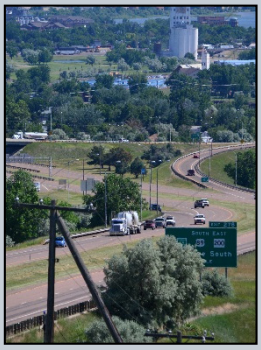
Appendix 3:

Environmental Scan Report



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I-15 Gore Hill to Emerson Junction Corridor Study

Environmental Scan

Table of Contents

Contents

List of Tables

List of Figures (See Appendix D)

Abbreviations and Acronyms

AASHTO	American Association of State Highway and Transportation Officials
BMPs	Best Management Practices
CECRA	Comprehensive Environmental Cleanup and Responsibility Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
COE	US Army Corps of Engineers
DEQ	Montana Department of Environmental Quality
DNRC	Department of Natural Resources and Conservation
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Maps
FWP	Fish, Wildlife, and Parks
GIS	Geographic Information System
LID	Low Impact Development
LUST	Leaking Underground Storage Tank
MDT	Montana Department of Transportation
MEPA	Montana Environmental Policy Act
MSAT	Mobile Source Air Toxics
MS4	Municipal Separate Storm Sewer System
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
TMDL	Total Maximum Daily Load
USFWS	US Fish and Wildlife Service
USGS	US Geologic Survey
UST	Underground Storage Tank
Section 4(f)	Section 4(f) of the 1966 Department of Transportation Act
Section 6(f)	Section 6(f) of the National Land and Water Conservation Funds Act

1 Introduction

1.1 Background

The primary objective of this Environmental Scan Report is to identify resources in, and determine potential impacts, constraints, and opportunities for the I-15 Gore Hill to Emerson Junction Corridor Study (Study). The Study encompasses the Interstate 15 (I-15) corridor from Gore Hill interchange to Emerson Jct. As a planning level scan, the information gathered is from various publicly available reports, websites and documents, as well as a "windshield survey" conducted by Montana Department of Transportation (MDT) staff This scan is not a detailed environmental investigation.

If improvement option(s) move forward from the Study into project development, an analysis for compliance with the National and Montana Environmental Policy Acts (NEPA and MEPA) will take place as part of the normal project development process. The information obtained from the Study will be used in the future NEPA/MEPA analysis.

1.2 Study Area

The Study corridor is located in Cascade County in central Montana. The Study area is located adjacent to I-15 between RP 276.8 (southwest of the Gore Hill Interchange #277) and RP 284.3 northwest of Emerson Junction (Interchange #282). As such, part of the Study area is located in the city and urbanized areas of Great Falls. This section of I-15 crosses over the Sun River. An offshoot of the Study I-315 (US 89) extends northeast to the west end of Warden Bridge over the Missouri River. As the Missouri River is at the east of the study boundary at this time based on initial needs of the corridor study no impact to the Missouri is expected. If a project is nominated that could affect the Missouri further investigation on environmental characteristics of the Missouri River should be explored. Land use within the corridor is a combination of transitional urban development, rural residential, agricultural pasture, and range lands.

I-15 is functionally classified as a principal arterial, and is part of the National Highway System serving as the main north-south corridor from Idaho state line at Monida through Montana to the Canadian boundary at Sweet Grass. The corridor consists of a paved roadway with two 12-foot travel lanes in each direction with varying shoulder widths. The roadway was constructed or improved at various times, as early as 1939 to 2009. I-315 was constructed and opened to traffic in late 1967. It is also currently signed as US 89, MT 3, and MT 200. I-315 is one of the shortest Interstate highways at 0.82 miles, with its east terminus at the intersection of Fox Farm RD and 6th Street Southwest, where it loses the I-315 designation and continues signed as US 89, MT 3, and MT 200. It connects to US 87 which continues east to Lewistown, MT.

The Study area includes 300-foot buffer on either side of the roadway. Multiple maps have been prepared to illustrate resources present in the Study area. For ease of reading, all figures have been included in Appendix D. Figure 1 – Study Area depicts the study area while Figure 2 – Quadrangle Maps is a topographic map of the entire corridor area.

2 Physical Environment

2.1 Soil Resources and Prime Farmland

Information obtained on soils is to determine the presence of prime and unique farmland in the Study area to demonstrate compliance with the Farmland Protection Policy Act. The purpose of the Farmland Protection Policy Act is "to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses, and to assure that federal programs are administered in a manner that, to the extent practicable, will be compatible with State, unit of local government, and private programs and policies to protect farmland".

Farmland includes prime farmland; some prime if irrigated farmland; unique farmland; and farmland, other than prime or unique farmland, that is of statewide or local importance. Prime farmland soils are those that have the best combination of physical and chemical characteristics for producing food, feed, and forage; the area must also be available for these uses. Prime farmland can be either non-irrigated or lands that would be considered prime if irrigated. Farmland of statewide importance is land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crops.

Soil surveys of the Study area are available from the US Department of Agriculture, Natural Resource Conservation Service (NRCS). NRCS indicates that prime if irrigated farmlands, and farmlands of statewide importance are present in this corridor. Between approximate RP 278.8 – 279.0, 280.5 – 284.3 is considered prime if irrigated farmland. The approximate location of farmlands of statewide importance is between RP 266.8 – 278.0, 279.5 – 280.5, and 282.5 – 284.3. Figure 3 – Prime Farmlands contains maps and descriptions of the farmland classification types found in the Study corridor.

If a federally-funded improvement option is forwarded from the study that will require acquisition of lands from these areas, MDT will need to complete a CPA-106 Farmland Conversion Impact Rating Form for Linear Projects and coordinate with NRCS. The NRCS will use information from that form to keep inventory of the Prime and Important farmlands within the state. Some of the areas designated as prime farmland have previously been developed. Previously developed land designated as prime farmland is no longer subject to the Farmland Protection Policy Act, and should not be an impact to future improvements forwarded from the Study.

2.2 Geologic Resources

Information on the geology and seismicity in the area of the corridor study was obtained from several published sources. Geologic mapping was reviewed for rock types, the presence of unconsolidated material, and fault lines. The seismicity and potential seismic hazards were also reviewed. This geologic information can help determine potential design and construction issues related to embankments and road design. The following is a brief summary of the

geologic and seismic conditions present in the corridor study area. Figure 4 – Geology presents the geologic formations and structures within the study area.

The I-15 Gore Hill to Emerson corridor traverses upland plains dissected by the lowland valleys of the Sun and Missouri Rivers. The geologic materials within the corridor are mapped as the Taft and Flood Members of the Blackleaf Formation and the Kevin Member of the Marais River Formation. Quaternary alluvium and minor amounts of Quaternary glacial lake deposits are also found through the corridor.

The Blackleaf and Marias River Formations are Cretaceous-age bedrock consisting of shale, siltstone, and sandstone. This bedrock forms the upland terrain and intermediate slopes. The bedrock is generally soft and often weathered to soil in surface exposures. Quaternary glacial lake and alluvial terrace deposits overlie the older Cretaceous bedrock along some of the hillside slopes.

The alluvium of the Sun and Missouri Rivers consists of gravel, silt, sand, and clay infilling the valley floors. It is of considerable thickness in some areas and is often saturated.

Hillside slopes between the uplands and valley floor appear to be marginally stable at a maximum approximate slope of 2H:1V. There are numerous visible signs of instability, but most are relatively small and presently inactive. MDT exerted considerable effort stabilizing the cuts through Gore Hill in the 1980s; several landslides required regrading and a substantial network of pipes and drains were installed. Appropriate cut slope and drainage design will minimize risk from destabilizing these hillside slopes again.

Settlement of embankment fills on valley floor deposits poses some risk through the proposed corridor. This risk may be mitigated by a combination of methods including preloading embankments, lowering fill heights and using wick drains to speed settlement.

Structures will probably require deep foundations, particularly in the soft, deep alluvial soils in the river valleys.

Frost heave is a common risk with roadway pavements on soils in this region. Ensuring an adequate capillary break between subgrade soil and pavement mitigates frost heave. This can be accomplished by using clean base course material and separating that base course from fine grained soils in the subgrade with a suitable geosynthetic.

Seismic design of highway infrastructure is in accordance with American Association of State Highway and Transportation Officials (AASHTO) guidelines. The US Geologic Survey (USGS) Seismic Design Map for the Study Area indicates a Peak Ground Acceleration of 0.068g. This low Peak Ground Acceleration value suggests that seismic activity poses minimal risk for highway infrastructure.

Improvements brought forward from the study will be subject to more detailed analysis that takes into consideration the above mentioned geotechnical risk factors. Part of this detailed analysis may involve taking advance borings to evaluate soil characteristics at exact project locations. This is standard procedure for the majority of MDT road projects. The design of any improvements should take into consideration specific requirements that come from the detailed analysis.

2.3 Surface Waters

Maps and Geographic Information System (GIS) data were reviewed to identify the location of surface water bodies within the Study area, including rivers, streams, lakes, or reservoirs. The main surface water in the corridor is the Sun River. Additionally, a small variety of surface waters including streams, natural drainages, and wetlands are also present in the area. Figure 5 – Surface Water and Wetlands contains maps depicting the surface waters found in the Study corridor. Impacts to these surface waters may occur from project improvements such as culverts under the roadway or rip rap armoring of banks. US Army Corps of Engineers (COE), the Montana Department of Fish, Wildlife and Parks (FWP), the Montana Department of Natural Resources and Conservation (DNRC), and the Montana Department of Environmental Quality (DEQ) regulate these impacts. In order to comply with applicable environmental laws, any future projects will need to avoid and/or minimize impacts to waters of the US to the maximum extent practicable. Stream and wetland impacts may trigger permitting and compensatory mitigation requirements of the COE. Encroachment permit may be required from DNRC if impacts occur within the Sun River. Those issues will need to be further identified and coordinated with applicable agencies during any future project design.

Much of the study area is also located within the Great Falls Municipal Separate Storm Sewer System (MS4) area. Figure 13 – Great Falls MS4 depicts the boundaries of the Great Falls MS4. Under the Small MS4 General Permit, new development or redevelopment projects greater than or equal to one acre in size must implement, when practicable, low impact development (LID) practices that infiltrate, evapo-transpire, or capture for reuse the runoff generated from the first half-inch of rainfall from a 24-hour storm preceded by 48 hours of no measurable precipitation. MS4 issues, including potential applicability of LID requirements will need to be further evaluated during any future project design.

2.3.1 Total Maximum Daily Loads (TMDL) Information

Section 303, subsection “d” of the Clean Water Act requires the State of Montana to develop a list, subject to US Environmental Protection Agency approval, of water bodies that do not meet water quality standards. When water quality fails to meet state standards, DEQ determines the causes and sources of pollutants in a sub-basin assessment and sets maximum pollutant levels, called total maximum daily loads (TMDL).

