 | 000.003 | 000.139 | 002.353 | 000.004 | 000.004 | | 000.008 | 00301.516 |
| LDDT | 000.270 | 000.004 | 000.389 | 003.971 | 000.007 | 000.006 | | 000.008 | 00428.585 |
| HDDV | 000.614 | 000.013 | 005.915 | 001.983 | 000.169 | 000.155 | | 000.030 | 01487.496 |
| MC | 002.246 | 000.003 | 000.875 | 013.744 | 000.028 | 000.025 | | 000.055 | 00398.991 |

### 2.2.4 Trenching / Excavating Phase Formula(s)

**- Fugitive Dust Emissions per Phase**

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment

WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**

$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

# AIR CONFORMITY APPLICABILITY MODEL REPORT
# RECORD OF AIR ANALYSIS (ROAA)

**1. General Information:** The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

**a. Action Location:**

**Base:** MALMSTROM AFB
**State:** Montana
**County(s):** Fergus
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**b. Action Title:** Launch Facility D-02 Dewatering Alternative 2

**c. Project Number/s (if applicable):** NA - Alternative 2

**d. Projected Action Start Date:** 2 / 2022

**e. Action Description:**

Alternative 2: Install an interceptor trench around the perimeter of the site to dewater the silo and subsurface structures at LF D-02, an additional toe drain would be installed along the base of the LSB for added protection from snow and rain as well as any groundwater that may circumvent the interceptor trench. The sump pump discharge lines would be tied into the new toe drain to eliminate the need for the existing surface discharge location. The toe drain and sump pump discharge lines would be connected to the lateral pipe associated with the interceptor trench. Fugitive water would be collected from the interceptor trench, toe drain, and sump pump then transported south across adjacent agricultural lands via a subsurface pipeline and discharged to a nearby ephemeral drainage. The lateral pipe would discharge groundwater directly into the ephemeral drainage via daylighting the pipe to a rock riprap rundown. The existing monitoring wells would be abandoned at the completion of the project, in accordance with the Administrative Rules of Montana.

**f. Point of Contact:**


**Name:** Stephen Coe
**Title:** Senior Engineer
**Organization:** Water & Environmental Technologies
**Email:** scoe@waterenvtech.com
**Phone Number:** 406-299-9858


**2. Air Impact Analysis:** Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving "steady state" (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the USAF Air Emissions Guide for Air Force Stationary Sources, the USAF Air Emissions Guide for Air Force Mobile Sources, and the USAF Air Emissions Guide for Air Force Transitory Sources.

# AIR CONFORMITY APPLICABILITY MODEL REPORT
# RECORD OF AIR ANALYSIS (ROAA)

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are "Clearly Attainment" (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are "Near Nonattainment" (i.e., within 5% of any NAAQS). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

The action's net emissions for every year through achieving steady state were compared against the Insignificance Indicator and are summarized below.

**Analysis Summary:**

**2022**

| Pollutant | Action Emissions (ton/yr) | INSIGNIFICANCE INDICATOR | |
|---|---|---|---|
| | | Indicator (ton/yr) | Exceedance (Yes or No) |
| NOT IN A REGULATORY AREA | | | |
| **VOC** | 0.514 | 250 | No |
| **NOx** | 3.063 | 250 | No |
| **CO** | 3.042 | 250 | No |
| **SOx** | 0.009 | 250 | No |
| **PM 10** | 4.481 | 250 | No |
| **PM 2.5** | 0.123 | 250 | No |
| **Pb** | 0.000 | 25 | No |
| **NH3** | 0.001 | 250 | No |
| **CO2e** | 836.7 | | |

**2023 - (Steady State)**

| Pollutant | Action Emissions (ton/yr) | INSIGNIFICANCE INDICATOR | |
|---|---|---|---|
| | | Indicator (ton/yr) | Exceedance (Yes or No) |
| NOT IN A REGULATORY AREA | | | |
| **VOC** | 0.000 | 250 | No |
| **NOx** | 0.000 | 250 | No |
| **CO** | 0.000 | 250 | No |
| **SOx** | 0.000 | 250 | No |
| **PM 10** | 0.000 | 250 | No |
| **PM 2.5** | 0.000 | 250 | No |
| **Pb** | 0.000 | 25 | No |
| **NH3** | 0.000 | 250 | No |
| **CO2e** | 0.0 | | |

None of estimated annual net emissions associated with this action are above the insignificance indicators, indicating no significant impact to air quality.Therefore, the action will not cause or contribute to an exceedance on one or more NAAQSs.No further air assessment is needed.