A TMDL sets maximum pollutant levels in a watershed. The TMDLs become the basis for implementation plans to restore the water quality to a level that supports its designated beneficial uses. The implementation plans identify and describe pollutant controls and

management measures to follow (such as best management practices), the mechanisms by which the selected measures are to be put into action, and the individuals and entities responsible for implementation projects.

The Study corridor travels through the Sun River Watershed (Hydrologic Unit Code: 10030104). The Sun River crosses I-15 under a bridge within the corridor study boundary and runs parallel to, and north of, 10th Avenue South on the eastern edge of the corridor. In this segment of the Sun River, bank erosion and channel alterations decrease the quality of the instream habitat. Flows from Muddy Creek upstream of the corridor augment flows in the Sun River during the irrigation season; this Muddy Creek water is high in nutrients and suspended sediments.

According to a 2014 DEQ report, the Sun River fully supports the beneficial use of drinking water. This report is available for review in Appendix A: Water Quality Report. The creek does not support aquatic life (cold-water fishery and warm water fishery) use due to numerous reports of severe impairment. Macroinvertebrate and periphyton sampling indicate moderate to severe impairment. Aquatic life habitat is severely impaired due to siltation, flow alteration, bank erosion, and habitat degradation. Aquatic life chemistry is severely impaired due to high nutrient concentrations, turbidity, and temperatures. Agricultural uses are severely impaired due to relatively high total dissolved solids decreasing suitability for irrigation. The lack of support for recreation use is due to high amounts of nutrients increasing the risk of nuisance algal blooms.

The 2014 Integrated 303(d)/305(b) Water Quality Report for Montana by DEQ lists the Sun River watershed as impaired. The water bodies within the Sun River Watershed that are located in the Study area are Category 4A. Category 4A water bodies are waters where one or more applicable beneficial uses are impaired, threatened, or not supported and a TMDL has been completed and approved to address the factors causing the impairment or threat. Any construction practices will have to comply with the requirements set forth in the TMDL plan.

2.3.2 Wild and Scenic Rivers

The Wild and Scenic Rivers Act, created by Congress in 1968, provided for the protection of certain selected rivers, and their immediate environments, that possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. The US National Park Service website provided information on river segments that may be located within the Study area with wild and scenic designation. At this time, neither the Sun River nor any of its tributaries carry the wild and scenic designation. The Missouri River at the east terminus of the corridor study also does not carry the wild and scenic designation.

2.4 Groundwater

There are currently 6105 wells on record in Cascade County; some of these wells exist within the Study boundaries. The newest well is April 2014 with the oldest well from June 1864. There are three State Monitoring Network wells and 28 public water supply wells in Cascade County. The wells in Cascade County have many different uses with the most common being

domestic use. The typical setback for a public water supply well is a 100-foot isolation zone in which no source of pollutant should be inside, making a public well an item of avoidance. If either a private or public well is to be impacted, standard right-of-way procedures for an impact to an improvement would need to be followed. Which could be an increase in cost because of either compensation for acquiring the well or replacement of an impacted well in a new location outside of a project impact area. Consider impacts to existing wells if forwarding a project from the Study.

Appendix A: Water Quality Report provides information such as well and geologic source information, for Cascade County. Figure 6 – Wells and Water Rights depicts well locations within the Study area.

2.5 Wetlands

The COE defines wetlands as those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

National Wetland Inventory (NWI) mapping data is available for this area. The US Fish and Wildlife Service (USFWS) generates NWI maps basing the maps on the USFWS definition of wetlands, which does not follow the COE definition that MDT uses in wetland determination and delineation. NWI maps are typically generated based on aerial and satellite imagery, and are not accurate or detailed enough for MDT project wetland determination and/or delineation. That said, the NWI maps do provide information that is useful in this planning level study. The NWI maps show a few potential wetland areas along the corridor, primarily in the vicinity of the Sun River and near the Emerson Junction. Figure 5 – Surface Water and Wetlands depicts the locations of these wetlands.

Formal wetland delineations according to standard COE and MDT defined procedures will need to be conducted during the project development process. Additionally, impacts to wetlands will need to be avoided and minimized to the greatest extent practicable through conscientious project design. Documentation of avoidance and minimization measures will need to be included in the project development. Unavoidable wetland impacts will need to be mitigated in accordance with COE regulations and Executive Order 11990: Protection of Wetlands.

During any project development process, evaluation of potential stream impacts according to the COE May 2013 Stream Mitigation Procedure (or revised version) will be necessary.

2.6 Floodplains and Floodways

Executive Order 11988, Floodplain Management, requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. In accomplishing this objective, "each agency shall

provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by flood plains in carrying out its responsibilities" for the following actions:

- acquiring, managing, and disposing of federal lands and facilities;
- providing federally-undertaken, financed, or assisted construction and improvements;
- conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities.

Federal-Aid Policy Guide, 23 CFR 650, Bridges, Structures, and Hydraulics, provides “policies and procedures for the location and hydraulic design of highway encroachments on flood plains, including direct Federal highway projects administered by the FHWA.” This document defines the “Base Flood” as the “flood or tide having a 1 percent chance of being exceeded in any given year.” and the “Base Flood Plain” as the “area subject to flooding by the base flood.” Federal Emergency Management Agency Issued Flood Maps for Cascade County indicate the Zone AE 100-Year Flood with base flood elevations exist along only two small portions of the Study corridor. The remainder of the Study corridor is Zone X which is the 500-Year Flood or not within a flood plain at all. Figure 7 – Flood Zones depicts the different flood zones throughout the entire Study corridor. Forwarding of improvement options from the Study that result in the placement of fill within the regulatory floodplain, will need to identify and evaluate impacts to the floodplains. Project development could require coordination with Cascade County and the City of Great Falls to minimize floodplain impacts and obtain necessary floodplain permits for project construction.

2.7 Irrigation

Irrigated grazing land exists in Cascade County adjacent to the Study corridor. Figure 6 – Wells and Water Rights depicts wells used for irrigation and Figure 3 – Prime Farmlands shows areas that are irrigated farmlands. Depending on the improvement option(s) proposed during the corridor Study, there is a potential to impact irrigation facilities. Redesign, modify existing, and/or construct new irrigation canals, ditches or pressurized systems in consultation with the owners to minimize impacts to agricultural operations. Additional expenses may occur if impacts to irrigation facilities move forward from the study.

2.8 Air Quality

EPA designates communities that do not meet National Ambient Air Quality Standards (NAAQS) as “non-attainment areas.” States are then required to develop a plan to control source emissions and ensure future attainment of NAAQS. Great Falls was designated non-attainment for carbon monoxide (CO) in 1980, and eventually the limits of the non-attainment area were mapped as the 10th Avenue South Corridor. In 2002, Great Falls received designation to attainment status for carbon monoxide. Great Falls is now under a December 2000 Carbon Monoxide Limited Maintenance Plan (CO LMP). The Montana DEQ submitted an updated Great Falls CO LMP in 2011, and revisions to the State Implementation Plan (SIP) that would include

some alternative CO monitoring strategies laid out in the 2011 LMP. However, until EPA acts on these submittals, the December 2000 CO LMP is the controlling document for current air quality conformity determinations. The I-15 corridor is not located in the former non-attainment area boundaries, so no further transportation conformity analysis will be necessary.

Depending on the scope of the project under consideration along this corridor, an evaluation of mobile source air toxics (MSATs) may be required. MSATs are compounds emitted from highway vehicles and off-road equipment which are known or suspected to cause cancer or other serious health and environmental effects. The expectation for Special design considerations to be required is low in future project design to accommodate air quality issues.

2.9 Hazardous Substances

The Natural Resource Information System database was searched for underground storage (UST) sites, leaking underground storage tank (LUST) sites, abandoned mine sites, remediation response sites, landfills, National Priority List sites, hazardous waste, crude oil pipelines, and toxic release inventory sites in the vicinity of the Study. Presented below is a description of the findings.

2.9.1 Underground Storage Tanks (USTs) and Leaking Underground Storage Tanks (LUSTs)

There is a cluster of UST and LUST sites at the Airport Interchange, and numerous tank sites along Terminal Drive with facilities associated with the airport. None of these sites is likely to result in added cost or resources to any project that is forwarded from the Corridor Study.

There is one unresolved LUST site near 34th St SW, referred to as the Ruth Graham Property, and two other LUST sites along the Northwest Bypass both east and west of 34th St NW. Both of those sites are also currently unresolved. One is the Yellowstone Truck Stop and the other is N&H Transportation. Construction near these leaking tank sites may result in handling and disposal of contaminated soils, which will increase costs. Figure 8 – UST, LUST, and Response Sites depicts current sites along the corridor.

2.9.2 Water Quality Act / State Superfund Sites (CECRA)

There are four Water Quality Act (WQA) or State Superfund Sites listed in the DEQ's on-line database; only one of them (Western By Products) is active. Efforts should be made to avoid this site with any corridor improvement options forwarded from the Study. Figure 8 – UST, LUST, and Response Sites depicts current sites along the corridor.

1. The MDT Emerson Junction site is a DOT facility listed as an Inactive facility with a prior violation of the Water Quality Act. Remediation is complete. The site received "No Further Action" status and was de-listed from the WQA Site Ranking List.
2. The Dickson Brothers Jet Fuel Spill at the Great Falls Airport was delisted from the Water Quality Act Ranking List in 1994 following removal and treatment of over 3000 cubic yards of contaminated soil. The site's status is "No Further Action".

3. The Montana Army National Guard Fuel Spill Site located near the Great Falls Airport was delisted from the CECRA Priority List in 1996 following soil removal and cleanup activities. The site's status is "No Further Action".
4. The Western By Products site, located near the north end of the study area between I-15 and Vaughn Road is a listed State Superfund, or CECRA site. Another name for this site is Morgan Chemical - Baker Commodities. Information available for this site indicates that it is currently an "Active" site i.e. not de-listed; however, a No Further Action status was issued in 1984. If MDT encroaches onto this facility, there may be additional costs associated with contaminated soil and groundwater. Efforts should be made to avoid impact to this site if possible as it is still listed on the WQA Ranking list.

3 Biological Resources

The following information applies to natural resources within the designated boundary for the Study corridor. The information reflects a baseline natural resource condition of the Study area. Depending on the level of detail available through the high-level baseline scan, some of the information is at the county level, some at the entire corridor study area level (RP 276.8 to 284.3.)

3.1 Biological Community

3.1.1 Mammals

Wildlife species inhabiting or traversing the project study area are typical of those that occur in developed and disturbed areas of central Montana. Most species habituate to disturbed areas, and as a result are predominately generalist species.

Common mammals occupying habitats in, traversing, or having a distribution range that overlaps the study area are white-tail deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), and coyote (*Canis latrans*). Other common mammals potentially occurring in the project area include but are not limited to the porcupine (*Erethizon dorsatum*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), badger (*Taxidea taxus*), bobcat (*Felix rufus*), red fox (*Vulpes vulpes*), muskrat (*Ondatra zibethicus*), Richardson's ground squirrel (*Spermophilus richardsonii*), deer mouse (*Peromyscus maniculatus*), and meadow vole (*Microtus pennsylvanicus*).

A review of the MDT Maintenance Animal Incident Database for the period of January 2004 through December 2013 indicates that animal-vehicle collisions have occurred during this period in the Study area. There are 39 records from that period. With the exception of only a few other animals, white-tail deer and mule deer account for the majority of the recorded wildlife mortality along the Interstate within the Study area. One elk (*Cervus canadensis*), one pronghorn antelope (*Antilocapra americana*), one mountain lion (*Puma concolor*), and two coyotes (*Canis latrans*) comprise the other records. The majority of the carcass pick-ups were located around the bridge over the Sun River and to the north, from RP 279.5 to RP 284.

3.1.2 Birds

The Migratory Bird Treaty Act provides that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. The Act does not contain any prohibition that applies to the destruction of a non-active migratory bird nest (without birds or eggs), providing that no possession occurs during the destruction. This law prohibits direct disturbance of an active nest. Active nest means any nest that birds, hatchlings, fledglings or viable eggs are currently occupying. Trees or structures that will be impacted by any project resulting from this corridor study should be removed outside the nesting season (typical nesting season is from April 15 to August 15) or when active nests are not present. Any projects forwarded from this study will need to consider potential constraints that may result from nesting times of migratory birds.

No bald eagle or golden eagle nests are within one-half mile of the corridor study boundary at the time this environmental scan was completed. Review of the corridor for eagle nests will need to occur during project design and prior to construction to verify no new nests are present.

3.2 Threatened and Endangered Species

The USFWS maintains the federal list of Threatened and Endangered Species. Species on this list receive protection under the Endangered Species Act. An 'endangered' species is one that is in danger of extinction throughout all or a significant portion of its range. A 'threatened' species is one that is likely to become endangered in the foreseeable future. The USFWS also maintains a list of species that are candidates or proposed for possible addition to the federal list. According to the USFWS, five threatened, endangered or candidate species are listed as occurring in Cascade County (See Table 1 – Threatened and Endangered Species in Cascade County).

Table 1 - Threatened and Endangered Species in Cascade County

Latin Name	Common Name	Status
Lynx canadensis	Canada Lynx	Threatened
Calidris canutus rufa	Red Knot	Proposed
Gulo luscus	Wolverine	Proposed*
Anthus spragueii	Sprague's Pipit	Candidate
Pinus albicaulis	Whitebark Pine	Candidate

* Note that the wolverine has since been removed as a proposed threatened and endangered species.

According to the Montana Natural Heritage Program - Natural Heritage Map Viewer (report generated May 15, 2014) database, which records and maps documented observations of species in a known location, there are no records of any threatened, endangered, proposed, or candidate species within the boundaries of the corridor study.

As the federal status of protected species changes over time, reevaluation of the listing status and a review for the potential of these species to occur in the project area should occur prior to issuing a determination of effect relative to potential project impacts. If a project moves forward from the corridor study, completion of an evaluation of potential effects to any of the species listed above needs to occur during the project development process.

3.3 Species of Concern

Montana Species of Concern are native animals breeding in the state that are considered to be "at risk" due to declining population trends, threats to their habitats, and/or restricted distribution. Designation of a species as a Montana Species of Concern (SOC) is not a statutory or regulatory classification. Instead, these designations provide a basis for resource managers and decision-makers to direct limited resources to priority data collection needs and address conservation needs proactively.

According to the Montana Natural Heritage Program - Natural Heritage Map Viewer (report generated May 15, 2014) database, which records and maps documented observations of SOC in a known location, there is one historic record of many-headed sedge (*Carex sychnocephala*) within the boundaries of the corridor study. This record is from 1891; there is no expectation for this species to occur in the project area due to development of Great Falls since 1891.

Conducting a re-evaluation for the presence of SOC is important during the project design phase. If present, consider adding special conditions to the project design and/or construction documents to avoid or minimize impacts to these species.

3.4 Vegetation

According to the Montana National Heritage Program Landcover Report, near the Study the dominate landcover is developed land consisting of major roads including the Interstate, residential, and commercial land. Outside the developed land in the city of Great Falls are some cultivated crops including hayland south of the Gore Hill interchange and north of the Emerson Junction, as well as a minor amount of grassland, wetlands, and riparian habitat near the Sun River crossing. All land types in the project area are disturbed to some extent.

If forwarding a project from the Study, following practices outlined in both Standard Specification 201, and any related Supplemental Specifications will help to minimize adverse impacts to vegetation.

3.5 Fisheries Information

Montana Fish, Wildlife, and Parks listed the Sun River as a substantial fishery resource value and manages the Sun River as a trout water. Interstate 15 crosses the Sun River within the Study area, shown in Figure 5 – Surface Water and Wetlands.

According to the Montana Fisheries Information System database (report generated May 15, 2014), fish species commonly occurring within the Sun River within the study area are brown trout (*Salmo trutta*), longnose sucker (*Catostomus catostomus*), longnose dace (*Rhinichthys*

cataractae), stonecat (*Noturus flavus*), walleye (*Sander vitreus*), and white sucker (*Catostomus commersoni*). Rare fish species in the project area include mottled sculpin (*Cottus bairdi*), rainbow trout (*Onchorynchus mykiss*), mountain whitefish (*Prosopium williamsoni*), burbot (Lota lota), common carp (*Cyprinus carpio*), flathead chub (*Platygobio gracilis*), and northern pike (*Esox lucius*).

Montana Fish, Wildlife, and Parks listed the Missouri River as a substantial fishery resource value and manages the Sun River as a non-trout water. US 89 crosses the Missouri River at the east terminus of the Study area, shown in Figure 5 – Surface Water and Wetlands.

According to the MFISH database (report generated August 13, 2014), fish species commonly occurring within the Missouri River within the study area are brown trout, longnose sucker, longnose dace, walleye, rainbow trout, burbot, common carp, and white sucker. Rare fish species in the project area include mottled sculpin, stonecat, mountain whitefish, black bullhead (Ameiurus melas), fathead minnow (Pimephales promelas), pumpkinseed (Lepomis gibbosus), yellow perch (Perca flavescens), and flathead chub.

Forwarding any projects that affect the Sun River or Missouri River will likely require incorporation of design measures to facilitate aquatic species passage. Notification to FWP is necessary for impacts to the Sun River aquatic resources.

3.6 Noxious Weeds

Noxious weeds can degrade native vegetative communities, choke streams, compete with native plants, create fire hazards, degrade agricultural and recreational lands, and pose threats to the viability of livestock, humans and wildlife. Areas with a history of disturbance, like highway rights-of-way, are at particular risk of weed encroachment. The Invaders Database System lists 28 exotic plant species and 10 noxious weed species documented in Cascade County, some may be present in the Study corridor (Appendix C: Noxious Weeds in Cascade County).

Seeding disturbed areas with desirable plant species will reduce the spread and establishment of noxious weeds and allow re-establishing permanent vegetation. If forwarding a project from the Study, field surveys for noxious weeds should commence prior to any ground disturbance.

3.7 Crucial Areas Planning System

The Crucial Areas Planning System (CAPS) is a resource intended to provide useful and non-regulatory information during the early planning stages of development projects, conservation opportunities, and environmental review. The finest data resolution within CAPS is at the square mile section scale or waterbody, and use of these data layers at a more localized scale is not appropriate and may lead to inaccurate interpretations since the classification may or may not apply to the entire square mile section. This scale is too broad for use during MDTs assessment of potential impacts at the project level. The CAPS system provides a general overview of the Study area with a summary as follows.

The Terrestrial Conservation Species layer represents the cumulative expected occurrence of 85 of Montana's vertebrate species. The State Species of Concern (SOC) list determines species inclusion. In the Study area, the ratings vary from Class 1 to Class 4. The city limits of Great Falls rate as a Class 1, the Sun River Corridor rates as a Class 2, and the agricultural and hayland outside the city limits vary from Class 3 to Class 4.

The terrestrial species richness layer represents species richness of all native land-based species in Montana, including amphibians, reptiles, birds, and mammals. Species included are found year round or breed in the state. The metric presented is the average number of species associated with all cover types (habitats) in each section. The sections that have the Sun and Missouri Rivers within them have a Class 1 rating (highest), which is the majority of the project corridor. Other sections within the corridor contain Class 3 and 4 ratings for terrestrial species richness.

The Terrestrial Game Quality layer depicts areas considered valuable to 12 native game species and their specific habitat requirements. Terrestrial Game Quality rates as Class 3 throughout the project area.

The Sun River has a rating of Class 1 for Aquatic Connectivity in the corridor, in addition to a rating of Class 3 for native species richness in the corridor.

The land cover layer shows the entire corridor as low to medium density developed land.

CAPS provide FWP General Recommendations and Recommendations Specific to Transportation Projects for both terrestrial and aquatic species and habitat. These recommendations of the CAPS system can have a generic application to possible project locations moving forward from the Study. Coordination with the FWP wildlife biologist should occur on any projects brought forward from this corridor study.

4 Social and Cultural Resources

4.1 Demographic and Economic Conditions

Under National and Montana Environmental Policy Acts and associated implementing regulations, state and federal agencies are required to assess potential social and economic impacts resulting from proposed actions. FHWA guidelines recommend consideration of impacts to neighborhoods and community cohesion, social groups including minority populations, and local and/or regional economies, as well as growth and development induced by transportation improvements. The intent of this section is to present demographic and economic information to assist in identifying human populations that improvements may affect within the Study area.

Title VI of the US Civil Rights Act of 1964, as amended (USC 2000(d)) and Executive Order 12898 require that no minority, or, by extension, low-income person shall be disproportionately adversely impacted by any project receiving federal funds. For transportation projects, this means that no particular minority or low-income person may be disproportionately isolated, displaced, or otherwise subjected to adverse effects.

If forwarding a project from the improvement option(s) occurs, an Environmental Justice evaluation will need to occur during the project development process. Table 2 – Demographic Information and Table 3 – Population Data present characteristics of the existing population to provide a context in which to evaluate social impacts.

Table 2 - Demographic Information

Area	Population (2012 Estimate)	Population % Change (4/1/10 thru 7/1/12)	Median Household Income (2007 - 11)	Persons Below Poverty (2007 - 11)	Persons per Square Mile (2010)
City of Great Falls	58,893	0.5%	$42,085	16.9%	2,684.9
State of Montana	1,005,494	1.6%	$45,456	14.8%	6.8
USA	316,128,839	1.7%	$53,046	14.9%	87.4

As shown in the table, generally the project area population has inclined overall since 2010. Residents in the project area tend to be similar in age and slightly lower in median household income compared to Montana as a whole. These trends can generally attribute to Great Falls being one of the major cities in Montana.

Table 3 - Population Data

	City of Great Falls	State of MT	USA
Total Population [a]	58,893	1,005,494	316,128,839
White [b] (%)	88.5	89.4	77.9
African American [b] (%)	1.1	0.4	13.1
American Indian/Alaska Native [b] (%)	5.0	6.3	1.2
Asian [b] (%)	0.9	0.6	5.1
Native Hawaiian/Pacific Islander [b] (%)	0.1	0.1	0.2
Hispanic/Latino[b] (%)	3.4	2.9	16.9
2 or more races [b] (%)	3.8	2.5	2.4

Source: US Census Bureau

a. 2012 Estimate

b. 2010 Data in Percent (%)

In general, the ethnic makeup of the project area is primarily white, which is consistent with the state as a whole.

4.2 Land Ownership and Land Use

A review of GIS based information took place to assess the amount of area in the Study corridor that is public versus privately owned. Ownership of the land in the corridor is a mix of private and public. MDT and State trust are the only holders of public land within the corridor. Most of the public land is in the form of right-of way along the highway system or a state park. The majority of the land in the corridor is either residential rural and/or urban. The other land uses within the corridor are commercial, industrial, agricultural, and recreational. Figure 9 – Land Uses and Figure 10 – Public Lands depicts land ownership and uses for the Study area.

Additional research and coordination will be required to ascertain the specific encumbrances associated with specific parcels of land. Any projects that move forward from this Study will need to consider adjacent land use.

4.3 Recreational Resources

The intent of Section 4(f) is to protect publically owned parks, recreation areas, wildlife and waterfowl refuges, and public and private historic sites of local, state, and national significance. Transportation projects using federal funds cannot use properties that are protected by Section 4(f) unless there are no feasible and prudent avoidance alternatives and all possible planning to minimize harm has occurred. "Use" is when land is permanently incorporated into a transportation facility or when there is a temporary occupancy of the land that is adverse in terms of the statute's preservation purpose as determined by specific criteria. Constructive "use" can also occur when a project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under 4(f) are "substantially impacted". Avoiding impacts to 4(f) resources is a priority. Demonstrating the appropriateness of a 4(f) use is a lengthy process involving rigorous justification requirements and approvals from multiple agencies.

A variety of recreational resources exist within and near the Study area. These resources are shown Figure 10. There is a green belt located on the North East corner of US 89 and 6th ST SW that is owned by Montana Department of Transportation, which is not protected under Section 4(f) per 23CFR774.13(H)(2014). According to the Montana Fish Wildlife and Parks resources list, there are two state owned parks inside the Study area buffer zone. There is one City of Great Falls park located within the Study area at 410 16th Street Southwest (not shown on figure). Other local parks, which are outside the buffer area, are shown in the figure as a reference. The three parks within the Study area buffer zone are Westside Viaduct park, West Hill park, and Community Hall park. Currently the only development on either Westside Viaduct park or West Hill park is a lift station in West Hill Park. The remainder of this park land is undeveloped and not currently available for public use. Community Hall park is currently being used as a community garden/orchard that has standard access hours outside of which it is locked preventing access by the public.

If a project is forwarded at a later date that may impact these three parks, a re-evaluation should take place to determine what the parks availability for use by the public is at that time.

If these three parks are at a future time available for full time public use, additional investigation and coordination with the officials with jurisdiction over the parks will be necessary to determine whether the parks are "significant" and protected by Section 4(f) of the US Department of Transportation Act.

Section 6(f) of the National Land and Water Conservation Fund Act is another federal measure intended to preserve, develop, and assure the quality and quantity of outdoor recreation resources. Section 6(f) protection applies to all projects that impact recreational lands purchased or improved with land and water conservation funds. The Secretary of the Interior must approve any conversion of Land and Water Conservation Fund encumbered property to a use other than public, outdoor recreation. At this time, there are no Section 6(f) resources identified in the Study corridor. If the corridor of the Study were to expand in width, re-evaluation of 6(f) resources needs to occur, as they do exist close to the Study boundary. Avoiding impacts to 6(f) resources is a priority. Approval for a 6(f) use is a lengthy process involving rigorous mitigation requirements and approvals from several resource agencies. Figure 11 – Park Locations depicts both 4(f) and 6(f) locations.

4.4 Cultural Resources

If MDT projects forwarded from the Study are federally-funded, MDT would need to conduct a cultural resource survey of the Area of Potential Effect for this project as specified in Section 106 of the National Historic Preservation Act (36 CFR 800). Section 106 requires Federal agencies to "take into account the effects of their undertakings on historic properties." The purpose of the Section 106 process is to identify historic and archaeological properties that could be affected by the undertaking, assess the effects of the project and investigate methods to avoid, minimize or mitigate any adverse effects on historic properties. Section 4(f) of the Transportation Act also affords special protections to these properties.

As the purpose of the Study is intended to provide possible projects that will improve safety along the Interstate, improve traffic flow, and improve Interstate access, the cultural resource survey needs only include historic-age properties located adjacent to the existing I-15 alignment. A file search of the proposed Study Area through the Montana State Historic Preservation Office revealed one historic property located within 0.15 miles of the existing alignment. Table 4 – Historical Locations below lists the property, its approximate location and National Register of Historic Places (NRHP) status. The NRHP lists the Missouri River/Warden Bridge, which is in Figure 12 – Cultural Resources. In addition, five NRHP-listed historic districts and properties are located within a mile of the existing I-15 corridor, but are outside the impact area for this corridor study. An examination of the Montana Cadastral Survey information for the designated corridor indicates that at least 33 historic age properties are located within 0.2 miles of the existing I-15 corridor.

Table 4 - Historical Locations

Site	Site No.	Sec.	Tsp	Rge	NRHP elig.	RP±
Missouri River/Warden Bridge	24CA0401	14	20N	3E	Listed	N/A
Cascade County Courthouse	24CA0233				Listed	N/A
Great Falls Central Business District	24CA0977				Listed	N/A
C.M. & St. P. Passenger Depot	24CA0271				Listed	N/A
Great Falls Railroad Historic District	24CA0335				Listed	N/A
Great Falls West Bank Historic District	24CA1527				Listed	N/A

The Study corridor contains many cultural resources, all of which consist of historic sites. Cultural resources within the corridor of the Study will not likely be a significant issue. Forwarding a project from the Study, a cultural resource survey for unrecorded historic, pre-historic, and archaeological properties within the Area of Potential Effect will need to be completing during the project development process. MDT Standard Specifications for protection of archeological and historical findings, which includes pre-historic, should be included in the project special provisions of any improvements forwarded from this study. The key is flexibility in design to avoid and/or minimize potential adverse impact to significant sites in the Study corridor.

4.5 Noise

Traffic noise may need to be evaluated for planned improvements to the I-15 Gore Hill to Emerson Junction corridor. Noise analysis is necessary for "Type I" projects. If the roadway improvements are limited (e.g., the horizontal and vertical alignments are not changed and the highway remains a two-lane facility) then the project would not be considered a Type I project. If the improvements planned for the road include a substantial shifting the horizontal or vertical alignments; increasing the number of thru-lanes, passing lanes, or turning lanes; or increasing the traffic speed and volume then the project is a Type I project.

A detailed noise analysis would be required if the project is considered a Type I project. A detailed noise analysis includes measuring ambient noise levels at selected receivers and modeling design year noise levels using projected traffic volumes. Consideration of noise abatement measures (usually in the form of noise barriers) take place for the project if noise levels approach or substantially exceed the noise abatement criteria. Implementation of noise abatement measures is required to be reasonable and feasible. Figure 9 – Land Uses shows areas high in residential zoning which may require noise abatement. If noise abatement

measures are deemed necessary, they could increase costs of proposed future "Type I" roadway improvements.

4.6 Visual Resources

The visual resources of an area include landforms, vegetation, water features, and physical modifications caused by human activities that give the landscape its visual character and aesthetic qualities. Visual resources are typically assessed based on the landscape character (what is seen), visual sensitivity (human preferences and values regarding what is seen), scenic integrity (degree of intactness and wholeness in landscape character), and landscape visibility (relative distance of seen areas) of a geographically defined view shed. The area along the Study corridor is a blended landscape that has been developed with islands of natural beauty persevering.

An evaluation of the potential effects on visual resources may be necessary, depending on the improvement options forwarded from this Study.

5 Conclusion

This environmental scan identifies physical, biological, social and cultural features within the Study area that may be impacted by potential improvements to I-15. Project-level environmental analysis would be required for any improvements forwarded from this Study. Information contained in this report is available for use to support future NEPA/MEPA environmental documentation.

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Appendix A: Water Quality Report

Montana Department of Environmental Quality — Data Search Tools

2014 Water Quality Information

Water Information

AUID	MT41K001_020	**Water Type**	RIVER
Waterbody Name	Sun River	**Hydro Unit**	10030104
Size (Miles / Acres)	17.3	**Basin**	Upper Missouri
Ecoregion	Northwestern Glaciated Plains	**Watershed**	Missouri-Sun-Smith
County	CASCADE CO	**Use Class**	B-3
TMDL Planning Area	Sun	**Trophic Status and Trend**	
Location	SUN RIVER, Muddy Creek to mouth (Missouri River)		
Water Quality Category	4A		

Beneficial Use Support Information

Use Name	Fully Supporting	Not Supporting	Threatened	Insufficient Information	Not Assessed
Drinking Water	✓				
Primary Contact Recreation		✓			
Agricultural		✓			
Aquatic Life		✓			

Impairment Information

Probable Cause	Probable Sources	Associated Uses	TMDL Completed

Nitrogen (Total)	Rangeland Grazing, Irrigated Crop Production, Agriculture	Aquatic Life, Primary Contact Recreation, Agricultural	Yes
Other flow regime alterations	Irrigated Crop Production	Aquatic Life, Agricultural	N/A
Phosphorus (Total)	Rangeland Grazing, Irrigated Crop Production, Agriculture	Primary Contact Recreation, Agricultural, Aquatic Life	Yes
Sedimentation/Siltation	Irrigated Crop Production, Channelization, Rangeland Grazing	Primary Contact Recreation, Agricultural, Aquatic Life	Yes
Total Suspended Solids (TSS)	Channelization, Rangeland Grazing, Irrigated Crop Production	Agricultural, Aquatic Life, Primary Contact Recreation	Yes

Observed Effects

Observed Effect Associated Uses

Report Explanation

Water Information

- *AUID* - A unique code assigned to each assessed waterbody to facilitate identification and tracking. A stream waterbody may be segmented into more than one assessment unit or may be the entire stream length.
- *Waterbody Name* - The current name of the waterbody
- *Size (Miles/Acres)* - The size of the assessment unit; rivers and streams are measured in miles; lakes in acres
- *Ecoregion* - An ecoregion is a large unit of land containing a geographically distinct assemblage of species, natural communities, and environmental conditions
- *County* - The county or counties within which the waterbody (assessment unit) is situated
- *TMDL Planning Area* - DEQ has divided the state in multiple planning areas to facilitate a 'watershed approach' to developing TMDLs
- *Water Type* - Lake or river
- *Hydro Unit* - The code used by USGS to identify hydrologic units, DEQ uses 4th code (eight digit) HUCs
- *Basin* - Montana DEQ divides the state into four major (administrative) basins; Columbia, Upper Missouri, Lower Missouri (including Saskatchewan) & Yellowstone.
- *Watershed* - Each major basin is divided into sub-major basins, or watersheds, that identify the major waterbodies that smaller streams drain into. Montana has 16 sub-major basins.

Montana Department of Environmental Quality — Data Search Tools

2014 Water Quality Information

Water Information

AUID	MT41K001_010	**Water Type**	RIVER
Waterbody Name	Sun River	**Hydro Unit**	10030104
Size (Miles / Acres)	83.01	**Basin**	Upper Missouri
Ecoregion	Canadian Rockies, Northwestern Glaciated Plains	**Watershed**	Missouri-Sun-Smith
County	CASCADE CO, TETON CO, LEWIS AND CLARK CO	**Use Class**	B-1
TMDL Planning Area	Sun	**Trophic Status and Trend**	
Location	SUN RIVER, Gibson Dam to Muddy Creek		
Water Quality Category	4A		

Beneficial Use Support Information

Use Name	Fully Supporting	Not Supporting	Threatened	Insufficient Information	Not Assessed
Drinking Water	✓				
Primary Contact Recreation	✓				
Agricultural	✓				
Aquatic Life		✓			

Impairment Information

Probable Cause	Probable Sources	Associated Uses	TMDL Completed
Alteration in stream-side or littoral vegetative covers	Channelization, Impacts from Hydrostructure Flow Regulation/modification	Aquatic Life	N/A
Other flow regime alterations	Channelization, Impacts from Hydrostructure Flow Regulation/modification	Aquatic Life	N/A
Sedimentation/Siltation	Grazing in Riparian or Shoreline Zones, Agriculture	Aquatic Life	Yes
Temperature, water	Impacts from Hydrostructure Flow Regulation/modification, Channelization	Aquatic Life	Yes

Observed Effects

Observed Effect Associated Uses

Report Explanation

Water Information

- *AUID* - A unique code assigned to each assessed waterbody to facilitate identification and tracking. A stream waterbody may be segmented into more than one assessment unit or may be the entire stream length.
- *Waterbody Name* - The current name of the waterbody
- *Size (Miles/Acres)* - The size of the assessment unit; rivers and streams are measured in miles; lakes in acres
- *Ecoregion* - An ecoregion is a large unit of land containing a geographically distinct assemblage of species, natural communities, and environmental conditions
- *County* - The county or counties within which the waterbody (assessment unit) is situated
- *TMDL Planning Area* - DEQ has divided the state in multiple planning areas to facilitate a 'watershed approach' to developing TMDLs
- *Water Type* - Lake or river
- *Hydro Unit* - The code used by USGS to identify hydrologic units, DEQ uses 4th code (eight digit) HUCs
- *Basin* - Montana DEQ divides the state into four major (administrative) basins; Columbia, Upper Missouri, Lower Missouri (including Saskatchewan) & Yellowstone.
- *Watershed* - Each major basin is divided into sub-major basins, or watersheds, that identify the major waterbodies that smaller streams drain into. Montana has 16 sub-major basins.
- *Use Class* - Montana's Water Quality Act establishes a systematic classification of waters in accordance to their "present and future most beneficial uses" (75-5-701

Appendix B: Groundwater Data

Groundwater Information Center
Montana Bureau of Mines and Geology
Montana Tech of The University of Montana
1300 West Park Street - Natural Resources Building Room 329
Butte Montana 59701-8997
Ph: (406) 496-4336 Fx: (406) 496-4343

6/3/2014

Overview of CASCADE county

BEAVERHEAD · get data

At-A-Glance

Number of wells in County	6117
Deepest well on record (feet)	2301
Shallowest well on record (feet)	4
Most recent well on record	5/30/2014
Oldest well on record	6/1/1864
Number of water quality samples	983
Number of measured water levels	444163
Statewide Monitoring Network wells	28

Other Reports

Use By Year View this report to see the number of wells and their reported water uses by year.

Histograms for CASCADE county

Wells by Year

The table below shows the breakdown of wells reportedly drilled in the county during the last 20 years. Click the "show all" link to display all data available.

2014	12
2013	83
2012	73
2011	55
2010	44
2009	69
2008	84
2007	120
2006	103
2005	140
2004	136
2003	112
2002	163
2001	200
2000	193
1999	203
1998	135
1997	183
1996	157
1995	191

Show all years

Wells by Depth

The table below shows the number of wells that fall between the depth ranges in the left hand column. All depths are listed in feet below ground surface.

0 -99	3121
100 -199	1401
200 -299	648
300 -399	341
400 -499	260
500 -599	130
600 -699	61
700 -799	51
800 -899	40
900 -999	17
> 1000	47

Reported Water Use

The table below shows the number of each type of water use that has been reported for wells in this county.

UNKNOWN	141
RECREATION	3
INJECTION	14
INDUSTRIAL	21
OTHER	36
PUBLIC WATER SUPPLY	181
TEST WELL	59
UNUSED	66
WILDLIFE	2
FIRE PROTECTION	11
MEDICAL	1
MONITORING	871
COMMERCIAL	20
IRRIGATION	359
RESEARCH	26
GEOTHERMALEXTRACTION	1
GEOTECH	117
GEOTHERMALINJECTION	1
STOCKWATER	1088
DOMESTIC	4056

* Total 7074

* Number may differ from county total since one well may have several reported **water uses**.

Geologic Source

The table below shows the breakdown of geologic sources for wells in this county. Note that not all wells in a county necessarily have had the geologic source code assigned.

KOOTENAI FORMATION (217KOTN)	1091
MADISON GROUP OR LIMESTONE (330MDSN)	982
ALLUVIUM (QUATERNARY) (110ALVM)	491
GLACIAL GREAT FALLS LAKE SEDIMENTS (112GFLK)	475
SAND AND GRAVEL (PLEISTOCENE) (112SNGR)	455
SAND AND GRAVEL (HOLOCENE) (111SNGR)	359
COLORADO SHALE OR FM. (OF COLORADO GROUP) (211CLRD)	270
BLACKLEAF FORMATION (OF COLORADO GROUP) (217BCKF)	166
ADEL MOUNTAIN VOLCANICS (211ADLM)	158
MORRISON FORMATION (221MRSN)	109
FLOOD SHALE MEMBER (OF BLACKLEAF FM.) (217FLOD)	95
TERRACE DEPOSITS (PLEISTOCENE) (112TRRC)	87
PALEOZOIC UNDIFFERENTIATED (300UDFD)	56
SWIFT FORMATION (OF ELLIS GROUP) (221SWFT)	47
VAUGHN MEMBER (OF BLACKLEAF FM.) (217VGHN)	44
MARIAS RIVER FORMATION (OF COLORADO GROUP) (211MRRV)	30
FERDIG SHALE MEMBER (OF MARIAS RIVER FM.) (211FRDG)	27
JEFFERSON LIMESTONE (341JFRS)	26
WOLSEY SHALE OR FORMATION (374WLSY)	26
SUNBURST SANDSTONE (217SBRS)	24
FLATHEAD QUARTZITE OR SANDSTONE (374FLTD)	23
KEVIN SHALE MEMBER (OF MARIAS RIVER FM) (211KVIN)	22
ALLUVIUM (PLEISTOCENE) (112ALVM)	20
VIRGELLE SANDSTONE MEMBER (OF EAGLE SANDSTONE) (211VRGL)	19
ALLUVIUM (HOLOCENE) (111ALVM)	18
CUT BANK SANDSTONE (217CBNK)	15
BOOTLEGGER MEMBER (OF BLACKLEAF FM.) (217BLGR)	14
ELLIS GROUP (221ELLS)	13
SAND AND GRAVEL (QUATERNARY) (110SNGR)	13
VOLCANICS (TERTIARY) (120VLCC)	12
TWO MEDICINE FORMATION (OF MONTANA GROUP) (211TMDC)	10
GNEISS AND SCHIST (EARLY PROTEROZOIC OR ARCHEAN) (500GNSC)	10
DEVONIAN UNDIFFERENTIATED (340UDFD)	10
GLACIAL DRIFT (112DRFT)	9
KIBBEY SANDSTONE (OF BIG SNOWY GROUP) (331KBBY)	9
TAFT HILL MEMBER (OF BLACKLEAF FM.) (217TFHL)	7
PARK SHALE OR ARGILLITE (374PARK)	6
JURASSIC UNDIFFERENTIATED (220UDFD)	4
GLACIAL OUTWASH (PLEISTOCENE) (112OTSH)	3
MEAGHER LIMESTONE (374MGHR)	3
TELEGRAPH CREEK FORMATION (OF MONTANA GROUP) (211TPCK)	3
OTTER FORMATION (OF BIG SNOWY GROUP) (331OTTR)	3
VOLCANICS (CRETACEOUS) (210VLCC)	2
CENOZOIC UNDIFFERENTIATED (100UDFD)	2
CAMBRIAN UNDIFFERENTIATED (370CMBR)	2
CANYON CLINKER (110CNKB)	1
BELT SUPERGROUP (400BELT)	1
LAKOTA SANDSTONE (OF INYAN KARA GROUP) (217LKOT)	1
PILGRIM LIMESTONE OR DOLOMITE (371PLGM)	1
PLEISTOCENE SILT AND CLAY (112SICL)	1

Appendix C: Noxious Weeds in Cascade County

Exotic Plants of Cascade County

Genus	Species	Common Name	Noxious In	Exotic
Anchusa	*officinalis*	common bugloss	OR,WA	×
Arctium	*minus*	common burdock	WY	×
Artemisia	*absinthium*	absinth wormwood	WA	×
Cardaria	*draba*	hoary cress	ID,**MT**,OR,WA,WY	×
Carduus	*acanthoides*	plumeless thistle	OR,WA,WY	×
Carduus	*nutans*	musk thistle	ID,OR,WA,WY	×
Centaurea	*diffusa*	diffuse knapweed	ID,**MT**,OR,WA,WY	×
Centaurea	*maculosa*	spotted knapweed	ID,**MT**,OR,WA,WY	×
Centaurea	*nigra*	black knapweed	WA	×
Centaurea	*repens*	Russian knapweed	ID,**MT**,OR,WA,WY	×
Chrysanthemum	*leucanthemum*	oxeye daisy	**MT**,WA,WY	×
Cirsium	*arvense*	Canada thistle	ID,**MT**,OR,WA,WY	×
Cirsium	*vulgare*	bull thistle	OR,WA	×
Conium	*maculatum*	poison hemlock	ID,OR,WA	×
Convolvulus	*arvensis*	field bindweed	ID,**MT**,OR,WA,WY	×
Cuscuta	*approximata*	clustered dodder	OR,WA	×
Cynoglossum	*officinale*	houndstongue	**MT**,OR,WA,WY	×
Equisetum	*arvense*	field horsetail	OR	
Euphorbia	*esula*	leafy spurge	ID,**MT**,OR,WA,WY	×
Hyoscyamus	*niger*	black henbane	ID,WA	×
Kochia	*scoparia*	kochia	OR,WA	×
Linaria	*dalmatica*	dalmatian toadflax	ID,**MT**,OR,WA,WY	×
Matricaria	*maritima*	scentless chamomile	WA	×
Panicum	*miliaceum*	wild proso millet	OR	×
Phalaris	*arundinacea*	reed canarygrass	WA	×
Polygonum	*cuspidatum*	Japanese knotweed	OR,WA	×
Salvia	*pratensis*	meadow sage	WA	×
Sonchus	*arvensis*	perennial sowthistle	ID,WA,WY	×

Appendix D: Figures

Figure 1 – Study Area

Figure 2 – Quadrangle Maps

Figure 3 - Prime Farmland

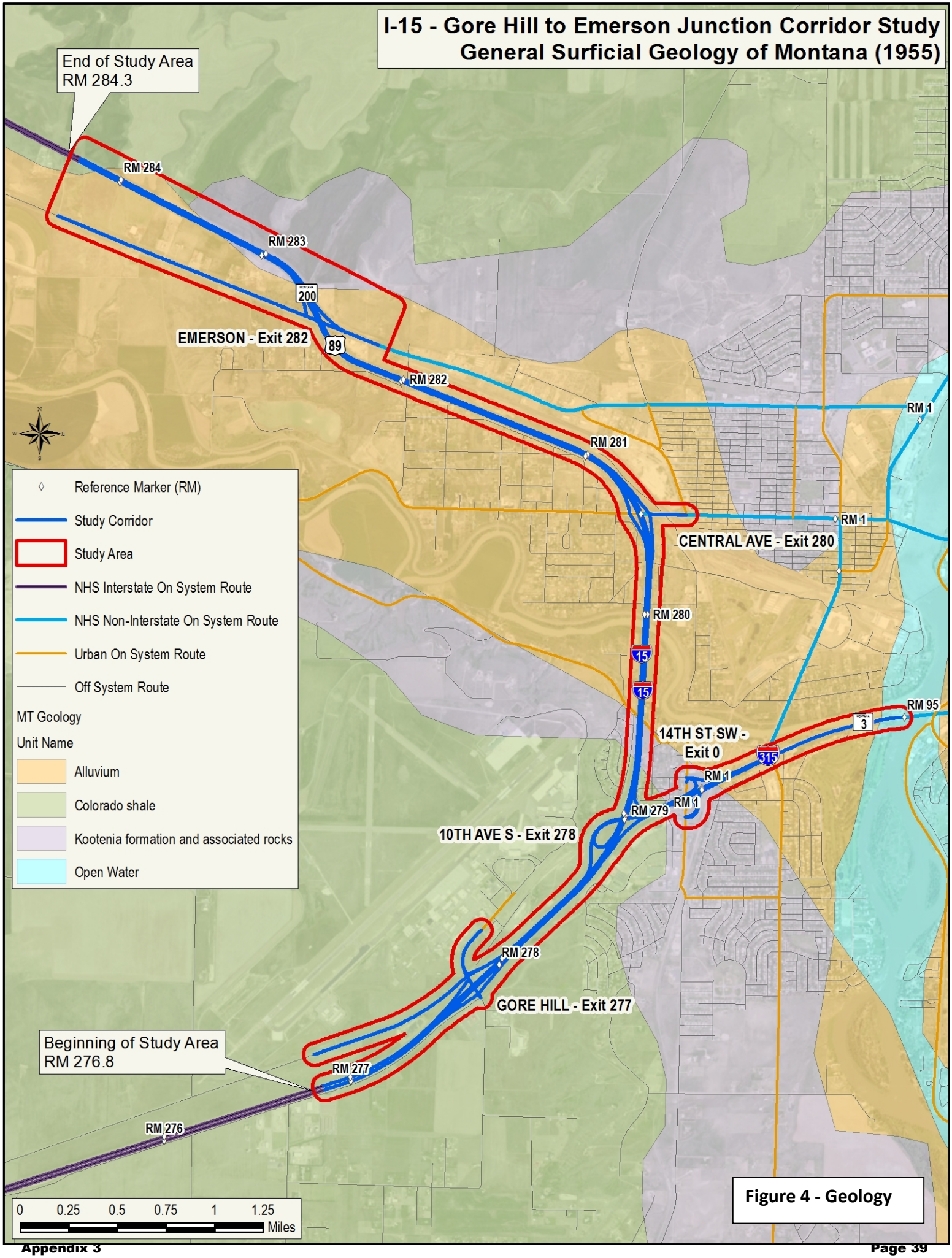

Figure 4 - Geology

Figure 5 - Surface Water and Wetlands

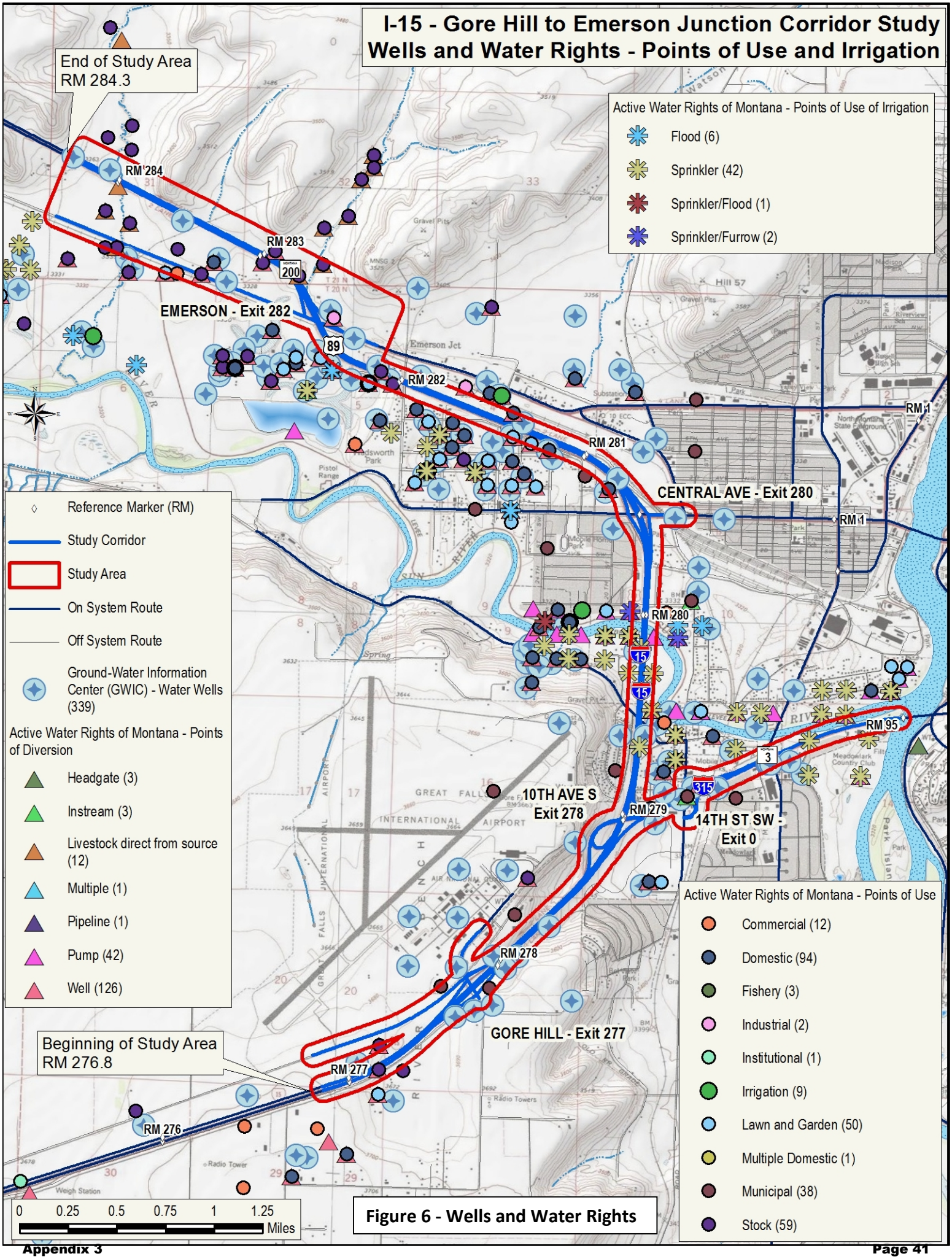

Figure 6 - Wells and Water Rights

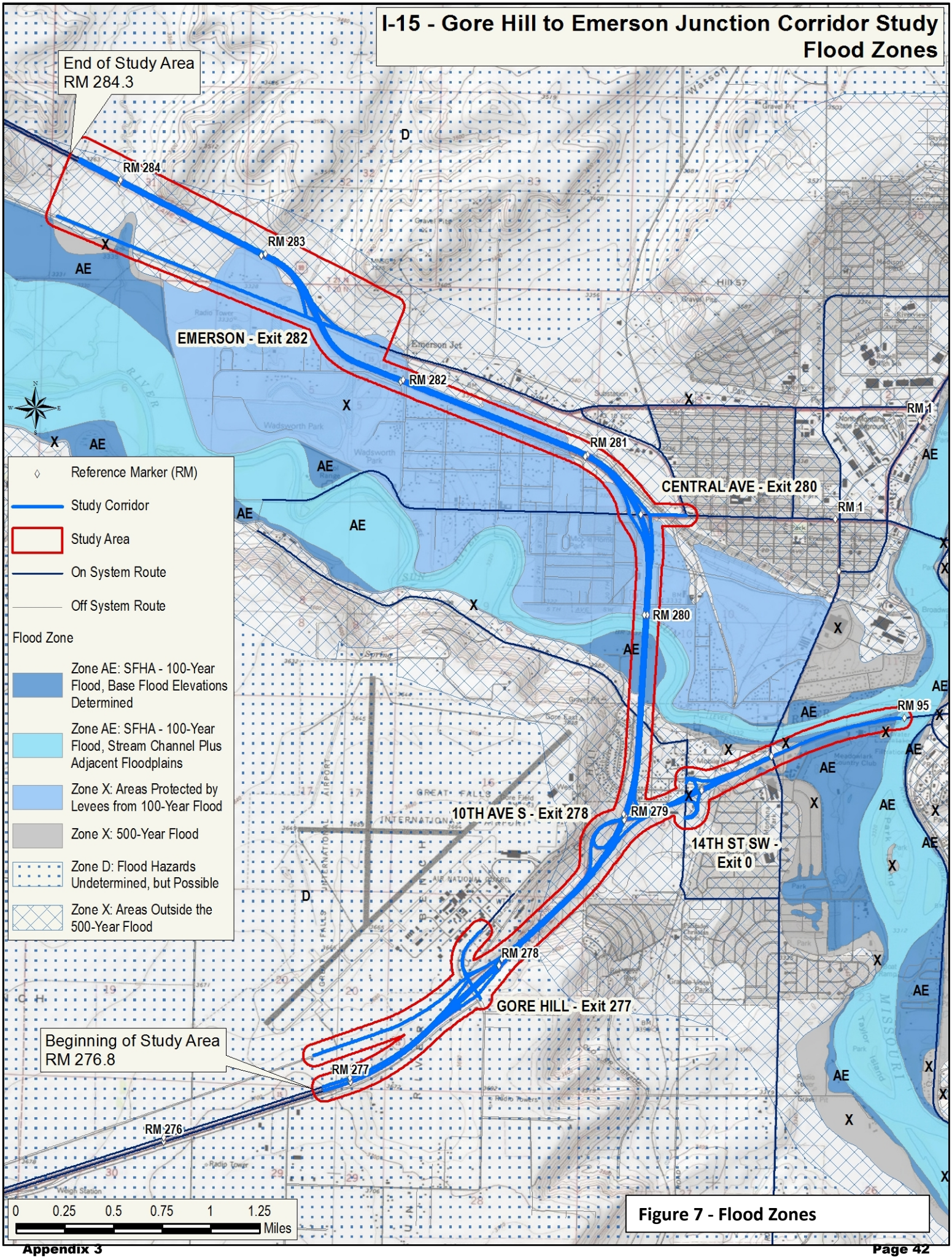

Figure 7 - Flood Zones

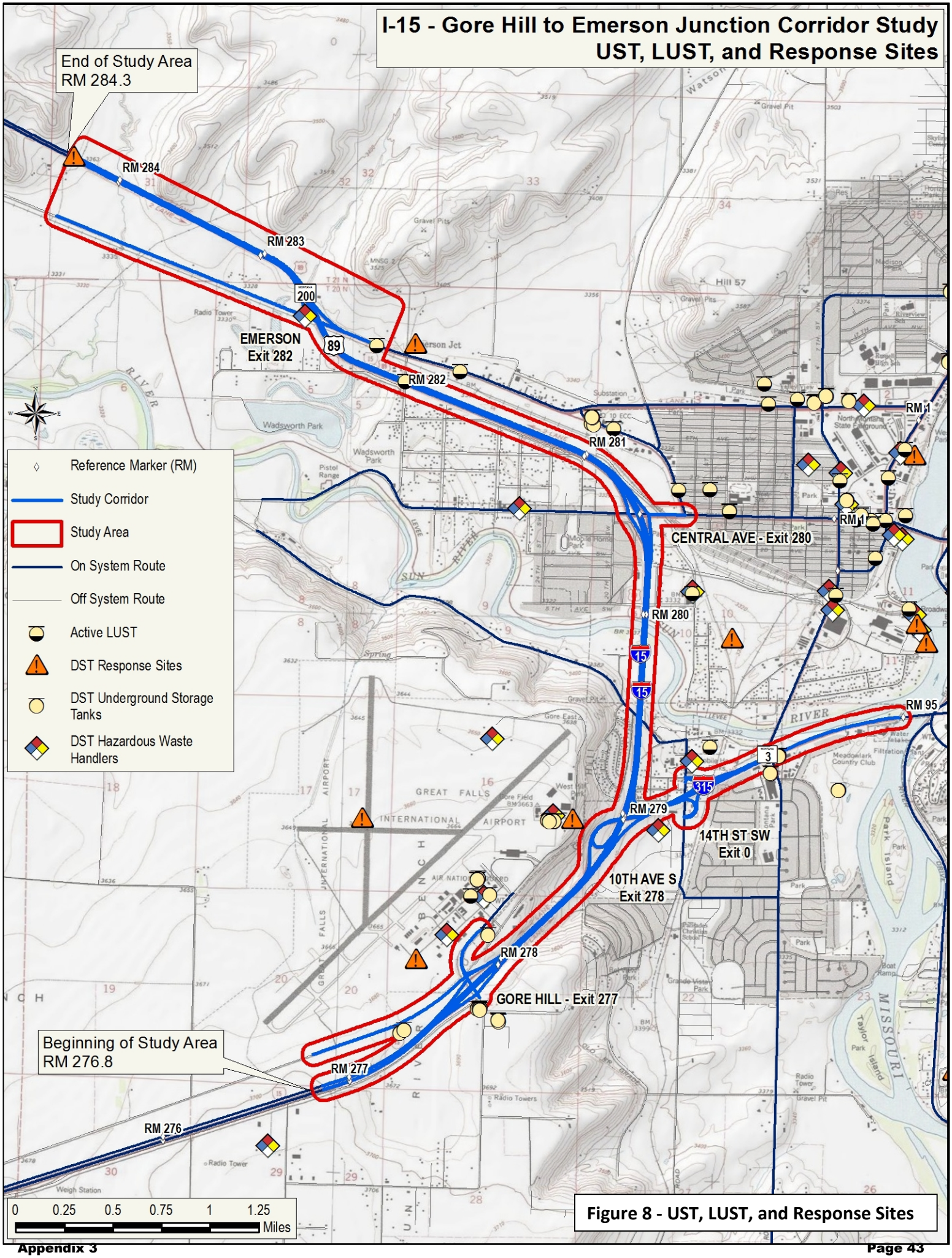

Figure 8 - UST, LUST, and Response Sites

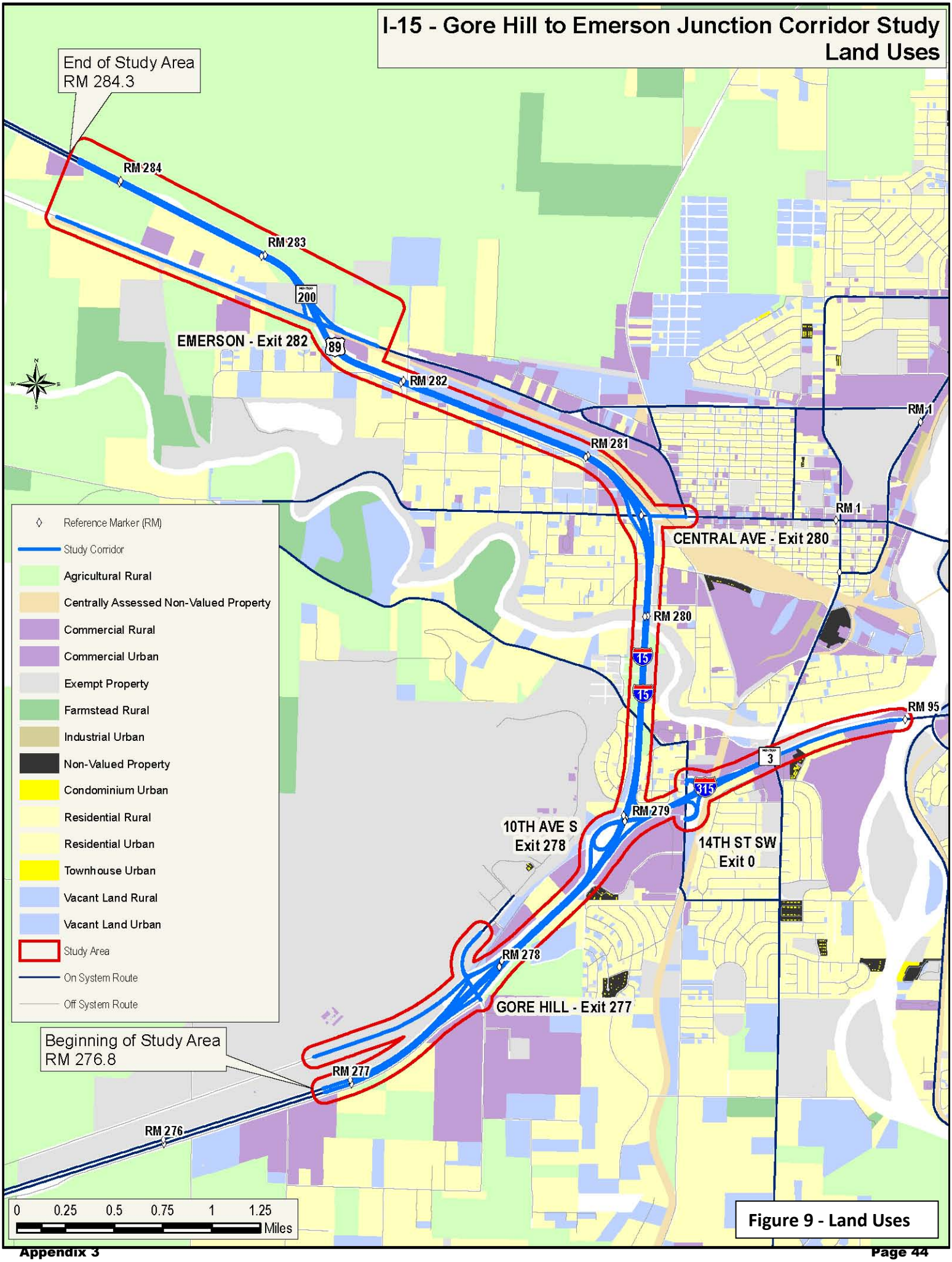

Figure 9 - Land Uses

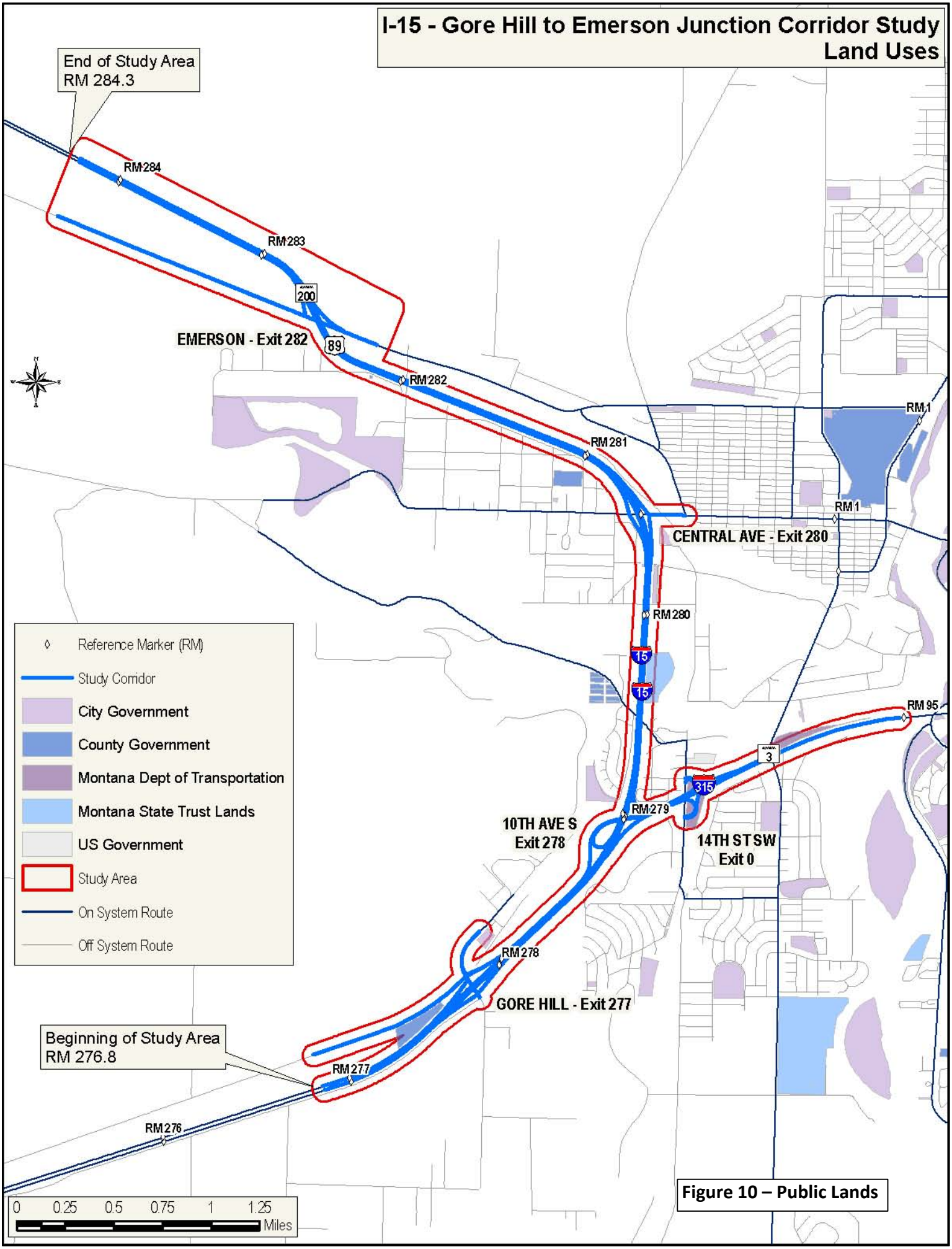

Figure 10 – Public Lands

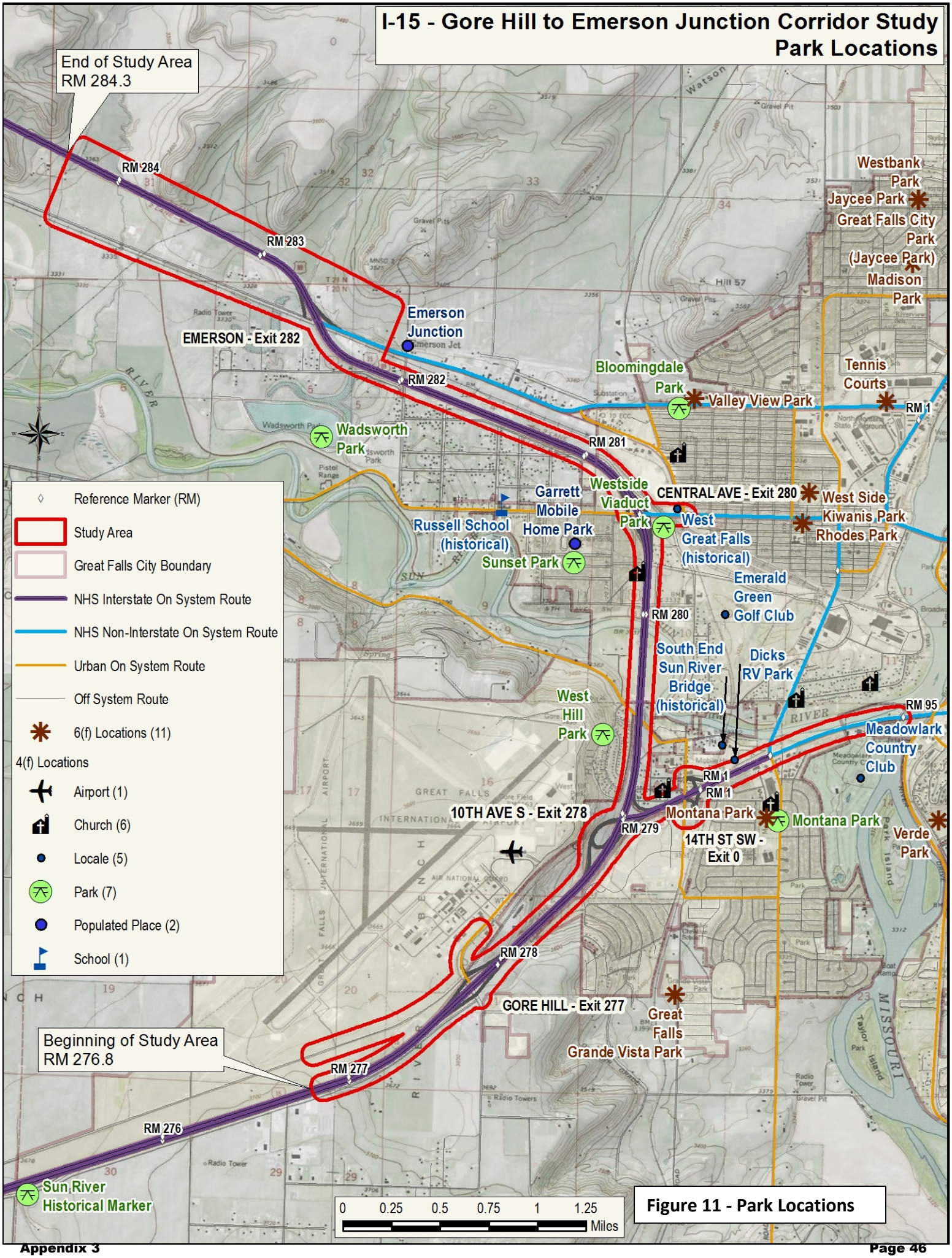

Figure 11 - Park Locations

Figure 12 - Cultural Resources

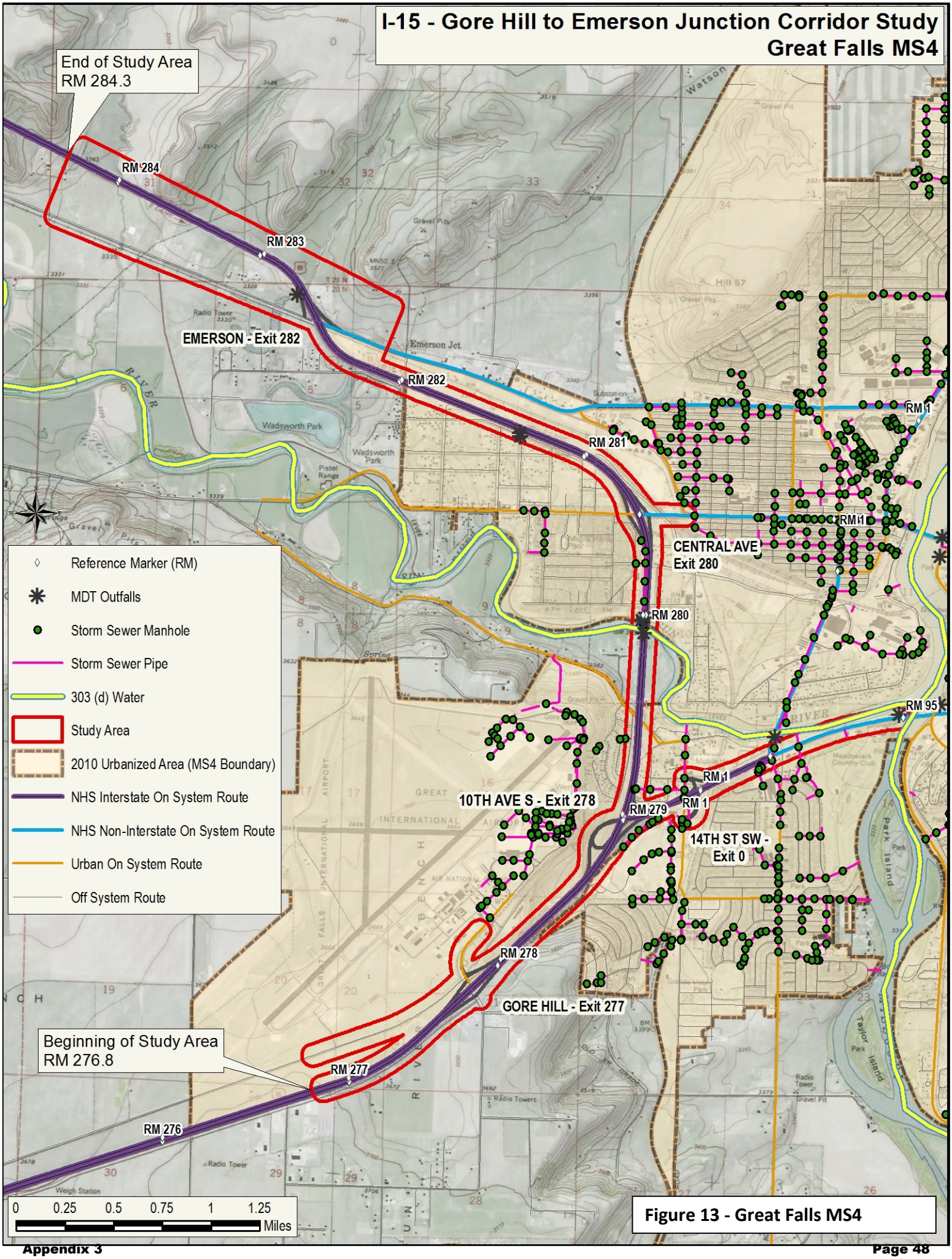

Figure 13 - Great Falls MS4