_____ _____

Stephen Coe, Senior Engineer DATE

# DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

## 1. General Information

**- Action Location**

**Base:** MALMSTROM AFB
**State:** Montana
**County(s):** Fergus
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Action Title:** Launch Facility D-02 Dewatering Alternative 2

**- Project Number/s (if applicable):** NA - Alternative 2

**- Projected Action Start Date:** 2 / 2022

**- Action Purpose and Need:**

Malmstrom Air Force Base (MAFB) is proposing the completion of a military-construction (mil-con) project at Launch Facility (LF) Delta-02 (D-02). The proposed project is located in a rural area of Fergus County, within T21N, R15E, Section 35, approximately 18-miles north of Denton, Montana (Figure 1a & 1b). The proposed action would install an interceptor trench around the perimeter of the facility to divert surface and groundwater from entering the site and reaching the launch support building (LSB) and missile silo. To facilitate dewatering of the facility silo and subsurface structures, captured water would be transported south across adjacent agricultural lands via a subsurface pipeline and discharged to a nearby ephemeral drainage. The discharge location is approximately 0.2-miles from Falls Coulee, which is approximately 4.5-miles from Wolf Creek, a tributary to the Judith River.

The purpose of the Proposed Action is to install a more effective dewatering system at D-02 which will prevent surface and groundwater from entering the LSB and the silo. The Proposed Action would replace the existing system which discharges captured water to the ground surface adjacent to the LSB and silo, allowing it to reinfiltrate. This results in capture and pumping of the same water through the system and does not effectively dewater the facility structures.

**- Action Description:**

Alternative 2: Install an interceptor trench around the perimeter of the site to dewater the silo and subsurface structures at LF D-02, an additional toe drain would be installed along the base of the LSB for added protection from snow and rain as well as any groundwater that may circumvent the interceptor trench. The sump pump discharge lines would be tied into the new toe drain to eliminate the need for the existing surface discharge location. The toe drain and sump pump discharge lines would be connected to the lateral pipe associated with the interceptor trench. Fugitive water would be collected from the interceptor trench, toe drain, and sump pump then transported south across adjacent agricultural lands via a subsurface pipeline and discharged to a nearby ephemeral drainage. The lateral pipe would discharge groundwater directly into the ephemeral drainage via daylighting the pipe to a rock riprap rundown. The existing monitoring wells would be abandoned at the completion of the project, in accordance with the Administrative Rules of Montana.

**- Point of Contact**


**Name:** Stephen Coe
**Title:** Senior Engineer
**Organization:** Water & Environmental Technologies
**Email:** scoe@waterenvtech.com
**Phone Number:** 406-299-9858


**- Activity List:**

| Activity Type | | Activity Title |
|---|---|---|
| 2. | Construction / Demolition | Dewatering Install |

# DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

## 2. Construction / Demolition

### 2.1 General Information & Timeline Assumptions

**- Activity Location**
**County:** Fergus
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** Dewatering Install

**- Activity Description:**
Excavation and installation of dewatering pipline, including regrading and stabilation.

**- Activity Start Date**
**Start Month:** 2
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 7
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.513597 |
| $SO_x$ | 0.008529 |
| $NO_x$ | 3.062980 |
| CO | 3.042389 |
| PM 10 | 4.480791 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.123460 |
| Pb | 0.000000 |
| $NH_3$ | 0.001085 |
| $CO_2e$ | 836.7 |
| | |

### 2.1 Site Grading Phase

### 2.1.1 Site Grading Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 2
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 6
**Number of Days:** 0

### 2.1.2 Site Grading Phase Assumptions

**- General Site Grading Information**
**Area of Site to be Graded ($ft^2$):** 36500
**Amount of Material to be Hauled On-Site ($yd^3$):** 0

**Amount of Material to be Hauled Off-Site ($yd^3$):** 0

**- Site Grading Default Settings**

**Default Settings Used:** Yes

**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Excavators Composite | 1 | 8 |
| Graders Composite | 1 | 6 |
| Other Construction Equipment Composite | 1 | 8 |
| Rubber Tired Dozers Composite | 1 | 6 |
| Scrapers Composite | 2 | 8 |
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**

**Average Hauling Truck Capacity ($yd^3$):** 20 (default)

**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**

**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

### 2.1.3 Site Grading Phase Emission Factor(s)

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| **Excavators Composite** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0648 | 0.0013 | 0.3170 | 0.5103 | 0.0136 | 0.0136 | 0.0058 | 119.72 |
| **Graders Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Scrapers Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.1723 | 0.0026 | 1.1176 | 0.7579 | 0.0447 | 0.0447 | 0.0155 | 262.87 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.343 | 000.002 | 000.257 | 003.756 | 000.010 | 000.009 | | 000.022 | 00313.875 |
| LDGT | 000.400 | 000.003 | 000.434 | 004.961 | 000.012 | 000.011 | | 000.024 | 00404.284 |
| HDGV | 000.657 | 000.005 | 001.065 | 014.900 | 000.026 | 000.023 | | 000.044 | 00740.723 |
| LDDV | 000.141 | 000.003 | 000.139 | 002.353 | 000.004 | 000.004 | | 000.008 | 00301.516 |
| LDDT | 000.270 | 000.004 | 000.389 | 003.971 | 000.007 | 000.006 | | 000.008 | 00428.585 |
| HDDV | 000.614 | 000.013 | 005.915 | 001.983 | 000.169 | 000.155 | | 000.030 | 01487.496 |
| MC | 002.246 | 000.003 | 000.875 | 013.744 | 000.028 | 000.025 | | 000.055 | 00398.991 |

### 2.1.4 Site Grading Phase Formula(s)

**- Fugitive Dust Emissions per Phase**

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**

$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

## 2.2 Trenching/Excavating Phase

### 2.2.1 Trenching / Excavating Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 2
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 6
**Number of Days:** 0

### 2.2.2 Trenching / Excavating Phase Assumptions

**- General Trenching/Excavating Information**
**Area of Site to be Trenched/Excavated ($ft^2$):** 36500
**Amount of Material to be Hauled On-Site ($yd^3$):** 5408
**Amount of Material to be Hauled Off-Site ($yd^3$):** 0

**- Trenching Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Excavators Composite | 2 | 8 |
| Other General Industrial Equipmen Composite | 1 | 8 |
| Tractors/Loaders/Backhoes Composite | 1 | 8 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

### 2.2.3 Trenching / Excavating Phase Emission Factor(s)

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| **Excavators Composite** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0648 | 0.0013 | 0.3170 | 0.5103 | 0.0136 | 0.0136 | 0.0058 | 119.72 |
| **Graders Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Scrapers Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.1723 | 0.0026 | 1.1176 | 0.7579 | 0.0447 | 0.0447 | 0.0155 | 262.87 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.343 | 000.002 | 000.257 | 003.756 | 000.010 | 000.009 | | 000.022 | 00313.875 |
| LDGT | 000.400 | 000.003 | 000.434 | 004.961 | 000.012 | 000.011 | | 000.024 | 00404.284 |
| HDGV | 000.657 | 000.005 | 001.065 | 014.900 | 000.026 | 000.023 | | 000.044 | 00740.723 |
| LDDV | 000.141 | 000.003 | 000.139 | 002.353 | 000.004 | 000.004 | | 000.008 | 00301.516 |
| LDDT | 000.270 | 000.004 | 000.389 | 003.971 | 000.007 | 000.006 | | 000.008 | 00428.585 |
| HDDV | 000.614 | 000.013 | 005.915 | 001.983 | 000.169 | 000.155 | | 000.030 | 01487.496 |
| MC | 002.246 | 000.003 | 000.875 | 013.744 | 000.028 | 000.025 | | 000.055 | 00398.991 |

### 2.2.4 Trenching / Excavating Phase Formula(s)

**- Fugitive Dust Emissions per Phase**

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)

2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**

$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons