City of Red Lodge Stormwater

2020 Preliminary Engineering Report

CITY OF RED LODGE

Preliminary Engineering Report
Stormwater Facility Improvements

June 2020

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City of Red Lodge

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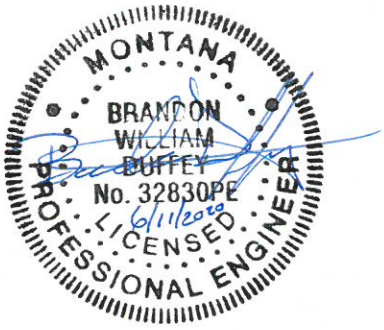

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Table of Contents

List of Figures

List of Tables

Appendices

1.0 EXECUTIVE SUMMARY

1.1 Introduction and Background

The City of Red Lodge has an existing stormwater system that was originally installed in 1985 when stormwater cross connections to sanitary sewer were common. Stormwater is currently being collected by a sporadic system of inlets and stormwater conveyance pipes and ditches located throughout the city.

MDT stormwater systems are present along US Highway 212 from 8th Street West to Robinson Lane and along MT Highway 78 from US Highway 212 to Lazy M Street. These two systems were installed in 2015/2016, are maintained by MDT and are excluded from analysis in this PER.

In addition to the older 1985 city stormwater system, which does overlap MDT's system in areas and serves the primary core area of Red Lodge, the city has some newer subdivisions on the perimeter of the city limits that handle stormwater with internal systems (i.e. storm ponds), and other areas of the city that don't have any stormwater infrastructure.

Stormwater runoff in Red Lodge can generally be separated into seven drainage basins:

- Haggin Avenue Drainage Basin
- 19th Street Drainage Basin
- Areas that drain to Sanitary Sewer
- City Entrance Drainage Basin
- Country Club Estates (CCE) Basin
- East City Basin
- Closed Basin

The majority of the City's stormwater is collected by inlets and laterals that convey runoff to one of two discharge points in Rock Creek, 19th Street outfall or Haggin Avenue outfall. The drainage areas within these two drainage basins that have inlets that drain to the sanitary sewer have been identified and need new infrastructure installed to connect them to the City's two primary drain systems identified above. The City Entrance and East City Basin consist of newer developments that provide onsite retention or are primarily undeveloped. Little stormwater infrastructure exists in these basins and stormwater either infiltrates the roadside ditch of U.S. Highway 212 or

discharges directly into Rock Creek via overland flow. The CCE Basin is one of the newer portions of the City's infrastructure and consists of localized inlets and conveyance pipes that direct stormwater to stormwater retention facilities located on the golf course. This basin is intended not to discharge stormwater except during large storm events in which case excess stormwater is directed to the irrigation ditches located on top of the bench.

In an effort to gather detailed information on the existing stormwater facilities, the City decided to compile a Preliminary Engineering Report (PER) based upon the outline contained in the Uniform Application for Montana Public Facility Projects. Projects identified and recommended by the PER can potentially seek funding from various agencies in Montana if the PER follows the guidelines of the Uniform Application.

1.2 Problem Definition

An analysis of the existing system has shown that the stormwater infrastructure within the Haggin Avenue and 19th Street Drainage basins is undersized, with numerous drainage areas that have inlets that drain to the sanitary sewer system. These cross connections were identified by City staff completing video inspection on storm and sanitary lines and causes extreme maintenance issues with the wastewater treatment plant, and a public health and safety concern as City employees must deal with excess flow into the wastewater treatment plant to prevent flooding of the plant. An inflow chart to the sewer plant is shown below in Figure 1, this influent graph is a snip of 2019 influent data for April 17 to May 20, 2019. The peaks in the graph indicate an increase in wastewater flows that correlates directly to rain events recorded by NOAA. A summary of the identified deficiencies is listed below, and explained in detail in Section 4:

- Cross connections of storm drains to sanitary sewer mains
- Existing infrastructure is undersized
- Localized flooding
- Maintenance issues

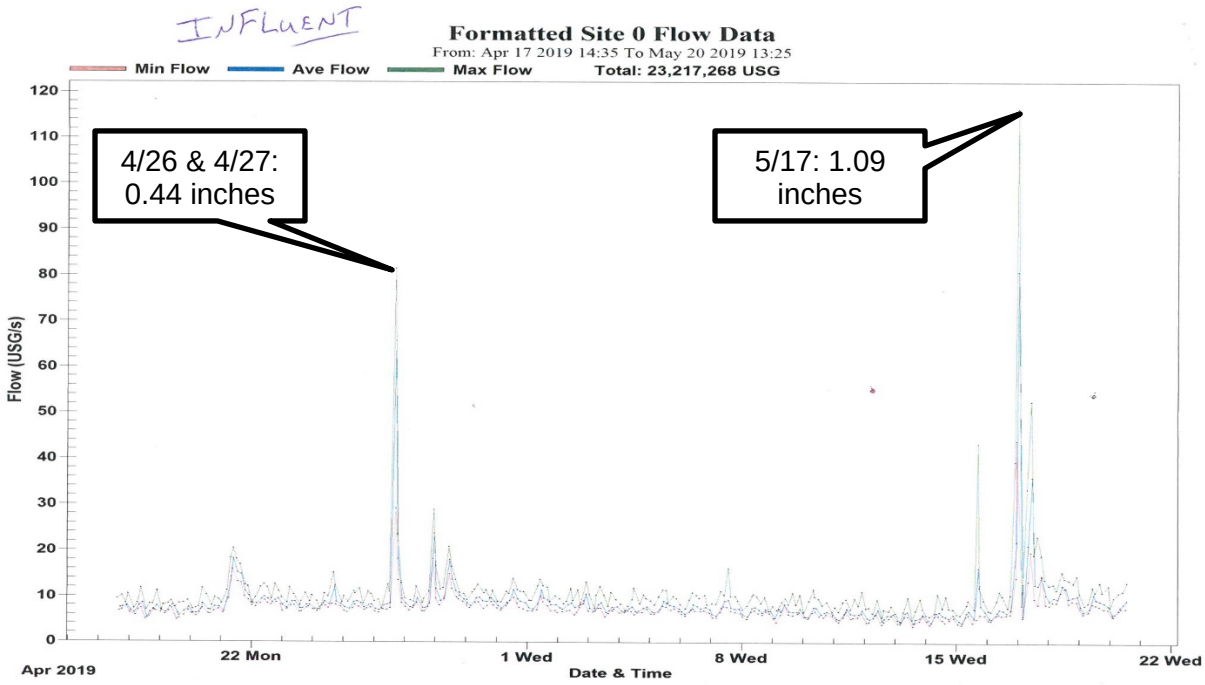


Figure 1: Spike in Sanitary Sewer Treatment Plant Inflow Due to Rain Events, April 17 to May 20, 2020

1.3 Alternatives Considered

1.3.1 Cross connected to sanitary sewer

Three alternatives were considered to address the storm drain inlets that are cross connected to the sanitary sewer system. Two of the alternatives were determined to be unfeasible, leaving the following alternative to be considered in the areas where this deficiency occurs:

- New Stormwater Infrastructure

1.3.2 Existing infrastructure undersized

In areas of the City that have existing stormwater infrastructure, but it is undersized and exhibiting surcharging there were only really two options to explore: no action and upsizing. The no action alternative was considered unfeasible as it does not address the issue of undersized mains and does not allow for installing new infrastructure to disconnect cross connections. Therefore, areas with undersized mains were upsized to handle the design event.

1.3.3 No infrastructure

Three alternatives were considered for this deficiency: no action, surface drainage improvements, and new stormwater infrastructure. The no action alternative does not address the issues of stormwater flooding and other concerns identified in the PER therefore it was not considered further. The other two alternatives both provided viable solutions to addressing the issue of no stormwater infrastructure and were both implemented in the proposed improvements based on their feasibility with each site identified.

Analysis of the existing system served to identify 16 problem areas within the City of Red Lodge's existing stormwater infrastructure which these deficiencies occur. These are listed in Table 1 below.

Table 1: Identification of Problem Areas

SITE ID	AREA	MAIN LENGTH (FT)	EXISTING STRUCTURE TYPE	EXISTING SIZE	DESCRIPTION
1	6th St. to 8th St. & Platt to Broadway	N/A	N/A	N/A	Drainage basin drains to sanitary sewer
2	5th St. to 8th St. & Hauser to Word	N/A	N/A	N/A	Drainage basin drains to sanitary sewer
3	9th St. to 11 St. & Platt to Word	N/A	N/A	N/A	Drainage basin drains to sanitary sewer
4	12th St. to 14th St. & Broadway to top of hill/airport rd.	N/A	N/A	N/A	Drainage basin drains to sanitary sewer
5	15th St. to 17th St/Hauser to Grant & 14th St. to 19th St./Grant to McGillen	N/A	N/A	N/A	Drainage basin drains to sanitary sewer
6	Diamond C Estates Subdivision	N/A	N/A	N/A	Potential for some storm inlets to be tied into sanitary sewer system.
7a	Haggin Ave: Outfall to 8th St.	4,731	PVC/Vitrified Clay pipe	24" & 18"	Main is undersized
7b	Haggin Ave: 8th St. to 11th St.	1,100	PVC/Vitrified Clay pipe	18"	Main is undersized
7c	Haggin Ave: 11th St. to 14th St.	1,065	PVC/Vitrified Clay pipe	15"	Main is undersized
7d	14th St: Haggin to Alley, Alley: 14th St. to 16th St., & 16th St.: alley to Broadway	1,425	PVC/Vitrified Clay pipe	15" & 12"	Main is undersized
8	8th St.: Haggin to Word, & Word: 10th to 7th	2,545	PVC/Vitrified Clay pipe	12" & 8"	Main is undersized
9	11th St.: Haggin to Word	1,385	PVC/Vitrified Clay pipe	12"	Main is undersized
10	14th St.: Alley to Grant	1,485	PVC/Vitrified Clay pipe	12"	Main is undersized
11	19th St Storm Main System	7,700	PVC/Vitrified Clay pipe	24" & 8"	Main is undersized
12	3rd St.: Haggin to Broadway	1,320	PVC	15"-18"	Main is ok
13	Cooper Ave: 9th St. to 1st St.	N/A	N/A	N/A	No storm infrastructure

A decision matrix (Table 25 in Section 8.3) was developed to compare the sites against one another and to assist in prioritizing improvements.

1.4 Preferred Alternative

The decision matrix allowed the projects to be prioritized, with more weight given to the public health and safety criteria. Sites 1 thru 5 pose an imminent risk to public health and safety due to their sanitary sewer cross connections and cause for human contact at the headworks of the sewer treatment plant during rain events. Much of the existing stormwater infrastructure is undersized with the current drainage basins (already experiencing surcharging and flooding at 2-year, 24-hour event) and would not be able to accommodate additional flows from the cross connected drainage basins (sites 1-5), therefore, it is necessary to upsize the appropriate downstream stormwater infrastructure to accommodate these additional flows. It is not financially feasible to upsize all the mains and disconnect all areas of cross connections at once; therefore, phasing of the improvements is necessary. The Haggin Avenue Drainage basin was identified as the priority because it contains sites 1, 2, 3, 4, and approximate seventy-five percent of site 5. As with any gravity system, it is necessary to start at the downstream end and work upstream. The proposed project has been broken out into four phases with each phase being completed during each successful TSEP biennium. The phases are broken out as follows:

Phase 1: Sites 1, 2, 7a, & 6.

Phase 2: Sites 3 & 7b.

Phase 3: Sites 4, 7c, & 9.

Phase 4: Sites 5, 7d, & 11.

Future Phase(s): Sites 8, 10, & 13.

Phase 1 improvements will disconnect sites 1 & 2 from the sanitary sewer, which is approximately 13.6 acres of drainage area and equates to 16% of the confirmed cross connected areas. Upsizing the “Haggin” Ave main from the outfall to 8th street will also address the surcharging issue at Haggin and 3rd that causes the manhole cover to come off and creates localized flooding during common precipitation events. Upsizing of this main is also necessary to facilitate future expansion of the stormwater system.

1.5 Project Costs and Budget

Constructing the improvements identified in the preferred alternative (Phase 1) is estimated at a total cost of $2,671,982, as detailed below. The preferred funding scenario would be to utilize TSEP funds in conjunction with an SRF loan. The City will also need to create a stormwater utility district as the first step in generating funds to implement the selected project(s).

Table 2: Cost Estimate for Phase 1 Improvements

TOTAL PROJECT COST					
ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	*$165,000.00*	$165,000
2	Inspection Crew	20	HR	*$160.00*	$3,200
3	Equipment	20	HR	*$200.00*	$4,000
4	Remove and Dispose of Existing Structures	23	EA	*$1,300.00*	$29,900
5	Supply and Install 15" PVC Storm Pipe	3700	LF	*$45.00*	$166,500
6	Supply and Install 42" PVC Storm Pipe	2160	LF	*$118.00*	$254,880
7	Supply and Install 48" PVC Storm Pipe	905	LF	*$135.00*	$122,175
8	Supply and Install 54" PVC Storm Pipe	1250	LF	*$175.00*	$218,750
9	Storm Drain Manhole, Special Structure	4	EA	*$16,000.00*	$64,000
10	Storm Drain Manhole, 4' barrel	6	EA	*$5,500.00*	$33,000
11	Storm Drain Manhole, 6' barrel	9	EA	*$9,550.00*	$85,950
12	Storm Inlet	52	EA	*$4,250.00*	$221,000
13	Outfall Protection	1	LS	*$20,000.00*	$20,000
14	Asphalt Surface Restoration	69185	SF	*$5.25*	$363,221
15	Utility Conflicts	1	LS	*$41,100.00*	$41,100
16	Traffic Control	1	LS	$20,300.00	$20,300

Construction Subtotal		$1,812,976
2022 Construction Cost	3%	$1,923,387
Design Engineering		$205,000
Construction Engineering		$181,000
Administration/Legal	5%	$90,649
Contingency	15%	$271,946
TOTAL PROJECT COST		$2,671,982

2.0 PROJECT PLANNING

The City of Red Lodge is in southcentral Montana in the south-central region of Carbon County, and according to the 2015 Census information provided by the MT DOC Community Development Division, has a population of 2,236. Carbon County is bordered on the north by Yellowstone County and Stillwater County, on the east by Big Horn County, on the south by Park County, Wyoming and on the west by Park County, Montana. Red Lodge is located about 60 miles south of the City of Billings along Montana Highway 212 at the foothills of the Beartooth Mountains. Red Lodge is considered the gateway to Yellowstone National Park via the Beartooth Highway.

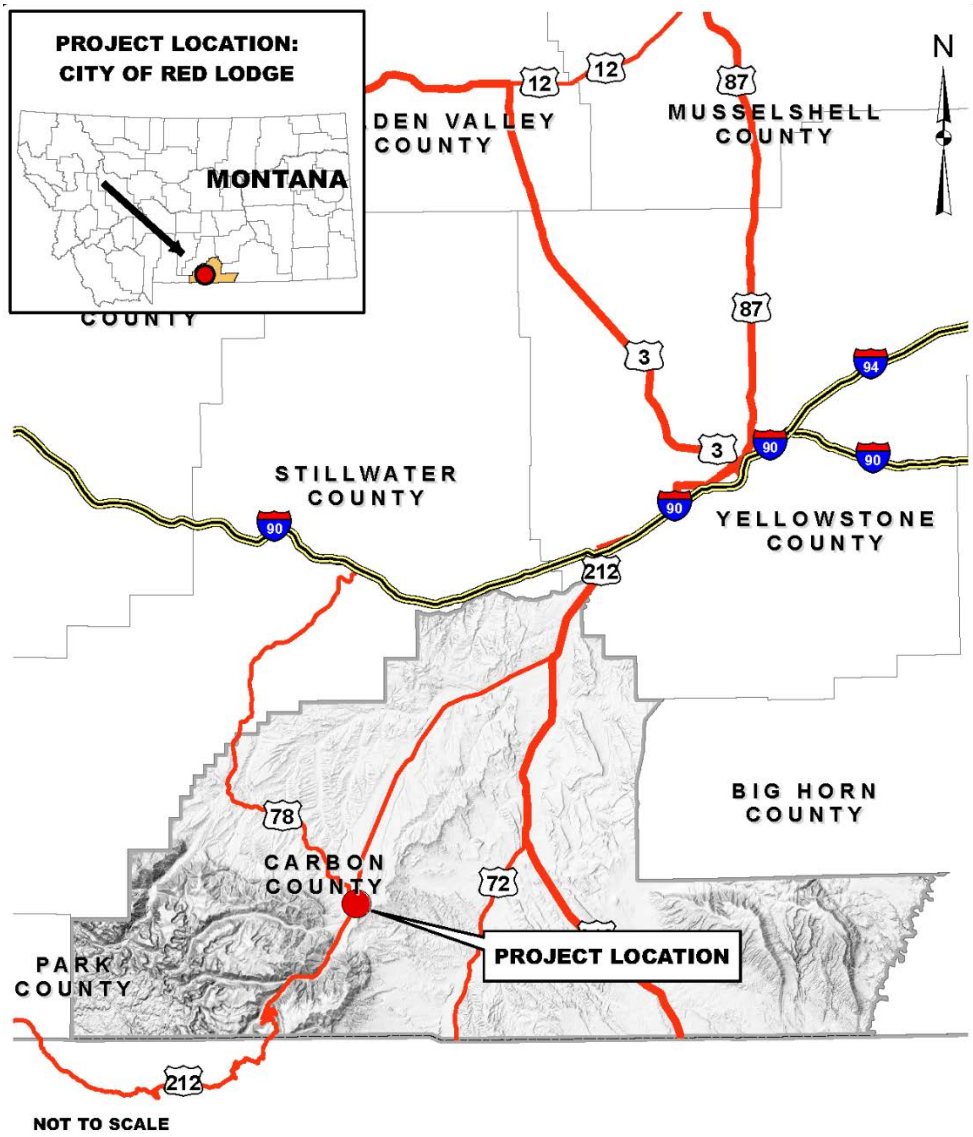


Figure 2: Project Vicinity Map

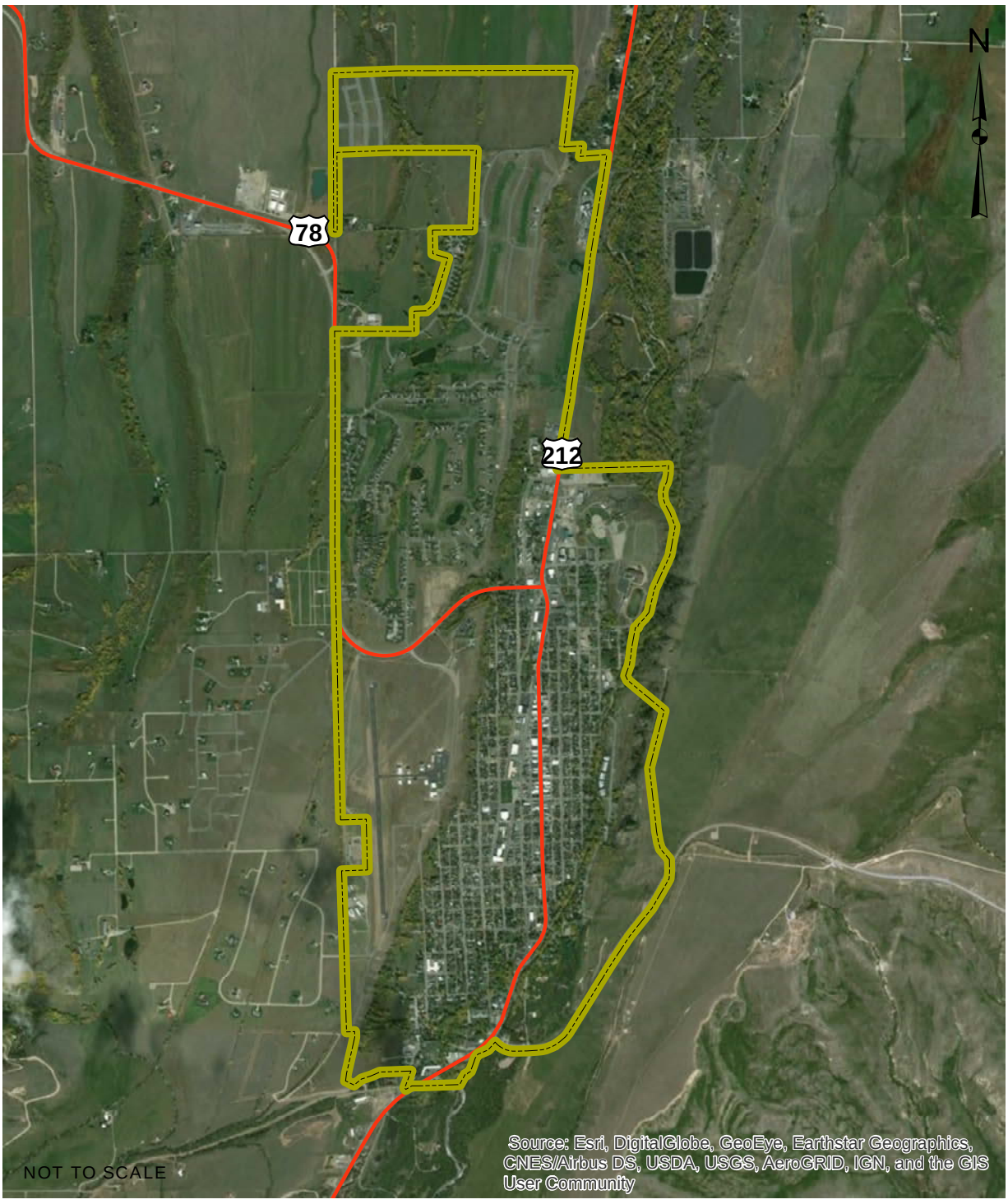
Carbon County consists of 2,049 square miles of land. The population density is 4.9 persons per square mile compared with 6.8 persons per square mile for the entire State of Montana.

The city of Red Lodge was officially established in 1884 but was an area that served the Crow Indians long before the arrival of permanent settlers. The areas' first mine was opened in 1887 by the Rocky Fork Coal Company and served as the backbone of the community until the mid-20th century. In 1943, an underground explosion killing 74 men at the Smith Mine in Bear Creek devastated the community and effectively ended coal mining. Tourism, recreation, and ranching soon replaced mining and continues to be the primary economy for the city.

Geographically, Red Lodge is located in one of the great landscapes of Montana. The Beartooth Mountains are immediately to the west of town; the Pryor Mountains to the east, and the valley to the north opens up to the Yellowstone River. Rock Creek flows through town providing fishing opportunities, and the Red Lodge Mountain Ski Area is just minutes from downtown and provides a major winter attraction.

Over the past 30 years, the local economy has gone through a transition from the dependence on agriculture and mining to more service-oriented, recreation-based businesses with an emphasis on tourism. The City has a 3% Resort Tax that is collected from lodging, retail, bars and restaurants. There are numerous areas available for backpacking, fishing, hiking, hunting, ATV riding, snowmobiling, skiing and other related activities.

Red Lodge is the forty-sixth largest city in Montana and lies 60 miles south of the state's largest city, Billings. Red Lodge is an incorporated city in Carbon County. The business district of Red Lodge includes a variety of services and restaurants for residents and visitors of the area.



RED LODGE STORMWATER FACILITY IMPROVEMENTS
FIGURE 3 - CITY BOUNDARIES

CITY OF RED LODGE, MONTANA
2020 PRELIMINARY ENGINEERING REPORT

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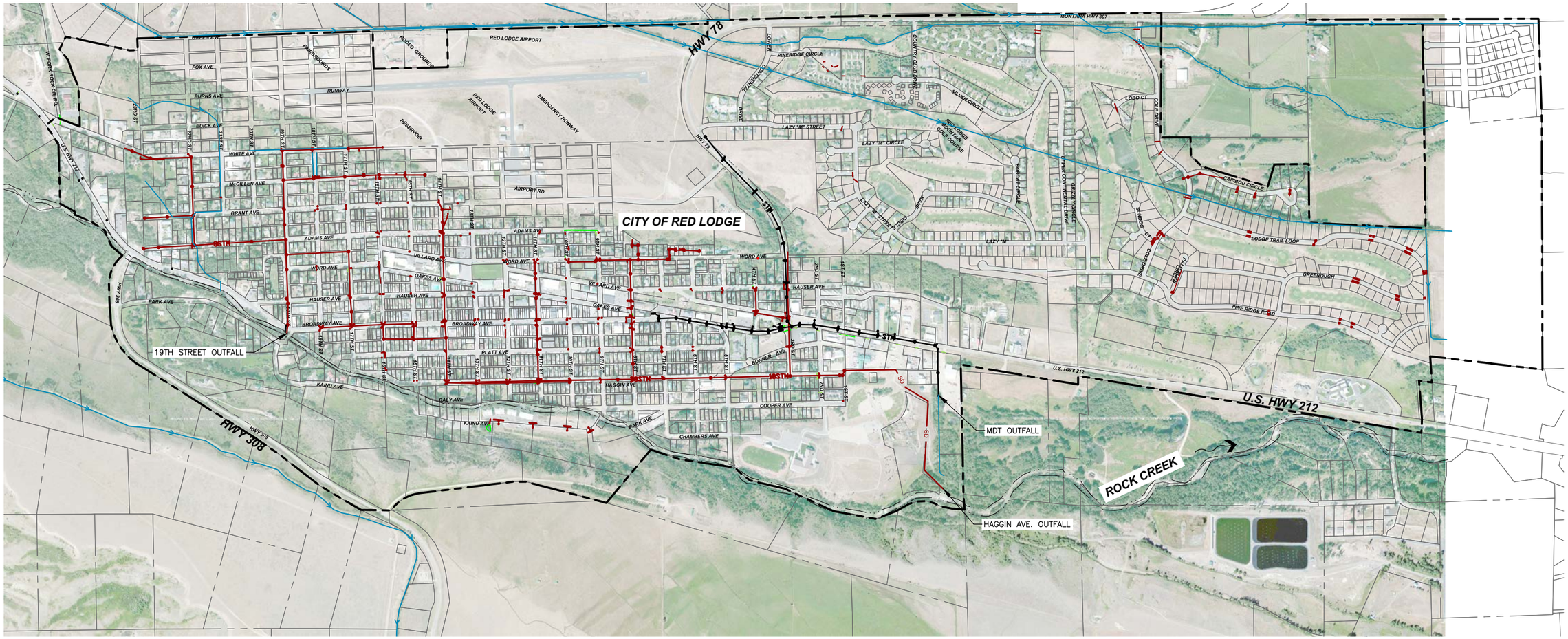
Red Lodge_Stormwater PER City Limits Map



LEGEND	
	RED LODGE CITY LIMITS (PLANNING AREA)
	EXISTING STORM SYSTEM
	IRRIGATION/DRAINAGE DITCH
	MDT STORM SYSTEM

NORTH

0 600 1200

SCALE IN FEET

Figure #4
PLANNING AREA WITH EXISTING SYSTEM SHOWN

CITY OF RED LODGE
2020 STORMWATER IMPROVEMENTS PER

J:\2-17103 - Red Lodge On-Call 2017\TO 15 - Stormwater PER Update\CADD 2-17103-T015\Exhibits\PER\2-17103-T015-PER-Planning Area.dwg

2.1 Location

Figure 4 shows the incorporated limits of the City of Red Lodge, which represents the service area for the stormwater system. Aerial, topographic, and other maps are included in Appendix A. More specifically, the City of Red Lodge stormwater collection system has the following geographic characteristics:

Haggin Avenue Outfall:

Elevation of outfall (Rock Creek):	5471 feet MSL (NAVD88)
Geographic coordinates of outfall:	45.199744° N latitude -109.239723° W longitude

19th Street Outfall:

Elevation of outfall (Rock Creek):	5586 feet MSL (NAVD88)
Geographic coordinates of outfall:	45.178959° N latitude -109.246621° W longitude

MDT Outfall:

Elevation of outfall (Rock Creek):	5479 feet MSL (NAVD88)
Geographic coordinates of outfall:	45.199539° N latitude -109.243642° W longitude

Township, Range, Section of entire collection system:	Sections 14, 15, 22, 23, 26, 27, 34, and 35 of Township 7 S, Range 20 E

2.2 Physical Characteristics of the Area

2.2.1 Geology

Located at the foot of the Beartooth mountains, Red Lodge is built upon alluvial terraces along the alluvium channel of Rock Creek. The mountains south and west of town primarily consist of gneissic rock. Geologically, Carbon County contains a wide variety of rocks ranging in age from

Precambrian (600 million years) to recent (20,000 years). Bedrock in the area is Precambrian consisting predominantly of granitic gneiss and migmatite.

The elevation of the city is approximately 5,568 feet above sea level. The western portion of town is located on top of a bench that gently slopes to the north. The main portion of town is located on a lower bench and is generally flat and slopes less than 5 percent. The ground surface drains toward the east and north, toward Rock Creek that runs through the eastern portion of the Town.

2.2.2 Soil

The NRCS Web Soil Survey was used to generate a map showing the soils in the area around the City of Red Lodge (see Appendix D). The soils found in Red Lodge are primarily composed of gravels, sands, loams, silt, and clays. The predominant soil types identified within the city limits are listed below:

- *Charlos loam, 0 to 2 percent slopes*
- *Charlos loam, 2 to 8 percent slopes*
- *Alluvial land*

Information was obtained describing physical and chemical properties for each soil type. For stormwater considerations, the runoff potential of particular soils is one of the most pertinent pieces of information. The Natural Resources Conservation Service (NRCS), developed four hydrologic soils groups (A, B, C, and D) to categorize the runoff potential of soils. The NRCS Web Soil Survey provides the following descriptions of the four hydrologic soils groups:

- **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.

A map illustrating the hydrologic soil group for soils in the Red Lodge area was generated using the NRCS Web Soil Survey, as well as a summary of each soil unit's rating. Both are included in Appendix D. The hydrologic soil groups of the soils in the Red Lodge vicinity are distributed as follows:

Table 3: Distribution of hydrologic soils group

Hydrologic Soils Group	Percent of Area
A	<1%
B	83.5%
C	5.6%
D	10.8%

Another important property of the soils that will affect the materials used in the stormwater system is the propensity of the soils to corrode concrete and/or steel. Therefore, each of these properties was analyzed. According to the NRCS,

> " 'Risk of corrosion' [of concrete] pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens concrete. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the concrete in installations that are entirely within one kind of soil or within one soil layer."

81% of the area of interest (AOI) was rated with a “moderate” risk of corrosion to concrete. The remainder of the AOI contains soils classified as a “low” risk of corrosion of concrete. A report listing the risk of corrosion to concrete is included in Appendix D.

The majority of the AOI, 93.2%, had a rating of “high” for risk of corrosion. A report listing the risk of corrosion to steel is included in Appendix D.

2.2.3 Climate

The climate in Red Lodge has a humid continental climate per the Koppen climate classification system with annual precipitation rates currently estimated at 21.31 inches. Over 64 percent of the annual precipitation total occurs from March through August. Precipitation can vary significantly from year to year, and location to location within a given year. November through March are the dryer times of the year with average monthly precipitation of 1.15 inches or less. The temperature extremes can range from 10ºF in the winter to 78ºF in the summer, based on monthly averages. The average growing season (consecutive frost-free days) is 100 days. Prevailing winds are from the west at 5-10 mph and gusts up to 20-30 mph are not uncommon.

2.2.4 Groundwater

Groundwater is fairly abundant in the area. The alluvial aquifer has high potential for development of large volume domestic, livestock, and irrigation wells. Rural residences rely on groundwater wells for potable water.

It is assumed that the groundwater flow in the area follows general contour lines and flows northeasterly towards Rock Creek. Area well logs obtained from the Groundwater Information Center (GWIC) and the Montana Bureau of Mines and Geology (MBMG) (included in Appendix E) show an average well depth of 53.6 feet, an average static water level of 19.7 feet and an average yield of 54 gallons per minute (GPM).

Groundwater levels in the Red Lodge area, as with much of Montana, vary with the irrigation season. Levels are low in the winter months and increase with spring runoff and irrigation use. MBMG’s monitoring network within the City show this cyclical trend in groundwater elevations with the seasons.

2.2.5 Surface Water

The largest surface water in the planning area is Rock Creek. Rock Creek originates high in the Beartooth Mountains at Glacier Lake southwest of Red Lodge and is located in the USGS Upper Yellowstone Central Mountain Region Drainage Basin. Less than a mile south of Red Lodge, the West Fork of Rock Creek converges with Rock Creek. The West Fork of Rock Creek serves as the source for multiple irrigation ditches which stretch across the upper bench of Red Lodge and serve the golf course and numerous ranches and farms downstream.

Rock Creek has been classified by the Montana DEQ as a B-1 surface water stream use class, which requires the specific water quality criteria are met to sustain the river's beneficial uses including:

> "waters classified as suitable for drinking, culinary, and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply" ARM 17.30.623(1)

DEQ's interactive mapping also shows a water quality category of 4C for Rock Creek which means:

> "Identified threats or impairments result from pollution categories such as dewatering or habitat modification and, thus, a TMDL is not required"

Rock Creek provides a yearlong source of water for irrigation, livestock, and domestic needs. This stream has several gauging stations installed by the United States Geological Survey (USGS) where flow measurements are taken and recorded at regular intervals.

Several irrigation ditch networks are located on the upper bench just west of the airport and convey flows from southwest to northeast through the Country Club Estates Subdivision and golf course. These irrigation ditches intercept stormwater flow to the upslope side of the ditch and prevent stormwater from west of the ditch from flowing east into the city.

2.2.6 Vegetation

The area around Red Lodge is comprised of open native grassland on the hills and benches, dense timber in the higher elevations of the Beartooth Mountains, and cultivated agricultural land

located on the valley floor adjacent to Rock Creek. Characteristic plant communities on the bench are those typically associated with rangeland production supported by the area soils units. Bluebunch wheatgrass, needle and thread, and western wheatgrass are among the most common found in the area along with some sites suitable for rough fescue and green needlegrass. Reedgrass, sedge, and tufted hairgrass are some of the grasses associated with the sub-irrigated soils in the lower elevations near the river. Other perennial grasses and shrubs, including sagebrush and common juniper are found in the area. There is also a variety of riparian and wetland ecosystems plant communities along the river and sloughs in the planning area. These riparian and wetland ecosystems serve as aquifer recharge areas, help maintain water quality and reduce the impacts of seasonal flooding.

2.3 Environmental Resources Present

As part of any potential construction project, the impacts of the project on the surrounding environment should be considered and provisions made to mitigate any negative impacts. The Uniform Application streamlines the process by utilizing a standard procedure called the Uniform Environmental Checklist. The Uniform Environmental Checklist combined with some additional environmental review questions will serve as an Environmental Assessment (EA) for this project. An EA must be completed in order to comply with the Montana Environmental Policy Act (MEPA). A draft EA for the proposed stormwater system improvements in Red Lodge is included in Appendix B.

As part of quantifying the impacts to various environmental resources, the EA process includes sending letters to interested local, state, and federal agencies requesting comments on any potential environmental impacts as a result of potential improvements. A copy of the letters along with responses are included in Appendix C. The following is a list of agencies that were contacted:

- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- USDA Natural Resource and Conservation Service
- U.S. Environmental Protection Agency
- U.S. Forest Service
- U.S. Department of Transportation
- Bureau of Land Management
- Bureau of Indian Affairs
- Occupational Safety and Health Administration
- Federal Aviation Administration
- National Park Service
- Montana Department of Commerce, Census and Economic Information Center
- Montana Department of Labor and Industry
- Montana Department of Natural Resources and Conservation

- Montana Department of Environmental Quality
- Montana Department of Transportation
- Montana Nature Resource Conservation
- Montana Department of Fish, Wildlife and Parks
- Montana State Historic Preservation Office
- Montana Natural Heritage Program (via Website Database)
- Carbon County Floodplain Administration

2.3.1 Land Resources

Agricultural and National Forest lands account for the majority of the land area in Carbon County. The northern portion of the county consists of small agricultural communities, while the south and west portions comprise National Forest Service Lands providing recreational opportunities. Commercial development is typically centralized along the main highway corridor and the adjoining main street of these Communities. There has been little change in the land use within the City of Red Lodge over the past 15 years.

Farmland classification, as defined by the NRCS, identifies soils as prime farmland, farmland of statewide importance, farmland of local importance or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage and oilseed crops. The majority of the soils within the map area of interest are classified as “prime farmland if irrigated” and “Farmland of statewide importance”. There are also areas within the AOI that are classified as “Not prime farmland”, though these are less prominent than the other two categories. The current land use of the project area will not be affected by the proposed stormwater upgrades. Because any construction that occurs during this project will be in previously disturbed areas and outside of farming activities, no prime farmland will be disturbed. See Appendix D for a map and table showing the farmland classification of the area soils.

Figure 5 below shows the land use plan adopted in the *2015 Red Lodge Growth Policy*.

The following is excerpts from the *2015 Red Lodge Growth Policy:*

<u>Strategies for Implementing the Future Land Use Goals</u> –

- *The following regulatory documents should be revised to reflect current laws and goals of this and other referenced documents.*
    - *Subdivision regulations*
    - *Zoning regulations*

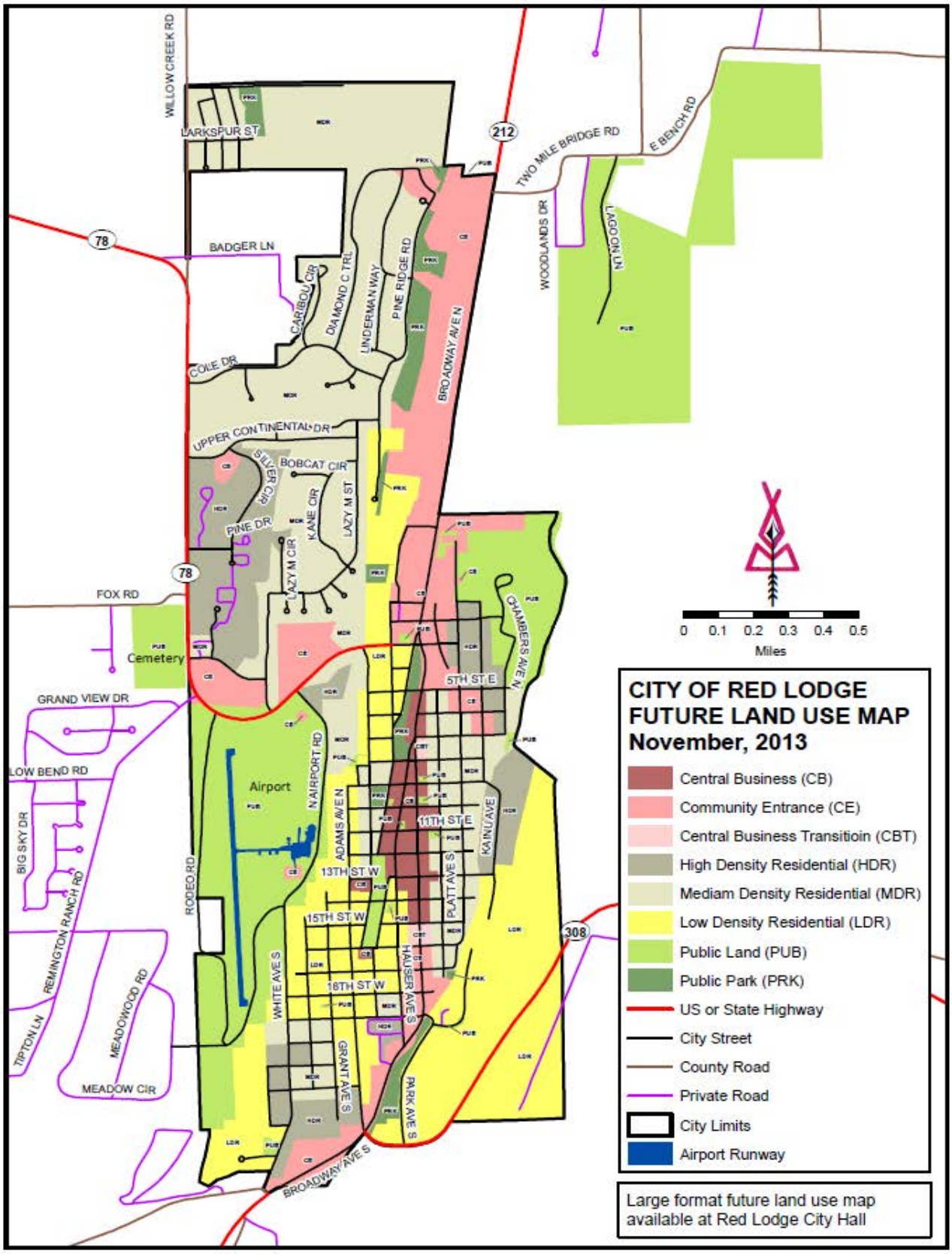
  - *Red Lodge Floodplain regulations*
  - *Other City Codes and policies*
- *Infill development should be encouraged as it has proven to be economically and environmentally beneficial. Infill development must be compatible with neighboring uses…*
- *City policy shall discourage sprawling fringe developments*
- *Development site plans shall be evaluated using performance standards that reflect community expectations*
- *The capital facilities planning process shall accommodate the anticipated growth of Red Lodge and the surrounding area.*
- *The City shall actively participate in any process to revise the Carbon County Growth Policy*
- *The Red Lodge Zoning Regulations should address the "perpetual care and maintenance" of landscaping…*
- *The City shall continue to evaluate what protects the night sky within all neighborhoods of Red Lodge*

<u>Stormwater Runoff:</u>

The City has limited stormwater runoff capacity that should be expanded through infrastructure and improved land management. Managing runoff will encourage planning for entire sites rather than piecemeal division of land. The coarse soils of the Red Lodge area make infiltration a viable runoff management strategy in many cases, as long as storm or melt water is directed onto an area with appropriate vegetative cover (a traditional grass hay meadow is fine - a manicured lawn is not, although lawn areas can be used to convey runoff to infiltration areas). Some fine-textured material in the upper four feet of the soil profile is also needed. The presence of clay lenses in the soil makes infiltration slow in parts of the City.

The City should consider the creation of a Special Improvement District (SID) to fund needed improvements to and expansion of a stormwater management system. It would also be possible via this SID to install proper curb, gutter and sidewalks in all areas of the City plus address 50-plus years of deferred maintenance to our streets, alleys and sidewalks.

Figure 5: Future Land Use Map, 2015 Growth Policy



2.3.2 Biological Resources

The Montana Natural Heritage Program database was queried for information on biological resources. Fauna of the area consists of typical mammalian species found in the intermountain west, including mule deer, whitetail deer, antelope, coyote, rabbit, skunk, weasel, rodents and other species. Common bird species include the black-billed magpie, American robin, Canadian goose, osprey, blackbird, sparrow, warbler, common waterfowl, other raptors, game birds and other species. The nearby Rock Creek holds rainbow, brook trout and brown trout. Reptile and amphibian species prevalent include snakes, lizard, and frogs. In terms of vegetation, the area is typically populated with riparian species and grasses.

The Montana Natural Heritage Program maintains a website with up-to-date lists of Species of Concern across the State of Montana, including species listed as endangered or threatened by the United States Fish and Wildlife Service (USFWS). A review of this information was completed as part of this PER effort and is included in Appendix G. A Species of Concern is a species at risk or potentially at risk as a result of declining population trends, threats to their habitats, and/or restricted distribution. While no statutory or regulatory classification or enforcement is associated with this designation, it helps resource managers make proactive decisions regarding species conservation and data collection priorities.

In the vicinity of Red Lodge (Township 7S, Range 20E), the following species of concern were identified:

- Birds
  - Northern Goshawk
  - Great Blue Heron
  - Veery
  - Greater Sage Grouse
  - Brown Creeper
  - Peregrine Falcon
  - Cassin's Finch
  - Clark's Nutcracker
  - Long-billed Curlew
  - Green-tailed Towhee
  - Brewer's Sparrow
- Reptiles
  - Western Milksnake
- Fish
  - Yellowstone Cutthroat Trout

- Mammals
  - Wolverine
  - Hoary Bat
  - Canada Lynx
  - Grizzly Bear

- Flowering Plants
  - Beautiful Fleabane
  - Wood Lily

The U.S. Fish and Wildlife Service was contacted and provided the following statement:

> *"The Service reviewed the project description and has no comments regarding federally-listed or proposed threatened or endangered species, critical habitat, or other trust species."*

The area was also reviewed for Sage Grouse habitat. Based on a review of the Montana Sage Grouse Habitat Conservation Program Mapper (*https://sagegrouse.mt.gov/projects*), the proposed project area is associated with the city limits, the south half of the city is within the "Exempt Community Boundary" of the City of Red Lodge, and the north half of the city is classified as not mapped in an Executive Order (EO) Area for Sage Grouse Habitat. The Sage Grouse habitat map is included in Appendix A. As such, Sage Grouse are not anticipated to be adversely affected by this work. Following the award of grant funds, and within 12 months of the proposed construction date, the City will consult with the MSGHCP regarding the work.

2.3.3 Water Resources

Stormwater systems can have a significant impact upon surrounding water resources, and urban runoff commonly contains a wide variety of pollutants including oil, grease, sediment, heavy metals and debris. Pollutants are generally introduced to a stormwater system through two methods. The first source is runoff flowing through urban areas which collects pollutants from the ground surface and ultimately conveys them to the storm sewer. The second common source of pollutants is a direct introduction of non-stormwater to the system, which can include illicit connections or the illegal dumping of oil, antifreeze, or other substances into storm grates.

Red Lodge's stormwater system does not currently require an MPDES General Permit for Stormwater Discharges Associated with Small Municipal Separate Stormwater Systems (MS4S). Presently, the population threshold for the permit is 10,000, *"as determined by the latest decennial*

census by the United States census bureau plus the number of commercially advertised bedroom accommodations that will allow for an overnight stay, as listed through the chamber of commerce, or any local resort or property management company" [ARM 17.30.1107(1)(b)]. Essentially, the State has been given authority by the U.S. Environmental Protection Agency (EPA) to regulate effluent from stormwater systems which release to state waters for public entities that meet the population threshold. As the City's population is not anticipated to exceed 10,000 in the next 20 years, the permit and requirements do not currently apply. Further information on the MPDES permit is included in Appendix O.

The City has previously identified the importance maintaining the quality and quantity of groundwater and surface water, as evidenced by the following excerpt from the *2015 Red Lodge Growth Policy*:

> *Strategies for Providing Municipal Services and Infrastructure (Investments):*
>
> *The City will continue to participate in the National Flood Insurance Program (NFIP) and update regulations to mitigate potential loss of life and property due to flood hazards. The City will work to acquire and remove structures from the floodplain and acquire undeveloped riparian lands.*
>
> *The Rock Creek watershed situated above Red Lodge is an important source for the City's municipal water supply and the County's agricultural productivity. Additionally, the watershed supports aquatic and riparian environments important to continued outdoor recreation opportunities and aesthetics associated with the Red Lodge community and economy. The City of Red Lodge is encouraged to support activities that will conserve water use and management activities that maintain the hydrologic function of the watershed.*
>
> *The City Council should work with the DEQ and the DNRC to pursue watershed protection, wellhead protection and isolation studies and zones to protect City water supplies.*
>
> *Strategies for Providing Municipal Services and Infrastructure (Regulations):*
>
> *The City of Red Lodge will implement the management recommendations of the Red Lodge Source Water Delineation and Assessment Report completed by*

Montana DEQ in 2003 in order to protect water resources. http://www.deq.mt.gov/ppa/swp/nrisreports/MT0000314.htm

The City should support the Custer National Forest's watershed protection efforts on the West Fork of Rock Creek. The City shall partner with Carbon County to assure development does not impact the City's public water supply. 2015 Red Lodge Growth Policy Page 41 of 60

The City of Red Lodge will use the Red Lodge Zoning Regulations and work with Carbon County to ensure that proposed development will not conflict with continued operation of the sewage treatment plant.

The City of Red Lodge will retain sufficient staff for enforcement of its building, zoning, floodplain and subdivision codes.

2.3.4 Floodplains

A review of the Federal Emergency Management Agency (FEMA) floodplain maps was completed in the proposed project area. The Flood Insurance Rate Maps (FIRM – 30009C0692D-2012, FIRM – 30009C0711D-2012, and FIRM 30009C0703D-2012) indicates that portions of the City of Red Lodge are within the 100-year floodplain of Rock Creek. A very small percentage of the City, as it relates to the proposed stormwater infrastructure is affected, and mostly includes areas near the outfalls of 19th Street and Haggin Avenue Stormwater Systems. As part of the proposed project, construction activity may be within the 100-year floodplain at the areas near the outfalls, and portions of the system adjacent to Rock Creek may be within the 500-year floodplain. A more detailed analysis of the project will be completed during the design phase to determine if a Joint Application Permit package is necessary for any of the proposed projects. The floodplain maps for the City of Red Lodge area are provided in Appendix A.

2.3.5 Wetlands

The National Wetlands Inventory maintained by the USFWS was queried for information on wetlands in the proposed construction areas. The Wetlands Mapper utility indicates that wetland areas are present along Rock Creek, but they all appear to be outside of the limits of the proposed stormwater improvements and will not be impacted by the project. A wetland delineation will be

performed to document any jurisdictional wetlands at the site vicinity during the design phase of the project to ensure wetlands are not impacted. Wetland maps are included in Appendix F.

2.3.6 Cultural Resources

As part of the environmental review process, the Montana State Historic Preservation Office (SHPO) was contacted and asked to comment on potential impacts to cultural resources in the project area. SHPO provided a response letter indicating that there are previously recorded sites in the Red Lodge area and that cultural resource inventories have been completed for in the area. The letter further stated that *"As long as ground disturbance will be kept to existing disturbed areas and there will be no disturbance or alteration to structures over fifty years of age, we feel that there is a low likelihood cultural properties will be impacted. We, therefore, feel that a recommendation for a cultural resource inventory is unwarranted at this time."* A copy of the response letter is included in Appendix C.

There does not appear to be any potential conflicts with any historic structures within the City. The final design will need to be coordinated to ensure that any historical structures are not adversely impacted or are mitigated properly.

The National Register of Historic Places is the official list of the nation's cultural resources worthy of preservation. Authorized under NHPA, the Register is administered by the National Park Service. Properties on the National Register include districts, sites, buildings, structures, objects that are significant in American history, architecture, archaeology, engineering and culture.

Table 4: Red Lodge properties listed on the National Register

Resource Name	Address	Date Listed
Hi Bug Historic District	Roughly bounded by W. 3rd St., N. Villard Ave., W. 8th St., and N. Word Ave.	1986-07-23
Red Lodge Commercial Historic District	Roughly Broadway from 8th to 13th Streets.	1983-04-14
Red Lodge Commercial Historic District	S. Broadway between 8th and 15th Streets.	1986-08-28
Yodeler Motel	601 S. Broadway Ave.	2014-03-26
Warila Boarding House and Sauna	20 N. Haggin	1985-10-24
Calvary Episcopal Church	9 N. Villard Ave.	1986-10-23
Red Lodge Brewing Company – Red Lodge Canning Company	904 N. Bonner St.	2007-09-05
Red Lodge Communal Mausoleum	Montana HWY 78	2001-03-21

2.3.7 Socio-economic and Environmental Justice Issues

The City of Red Lodge is not considered a minority of low-income community according to the Department of Commerce based on information from the 2015 American Communities Survey (ACS) and Census and Target Rate 2015 Information from Community Development Division. The median household income for Red Lodge, according to the 2015 ACS, is $42,500.

Red Lodge is considered to have a low and moderate income (LMI) percentage of 48.97%. In order to be eligible for a Community Development Block Grant (CDBG), which is a low-income grant program, a community must have an LMI of at least 51%. At the time of this report, Red Lodge is not eligible for a CDBG grant.

Concerns with the stormwater system are not anticipated to have a disproportionately high adverse effect to minority of low-income sections of the community. The proposed improvements will affect the entire community equally. The improvements will be beneficial to public safety and human health and will not adversely impact the environment.

2.4 Population Trends

The existing population of the City of Red Lodge is a key indicator of the type and extent of services that are needed to serve the population today, and when compared to recent and past trends, land development demands of the future and the subsequent demand on City services may be more accurately anticipated. An awareness of recent population trends provides a valuable guide for planning, budgeting, and financing decisions. Table 5 below shows the historic population of Red Lodge and Carbon County, using data obtained from the Montana Census & Economic Information Center. Supporting census data is included in Appendix I.

Table 5: Population History

	Red Lodge		Carbon County	
Census	Population	% Growth Annualized	Population	% Growth Annualized
1900	--	--	--	--
1910	4,860	--	--	--
1920	4,515	-0.7%	15,279	--
1930	3,026	-3.9%	12,571	-1.9%
1940	2,950	-0.3%	11,865	-0.6%
1950	2,730	-0.8%	10,241	-1.5%
1960	2,278	-1.8%	8,317	-2.1%
1970	1,844	-2.1%	7,080	-1.6%
1980	1,896	0.3%	8,099	1.4%
1990	1,958	0.3%	8,080	0.0%
2000	2,177	1.1%	9,552	1.7%
2010	2,125	-0.2%	10,078	0.5%
2015	2,236	0.5%	10,268	0.2%

Red Lodge has experienced a relatively stable population between the periods of 1980 and 2010. The most current population estimate (2015) shows 2,236 residents. The 2015 estimate and the 2010 census data were used to estimate a percent growth for estimating population projections.

Table 6: Population Projections

	Red Lodge		Carbon County	
Census	Population	% Growth Annualized	Population	% Growth Annualized
2010	2,125		10,078	
2015	2,233	1.0%	10,592	1.0%
2016	2,256	1.0%	10,698	1.0%
2017	2,278	1.0%	10,805	1.0%
2018	2,301	1.0%	10,913	1.0%
2019	2,324	1.0%	11,022	1.0%
2020	2,347	1.0%	11,132	1.0%
2030	2,593	1.0%	12,297	1.0%
2040	2,864	1.0%	13,584	1.0%
2050	3,164	1.0%	15,005	1.0%

2.5 Community Engagement

The City of Red Lodge has a long history of actively engaging the community in its planning process. Past efforts include the: 1995 Master Plan, the 1st Growth Policy (2001), 2008 Growth Policy, 2008 Capital Improvements Plan, 2013 Growth Policies, 2014 Capital Improvements Plan, annual updates to the CIPs, 2015 Growth Policy Update, 2016 Wastewater Collection and Treatment System Preliminary Engineering Report, 2018 Stormwater System Preliminary Engineering Report, 2020 Water System Preliminary Engineering Report, 2020 Stormwater Preliminary Engineering Report Update, and various plans for Park, Trees and Trails. The city has been diligent in each of these efforts to solicit the input of the citizens and businesses of Red Lodge through public forums, meetings, etc.

Red Lodge held Public Hearing for the 2018 Stormwater System Preliminary Engineering Report and environmental review on May 31, 2018. Another presentation on the PER/TSEP application was presented during the June 12, 2018 council meeting as well. Along with these original public hears, the Public Works Director gives an annual "state of the infrastructure" presentation during public city council meetings and discusses the needs of the community for water, sewer, and stormwater infrastructure as well as roads and snow removal. The 2019 state of the infrastructure presentation is included in Appendix P

Another community engagement effort has been undertaken by the City when the City decided to start a committee to pursue increasing the resort tax by 1%. It has been specifically identified by the committee that one hundred percent of the 1% tax will go to stormwater and stormwater-related projects. An article published in The Carbon County News, May 14, 2020 about one of these meetings in included Appendix P

It was originally planned to complete the public hearings for the updated PER and TSEP application on March 24, 2020 and the EA hearing on April 14, 2020, but both of those hearings were canceled due to the COVID-19 pandemic and restrictions that were in place. A presentation for the updated stormwater PER and TSEP grant was completed during the May 26, 2020 council meeting in conjunction with the resolutions for the PER and TSEP grant application. A summary of the PER and funding scenarios were presented, and the council along with participating community members were informed that the formal public hearings for the PER and EA will be completed at a later date once restrictions allow full community participation but before the August 3, 2020 TSEP deadline.

Supporting documents for these public meetings are included in Appendix P.

3.0 EXISTING FACILITIES

The City of Red Lodge has an existing stormwater system that was originally installed in 1985 when stormwater cross connections to sanitary sewer were common. Stormwater is currently being collected by a sporadic system of inlets and stormwater conveyance pipes and ditches located throughout the city.

MDT stormwater systems are present along US Highway 212 from 8th Street West to Robinson Lane and along MT Highway 78 from US Highway 212 to Lazy M Street. These two systems were installed in 2015/2016, are maintained by MDT and are excluded from analysis in this PER.

In addition to the older 1985 city stormwater system, which does overlap MDT's system in areas and serves the primary core area of Red Lodge, the city has some newer subdivisions on the perimeter of the city limits that handle stormwater with internal systems (i.e. they don't discharge to Rock Creek), and other areas that don't have any stormwater infrastructure.

Stormwater runoff in Red Lodge can generally be separated into seven drainage basins:

- Haggin Avenue Drainage Basin
- 19th Street Drainage Basin
- Areas that drain to Sanitary Sewer
- City Entrance Drainage Basin
- Country Club Estates (CCE) Basin
- East City Basin
- Closed Basin

The majority of the City's stormwater is collected by inlets and laterals that convey runoff to one of two discharge points in Rock Creek, 19th Street outfall or Haggin Avenue outfall. There are storm inlets within these two drainage basins that drain to the sanitary sewer. The areas that contribute to these inlets have been identified on Figure 7 with a red cross hatching and need new infrastructure installed to connect them to the City's stormwater infrastructure. The City Entrance and East City Basin consist of newer development that provides onsite retention or is primarily undeveloped. Little stormwater infrastructure exists in these basins and stormwater either infiltrates in the roadside ditch of U.S. Highway 212 or discharges directly to Rock Creek via overland flow. The CCE Basin is one of the newer portions of the City's infrastructure and

consists of localized inlets and conveyance pipes that direct stormwater to stormwater retention facilities located on the golf course. This basin is intended not to discharge stormwater except during large storm events in which case excess stormwater is directed to the irrigation ditches located on top of the bench. Field investigations in the CCE Basin area, and large inflows to the City's sewer lift station located just east of the basin, led to the conclusion that some stormwater infrastructure (curb inlets) may be cross connected to the sanitary sewer within the CCE Basin.

3.1 Location Map

A schematic of the existing drainage basins and stormwater facilities is shown below in Figure 7.

3.2 History

The City has little to no documentation of any drainage reports or other studies completed for their existing infrastructure.

The Montana Department of Transportation (MDT) has constructed stormwater infrastructure from 8th Street West to Robinson Lane. MDT maintains Highway 212 (Broadway Ave) through the City, and Highway 78 (3rd Street) from Highway 212 West. Consultation with the MDT yielded the following history of stormwater improvements made in Red Lodge:

- 2016, Red Lodge – Brewery Hill, STPP 78-1(17)0
- 2016, Red Lodge – 8th – Robinson, MT 28-2(49)70

The stormwater as-built plans from the MDT projects are included in Appendix J along with key section of the final drainage report that was prepared for those projects.

3.3 Condition of Existing Facilities

An analysis of the existing drainage issues throughout the City and a review of existing stormwater facilities was conducted by Great West Engineering and City of Red Lodge personnel in April of 2018. The condition of existing facilities was analyzed based on reports from Public Works personnel's video inspections. The existing infrastructure was constructed in 1985 and remains unchanged today.

Existing Collection System

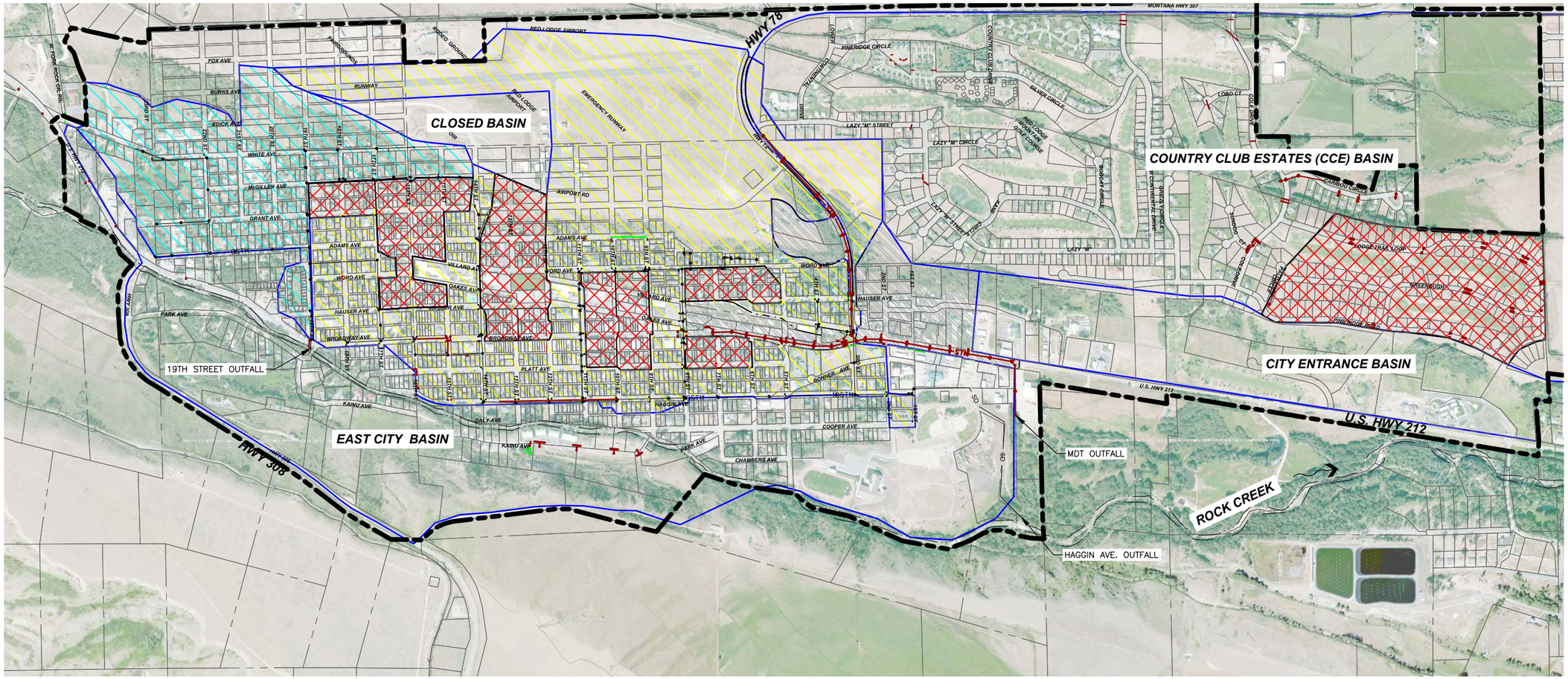
The existing stormwater collection system contains approximately 25,000 linear feet of pipe, consisting of vitrified clay, PVC, and RCP pipe ranging in size from 8" to 24". The system also incorporates manholes, grated inlets, limited curb and gutter, valley gutter and two outfalls to Rock Creek. Existing facilities and their drainage basins are shown in Figure 7. The existing systems within the 19th Street and Haggin Avenue Basins exhibit surcharging causing manhole lids to rise off manholes and creating localized flooding. This has been witnessed by publics work staff during common storm events (PW staff noted 1-2 times during spring rain events) requiring them to reset the lids after these storm events.

Figure 6: Manhole cover blown off by surcharging stormwater during May 22, 2018 storm

Refer to existing site photos in Appendix N.

Storage/Detention

No storage or detention facilities are incorporated into the existing infrastructure within the 19th Street Drainage Basin or the Haggin Avenue Drainage Basin. The CCE Basin has some stormwater retention/detention facilities located on the golf course. Over the years, several of these ponds have been infilled causing reduced storage capacity and flooding issues.



LEGEND

	RED LODGE CITY LIMITS
	EXISTING STORM SYSTEM
	MAJOR DRAINAGE BASINS
	IRRIGATION/DRAINAGE DITCH
	19TH STREET DRAINAGE BASIN
	HAGGIN AVE. DRAINAGE BASIN
	DRAINS TO SANITARY SEWER
	MDT DRAINAGE BASIN

NORTH

0 600 1200

SCALE IN FEET

Figure #7
EXISTING FACILITIES

CITY OF RED LODGE
2020 STORMWATER IMPROVEMENTS PER

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Hydraulic Loading

A detailed hydrologic and hydraulic analysis was completed on the 19th Street and Haggin Avenue Basins. The existing system was analyzed for capacity (at the 10-year event) and found to have insufficient capacity throughout most of the mains within these basins. Refer to Appendix M for hydraulics of the existing system and sub-basin layout. A summary of the calculated peak flows from each sub-basin is shown in Table 7 below.

Table 7: Runoff summary for the existing Red Lodge system

Basin	Drainage Area (acres)	Runoff 10-Year (cfs)
19th CM-1	27.00	6.50
19th CM-2	24.53	4.44
19th CM-3	40.45	11.40
19th CM-4	9.20	7.45
19th CM-5	10.10	5.07
19th Basin Totals:	**111.28**	**34.86**
Hag CM-1	24.2	22.50
Hag CM-2	8.84	10.83
Hag CM-3	15.80	14.22
Hag CM-4	11.22	7.01
Hag CM-5	12.13	12.56
Hag CM-6	20.59	13.76
Hag CM-7	30.29	8.30
Hag CM-8	9.31	11.85
Hag CM-9	10.25	11.08
Hag CM-10	144.36	4.62
Hag CM-11	15.18	9.64
Hag CM-12	25.35	21.92
Haggin Basin Totals:	**327.52**	**148.29**
SWR CM-1	28.34	31.57
SWR CM-2	25.95	15.68
SWR CM-3	16.51	21.16
SWR CM-4	8.23	9.09
SWR CM-5	5.36	5.60
Sewer Basins Totals:	**84.39**	**83.10**
Totals	**523.19**	**266.25**

3.4 Operational and Management Practices and Capabilities

Currently the City provides maintenance to the existing system with the limited funds available from the general budget. Their course of action involves inspecting and cleaning grates after storm events to mitigate flooding and replacing manhole covers that come off due to surcharging. City crews also complete routine cleaning of manholes to remove sediment, cleaning of inlets, video for condition assessment, and replacing damaged components (as budgets allow).

3.5 Financial Status of Existing Facilities

The existing stormwater infrastructure under City jurisdiction is currently being minimally maintained by City staff due to no direct funding source for stormwater infrastructure. Residents and businesses in the City of Red Lodge are currently not being assessed for upkeep of the system. However, the city does plan to set up a stormwater utility district as part of this PER in an effort to fund needed projects and provide adequate maintenance of the infrastructure in the future (As identified in the *2013 Red Lodge Growth Policy*). See Appendix Q for a potential stormwater utility district assessment scenario.

4.0 NEED FOR PROJECT

An analysis of the existing system has shown that the stormwater infrastructure within the Haggin Avenue and 19th Street Drainage basins is undersized, with numerous inlets that drain to the sanitary sewer system. These cross connections cause extreme maintenance issues with the wastewater treatment plant, and a public health and safety concern as City employees must deal with excess flow into the wastewater treatment plant to prevent flooding of the plant. An inflow chart to the sewer plant from May 22/23, 2018 is included in Appendix K, this extreme peak inflow is attributed to a 1.5 to 2.0-inch rain event per NOAA interactive mapper, which correlates to a rain event between the 2-year, 6-hour (1.25-inches) and the 2-year, 24-hour (2.1 inches) events. Additional Inflow graphs to the sewer plant for a period of March 12, 2019 to December 31, 2019 are also included in Appendix K, there are several spikes in the inflow data that correlate to snow melt and rain events. Records from NOAA for rain events from 2019 are also included in the appendix and correlate to the peaks in the inflow graphs. A summary of the identified deficiencies is listed below:

- Storm inlets cross connected to sanitary sewer mains
- Existing infrastructure is undersized
- Localized flooding
- Maintenance issues

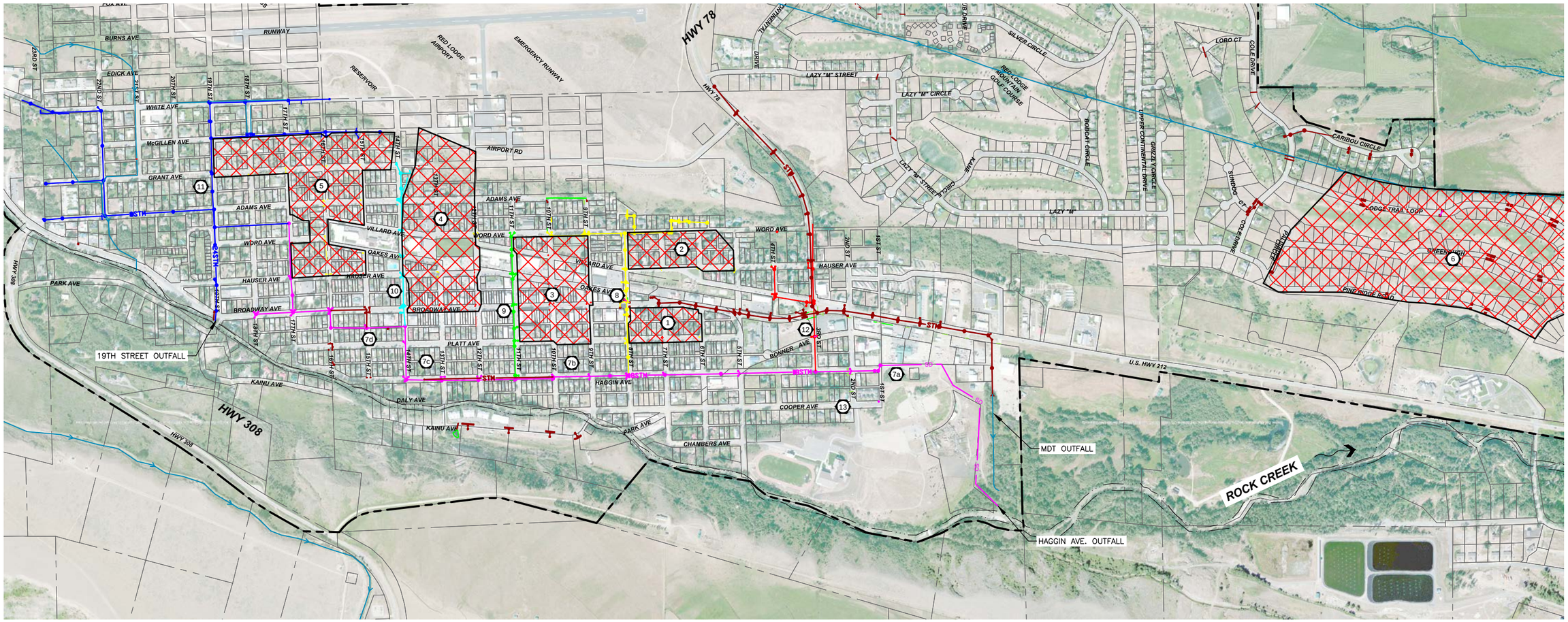
Each of the problem areas has been designated a numerical Site ID and are listed in Table 8 below and photos of the sites are included in Appendix N.

The 16 identified problem areas highlight those regions which currently exhibit surcharging pipe and manholes (insufficient capacity), localized flooding, and cross-connections to sanitary sewer.

In addition to identifying deficiencies with a public utility system and developing alternatives to correct those deficiencies, a PER must discuss the relevant need for the project to help small communities prioritize capital projects and manage limited resources and budgets. The following section will discuss the impact of the identified deficiencies on the community to assist later in prioritizing recommended improvements to correct the deficiencies.

Table 8: Identification of Problem Areas

SITE ID	AREA	LENGTH (FT)	EXISTING STRUCTURE TYPE	EXISTING SIZE	DESCRIPTION
1	6th St. to 8th St. & Platt to Broadway	N/A	N/A	N/A	Drainage basin drains to sanitary sewer/Storm Inlets connect to Sewer
2	5th St. to 8th St. & Hauser to Word	N/A	N/A	N/A	Drainage basin drains to sanitary sewer/Storm Inlets connect to Sewer
3	9th St. to 11 St. & Platt to Word	N/A	N/A	N/A	Drainage basin drains to sanitary sewer/Storm Inlets connect to Sewer
4	12th St. to 14th St. & Broadway to top of hill/airport rd.	N/A	N/A	N/A	Drainage basin drains to sanitary sewer/Storm Inlets connect to Sewer
5	15th St. to 17th St/Hauser to Grant & 14th St. to 19th St./Grant to McGillen	N/A	N/A	N/A	Drainage basin drains to sanitary sewer/Storm Inlets connect to Sewer
6	Diamond C Estates Subdivision	N/A	N/A	N/A	Potential for some storm inlets to be tied into sanitary sewer system.
7a	Haggin Ave: Outfall to 8th St.	4,731	PVC/Vitrified Clay pipe	24" & 18"	Main is undersized, Surcharging
7b	Haggin Ave: 8th St. to 11th St.	1,100	PVC/Vitrified Clay pipe	18"	Main is undersized, Surcharging
7c	Haggin Ave: 11th St. to 14th St.	1,065	PVC/Vitrified Clay pipe	15"	Main is undersized, Surcharging
7d	14th St: Haggin to Alley, Alley: 14th St. to 16th St., & 16th St.: alley to Broadway	1,425	PVC/Vitrified Clay pipe	15" & 12"	Main is undersized, Surcharging
8	8th St.: Haggin to Word, & Word: 10th to 7th	2,545	PVC/Vitrified Clay pipe	12" & 8"	Main is undersized, Surcharging
9	11th St.: Haggin to Word	1,385	PVC/Vitrified Clay pipe	12"	Main is undersized, Surcharging
10	14th St.: Alley to Grant	1,485	PVC/Vitrified Clay pipe	12"	Main is undersized, Surcharging
11	19th St Storm Main System	7,700	PVC/Vitrified Clay pipe	24" & 8"	Main is undersized, Surcharging
12	3rd St.: Haggin to Broadway	1,320	PVC	15"-18"	Main is ok
13	Cooper Ave: 9th St. to 1st St.	N/A	N/A	N/A	No storm infrastructure, localized flooding



LEGEND

(1)	SITE ID OF IDENTIFIED PROBLEM AREAS
	RED LODGE CITY LIMITS
SD	HAGGIN AVE. STORM MAINS
SD	3RD ST. STORM MAINS
SD	8TH ST. STORM MAINS
SD	11TH ST. STORM MAINS
SD	14TH ST. STORM MAINS
SD	19TH ST. STOMR MAINS
SD	OTHER STORM WATER FACILITIES
	DRAINS TO SANITARY SEWER
	IRRIGATION/DRAINAGE DITCH

NORTH

0 500 1000

SCALE IN FEET

Figure #8
ID OF PROBLEM AREAS

CITY OF RED LODGE
2020 STORMWATER IMPROVEMENTS PER

J:\2-17103 - Red Lodge On-Call 2017\TO 15 - Stormwater PER Update\CADD 2-17103-TO15\Exhibits\PER\2-17103-TO15-PER-ID of problem areas.dwg

4.1 Health, Sanitation and Security

Cross Connections to Sanitary Sewer

The existing system has numerous locations of cross connections in which the storm inlets in the street are tied directly into the sanitary sewer mains. DEQ Circular 2, Chapter 30 states that "sewers must be design for municipal wastewater only. Rainwater from roofs, streets, and other areas, and groundwater from foundation drains must not be permitted in municipal wastewater sewers".

The significance of these cross connections can be seen in Figure 9 below. This shows the City's wastewater plant influent flow rate as a function of time. This influent graph is a snip of 2019 influent data for April 17 to May 20, 2019, the peaks in the graph indicate an increase in wastewater flows that correlates directly to rain events recorded by NOAA. It is estimated in the 2016 Wastewater Collection and Treatment System PER completed by KLJ that the wastewater system receives up to 5 million gallons per day (MGD) of Stormwater Inflow.

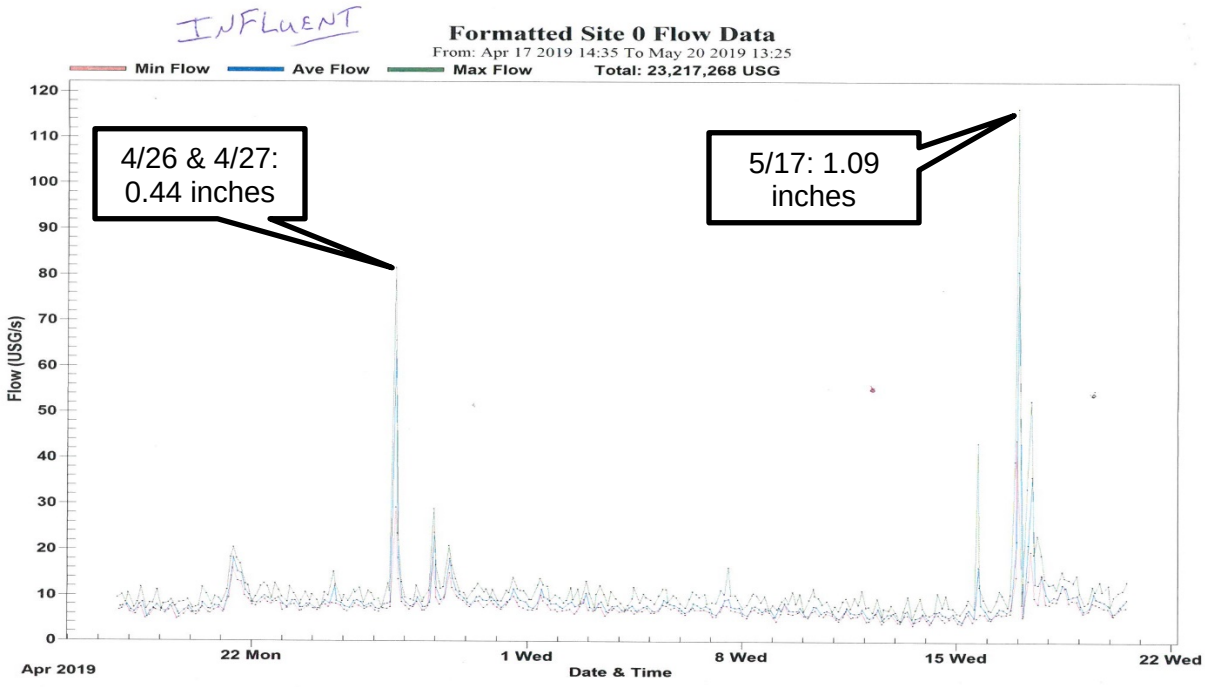


Figure 9: Red Lodge Wastewater Plant Influent April 17 to May 20, 2019

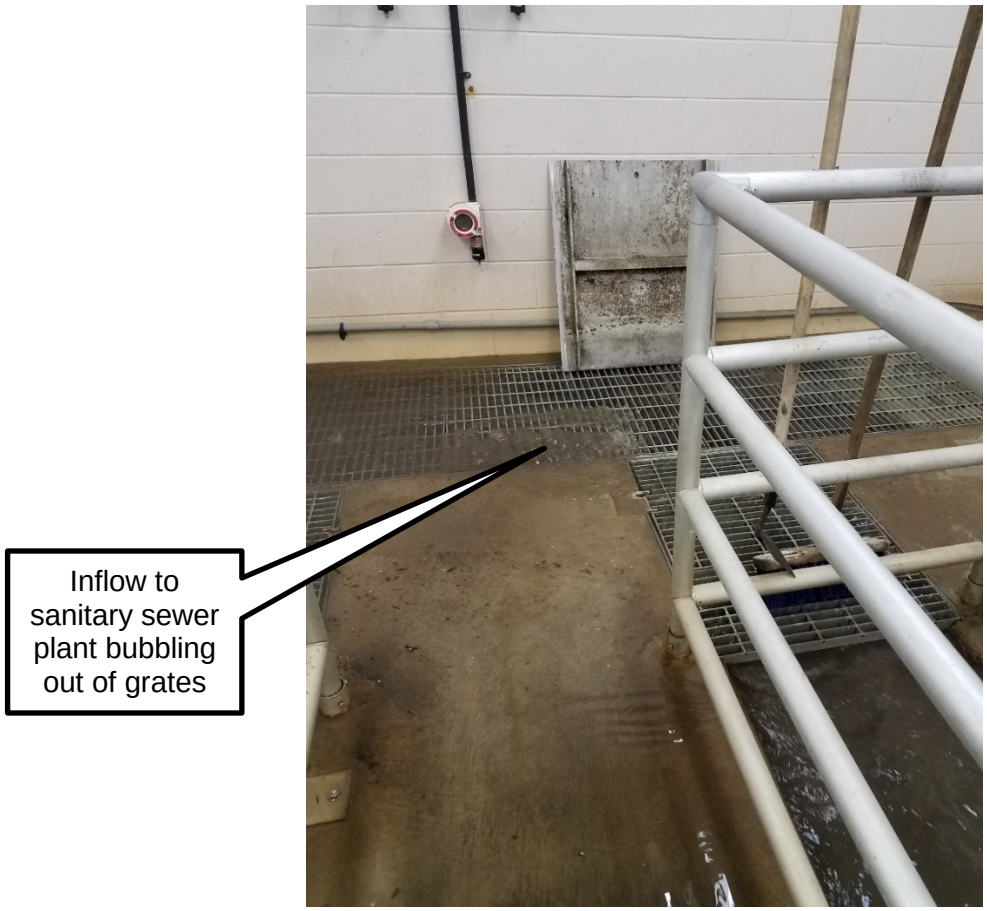


Figure 10: Flooding at headworks of sanitary sewer plant during 5/22/2018 storm

These extreme inflows of stormwater into the sanitary sewer system are a cause for human health and safety concerns as City employee's must interact with this mix of sewer and storm water to pump out excess water to a temporary lagoon to prevent flooding of the sanitary sewer treatment plant. Discussions with City staff have also indicated that sewer contaminated stormwater bubbles out of sewer manholes during larger events (estimated at one time per year), spilling contaminated water on the street surfaces where humans and animals may come into contact with it. In addition to the human contact concern, these cross connections cause issues with the sewer system because:

- It takes up capacity in the sewer pipes and ends up at the wastewater treatment plant where it must be treated like sewage, resulting in higher treatment costs.
- New and larger conveyance facilities are needed to transport larger volumes of flow, resulting in expensive capital projects.

- I/I flows contribute to sewer system overflows into local homes and the region's waterways, negatively impacting public health and the environment

Existing Infrastructure is Undersized

Modeling of the existing system has shown that surcharging is prevalent within existing storm pipes and manholes throughout the City, even during common rain events such as the 2-year, 24-hour. Figure 6 above shows one manhole cover that was blown off during the May 22, 2018 rain event which was slightly smaller than the 2-year, 24-hour. Since this event public works staff has noted that this manhole has come off on average of 2 times during spring rain events. Exposed manhole's pose an imminent risk to residents. Someone could fall into an exposed manhole and be seriously injured or worse, drown. Open manholes also pose a risk to traffic and could cause a serious accident or damage to vehicles if someone drives into/over the manhole. The city has considered bolting the manhole covers down but has fears of causing additional damage to the old manholes and vitrified clay pipe due to additional pressure being built up.

Localized Flooding

The existing condition of the City's drainage system results in surface drainage issues at several locations throughout the City.

Inadequate drainage facilities can result in standing water, which may result in the problems described below:

- Drowning potential, especially with young children
- Waterborne diseases
- Mosquito borne illnesses, primarily West Nile Virus
- Formation of ice during freezing events, which causes safety issues for pedestrians traversing obstacles to access the City's transportation network
- Vehicular hazards due to ice or water
- Delayed response time by emergency services

Flooding and/or water inundation also leads to deterioration of the sub-base of existing streets, sidewalks and other City infrastructure.

Figure 11: Area of localized flooding identified by resident during field investigation (18th St. & Grant Ave.)

Figure 12: View of intersection of Cooper Ave. and 7th St. looking west

Figure 13: View of intersection of 6th St. and Cooper Ave. Looking north

Figure 14: View of intersection of 2nd St. and Cooper Ave. Looking north

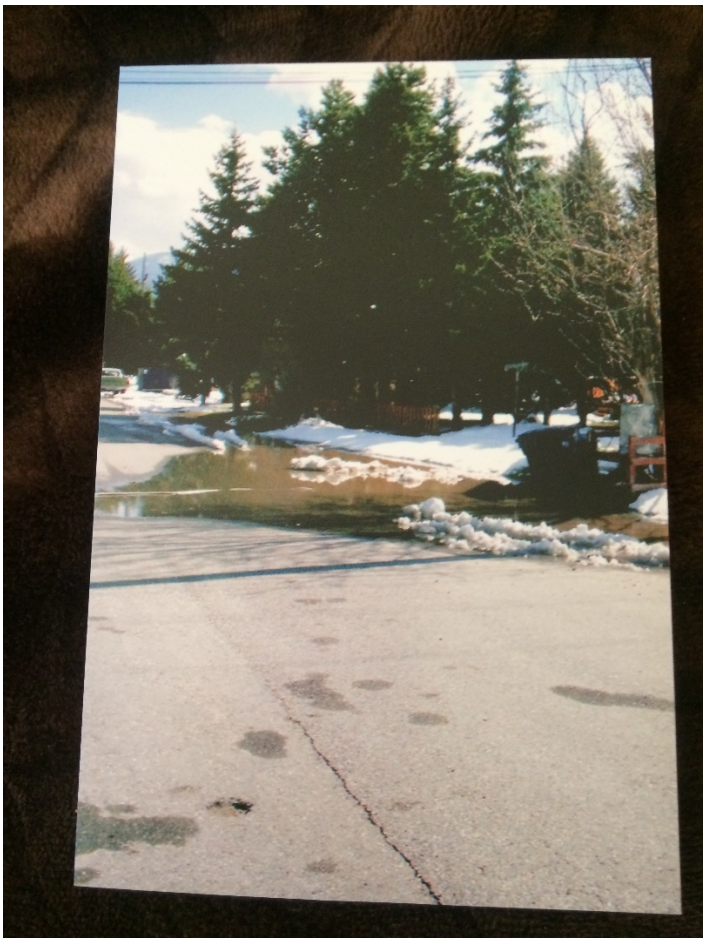


Figure 15: Flooding 14th Street and Haggin Ave. (Submitted by Resident)

All deficiencies identified above are existing problems that the city deals with on a continual basis (occurs during common rain events as small as a 2-yr event) and will continue long-term if no action is taken. The three deficiencies all combine to create significant maintenance issues for the City as stormwater affects the roadways and sanitary sewer plant.

4.2 Aging Infrastructure

The existing stormwater infrastructure within the 19th Street and Haggin Avenue Drainage Basins were constructed starting around 1985 and are approaching 35 years old. Discussions with City staff indicate that video inspection of portions of the stormwater infrastructure have shown poor/failing conditions of the vitrified clay pipe material with tree root intrusion and collapsed or broken sections of pipes (see picture below).

Figure 16: Condition of Haggin storm main, discovered during water main replacement July 2019.

4.3 Reasonable Growth

The effects of growth and development on stormwater systems are easily demonstrated. As land is converted from native rangeland or agricultural uses to commercial or residential areas, the runoff increases due to the construction of buildings, parking lots, sidewalks, and various other impervious improvements. Runoff also becomes more concentrated by site grading, the construction of streets with curb and gutter, and other efforts to direct runoff away from structures.

The City of Red Lodge's Growth policy identifies promoting infill development meaning maintain the core downtown and older residential areas that drain to Haggin Avenue and 19th Street drainage systems. In order to accommodate this development, it is necessary to provide adequately sized stormwater infrastructure.

5.0 GENERAL DESIGN REQUIREMENTS

Alternatives identified to increase capacity and correct deficiencies of the stormwater system will need to be sized to handle the appropriate design flows. Additionally, any improvements to the system will need to comply with applicable local, state, and federal regulations, as well as accepted industry standards for the design of stormwater facilities. The City of Red Lodge currently does not have stormwater design regulations identifying design events for hydrologic runoff or for hydraulic design of storm inlets and conveyance facilities. Therefore, appropriate design parameters for the alternatives analysis will be based on DEQ Circular 8, Montana Department of Transportation's (MDT) Hydraulics Section and their latest design manuals, and FHWA HEC-22- Urban Drainage Design Manual. MDT's Storm Drainage Systems Manual identifies the following as desirable characteristics for drainage systems:

- Surface runoff from the design storm must be removed with little damage to highway facilities and insignificant interruption of normal traffic
- Storms of greater intensity than the design storm must be removed with the minimum damage and the least interruption to normal traffic that is practical.
- Maintenance and operation difficulties must be minimized.
- Future expansion of facilities with a minimum of expense or interruption must be considered.
- Stormwater must be discharged with minimum damage to the receiving stream.

Applicable design criteria are identified below to quantify the above characteristics.

5.1 Hydrology

Hydraulic loading for stormwater systems is directly related to runoff from precipitation events over the contributing basin (hydrology). Peak runoff rates can be estimated through a variety of hydrologic methods. The two most common methods are the Rational Method and the SCS Method. The SCS Method is more sophisticated than the Rational Method in that it considers the time distribution of the rainfall, the initial rainfall losses to interception and depression storage, and an infiltration rate that decreases during a storm. This method is also more applicable to larger drainage basins, like Red Lodge, therefore, the SCS Method will be used. This method consists of four parameters: runoff factor (CN), rainfall, time of concentration, and drainage basin area.

Curve Number

Curve Numbers used for the PER are identified below in Table 9. Based on the NRCS Soil Survey and data presented in Section 2.2.2, the Hydrologic Soil Group that best describes the City of Red Lodge is "B".

Table 9: Runoff Coefficients

Land Use Description		Curve Numbers for Hydrologic Soil Group			
Fully Developed Urban Areas		A	B	C	D
Lawns, open spaces, parks, golf courses, cemeteries, etc.					
Good condition; grass cover on 75% or more of the area		39	61	74	80
Fair Condition; grass cover on 50 to 75% of the area		49	69	79	84
Paved parking lots, roofs, driveways, etc.		98	98	98	98
Streets & Roads					
Paved with curbs and storm sewers		98	98	98	98
Gravel		76	85	89	91
Dirt		72	82	87	89
Paved with open ditches		83	89	92	93
	Average % Impervious				
Commercial and business areas	85	89	92	94	95
Industrial districts	72	81	88	91	93
Residential average lot size:	Average % Impervious				
1/8 acre or less	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
Developing Urban Areas (No vegetation established)					
Newly graded area		77	86	91	94
Native ground cover					
Herbaceous – mixture of grass, weeds and low growing brush, with brush the minor element (30%-70% ground cover)			71	81	89
Herbaceous – mixture of grass, weeds and low growing brush, with brush the minor element (>70% ground cover)			62	74	85
Sagebrush with grass understory			35	47	55
Pasture, grassland or range – continuous forage for grazing		39	61	74	80
Meadow – continuous grass, protected from grazing, mowed for hay		30	58	71	78
Cultivated Agricultural Lands					
Row Crops		67	78	85	89
Close-seeded or broadcast legumes or rotation meadow		58	72	81	85
Small grain crops		63	75	83	87

Source: "Stormwater Management Manual", City of Billings, February 2018

Rainfall

Stormwater systems, particularly storm sewers, are typically designed to capture and handle design storms with a frequency ranging from 2 years to 25 years and should be analyzed for the 100-year to minimize flooding both upstream and downstream of the system. MDT recommends storm design frequencies based on land uses and identifies residential as 2-year, high value general commercial, and public building areas as 5-year, and High valued downtown business area as 5 to 10-year design frequency. Alternatives developed as part of the PER to improve the stormwater facilities in Red Lodge will utilize runoff from a 10-year storm as the target flow, based on high value downtown business areas that are affected as well as historic values in existing homes. Peak flow determinations for pipe sizing and analysis will be made at the design frequency (10-yr) with a duration equal to the time of concentration. To analyze storage volumes the 10-yr and 100-yr event will be analyzed at the 1-hour and 24-hour events.

MDT's hydraulics manual, Chapter 7 – Hydrology provides information for determining the appropriate storm distribution based on the ratio of 6-hour rainfall to the 24-hour rainfall for the design storm. The NOAA Atlas 2 isopluvial maps were used to determine the P_6 and P_{24} values for Red Lodge, 1.8" and 2.95", respectively. This yields a P6/P24 value of 0.610, therefore, based on the storm distribution values shown below (From MDT Hydraulics Manual, Chapter 7) a Type I Distribution is applicable for Red Lodge.

Type IA Distribution: P6/P24 < 0.518
Type I Distribution: P6/P24 = 0.518 to 0.639
Type II Distribution: P6/P24 = 0.640 to 0.767
For a ratio greater than 0.767, this method should not be used.

Rainfall depths and NOAA Atlas 2 isopluvial maps are included in Appendix L.

5.2 Hydraulics

Various criteria need to be considered in the design and construction of stormwater system collection systems, of which appropriate pipe sizes and adequate slope are amongst the most critical.

Hydraulic modeling that simulates the performance of proposed improvements under different storm events greatly assists in the selection of the proper pipe size.

Providing adequate slope for gravity lines is a factor that must be considered in the stormwater system design to maintain minimum velocities and prevent material deposition. The Municipal Stormwater Management handbook and MDT's manuals provide recommendations for maximum and minimum slopes:

1. The maximum hydraulic gradient should not produce a velocity that exceeds 10 feet per second.

2. The minimum desirable physical slope should be 0.5%, which will produce a minimum velocity of 2.5 feet per second when the storm drain is flowing full.

3. Pipe capacity: new pipes shall be sized to handle the design capacity at a maximum of 90% full pipe capacity.

4. Pipe Material: Pipe materials will meet the requirements of Montana Public Works Standard Specification and will generally be PVC, with the use of RCP when minimum cover requires.

The storm manholes will need to be of sufficient size to accommodate the pipe size and number of penetrations. The minimum allowable manhole size for this PER was based on local standards in Billings and are as follows:

Table 10: Minimum Allowable Manhole Size

Storm Drain Diameter	Manhole Diameter
12" to 24"	4'
27" to 36"	5'
42"	6'
48" and larger	Junction box or Tee Manhole

5.3 Storage/Detention

Storage or detention facilities are typically constructed for several reasons. Detention ponds can be designed to ensure post-development peak discharges do not exceed pre-development discharges. This practice is prevalent in subdivision design, and in fact, Circular DEQ 8 requires new subdivisions to make such provisions before being approved by the DEQ.

Local municipalities can require new development to provide on-site detention of storm runoff to prevent the overloading of area storm sewers. This is prevalent on the upper bench in Red Lodge at the Country Club Estates Subdivision and other newer subdivisions located around the City. These subdivisions were required to provide stormwater retention/detention facilities to mitigate the increased runoff rate and volume due to development. The remainder of the city drains directly to stormwater infrastructure in the streets and is conveyed through town and discharges at various locations into Rock Creek.

Discussions with MT DEQ indicated that since the proposed improvements are replacing existing infrastructure, no such requirements for storage would be required.

5.4 Treatment

The introduction of pollutants from stormwater discharges to receiving streams and lakes has become a significant concern in the last few decades. The Clean Water Act (CWA), enacted in 1972, prohibits the discharge of any pollutants to water of the United States by a point source unless the source is regulated by a discharge permit. The CWA was further amended in 1987 by Congress to require a two-phase program to address stormwater discharges. Accordingly, the EPA enacted the Storm Water Phase I Rule in 1990 and the Phase II Rule in 1999. Phase I requires discharge permits for stormwater discharges from municipal separate sewer systems (MS4's) serving population of 100,000 of more, specific industrial activities, and construction activities disturbing more than 5 acres. The Phase II regulations expanded the areas required to obtain a discharge permit to include stormwater discharges from smaller municipalities in urbanized areas, additional industrial activities, and construction project disturbing between 1 and 5 acres of land.

With these increased regulations professionals have developed best management practices (BMPs) and the concept of low impact development (LID) as ways of mitigating the impacts of increased runoff quantity and preventing pollutants from migrating to our natural waterways through stormwater conveyance systems. These concepts include things as simple as minimizing impervious area, utilizing grass filter strips, and allowing infiltration to more intensive measures such as bio-filtration, wetlands treatment areas, and hydrodynamic separators. Due to the nature of the stormwater system within the City of Red Lodge, it is anticipated that nutrient loads, trash and sediment will be the primary pollutants. The trash and sediment loading will be treated by maintaining grass lined ditches, allowing for natural infiltration, providing sumps for sediment

storage, and routine maintenance to alleviate trash loading. In the future, the proposed stormwater detention/retention facilities will be utilized as a stormwater BMP to provide treatment for nutrient loading, sediment, and discharge rates. These systems will be designed based on the new “Montana Post-Construction Storm Water BMP Design Guidance Manual”, September 2017 prepared by HDR.

Refer to discussion of MS4’s in Section 2.3.3 As the 2010 census population of Red Lodge is 2,125, with a 20-year design population projection of 2,808 (year 2038), Red Lodge remains well under the 10,000-population threshold, and as such, is not considered an MS4 and no additional treatment requirements for stormwater are required. This was confirmed by DEQ MPDES Permitting Section.

6.0 ALTERNATIVES CONSIDERED

The deficiencies in the City's existing system can generally be separated into three categories:

1. Cross connected to sanitary sewer,
2. Existing infrastructure undersized,
3. No infrastructure

Figure 8 identifies major areas that these deficiencies occur. Sites 1 - 5 are areas that have storm inlets that are connected to the sanitary sewer. Site 6 was identified as an area with potential cross connection to sanitary sewer during field investigations. Further investigation of this area with video inspection equipment is necessary before making any recommendations. Sites 7 thru 12 were identified by modeling the existing system at the design storm event (10-year, 24-hour) and seeing inundated pipes and potential for surcharging. This deficiency has been confirmed by maintenance personnel that have had to replace storm manhole lids that have blown off during larger rain events. Site 13 is identified as an area that experiences localized flooding and has no existing stormwater infrastructure.

Numerous alternatives exist that will address the identified deficiencies in the City's stormwater system. The Alternative Screening process will discuss the available alternatives and determine which ones are viable for detailed consideration in the Alternatives Analysis.

The "No Action" alternative must be included and considered in the alternative screening process in accordance with the Uniform Application and can be an attractive alternative to small communities facing the high cost of constructing major improvements. While attractive from a capital cost standpoint, the No Action alternative does not correct identified deficiencies and can prove to be costlier in the long run if facilities continue to fail and deteriorate other infrastructure or potentially lead to loss of life.

6.1 Alternative Screening

6.1.1 Alternatives Addressing Cross Connections to Sanitary Sewer

No Action

Not working to disconnect areas with known cross connections to sanitary sewer will continue to pose a risk to human health and safety. Currently, maintenance personnel have to deal with the water before it enters the sanitary sewer treatment plant, which can cause flooding or even worse, failure of the treatment plant. It is also a violation of DEQ regulations for the sanitary sewer system and will remain so until corrected. The no action alternative is unacceptable for many reasons, but most notable are:

- Human exposure to sanitary sewer;
- Increased operations cost of treatment plant due to increase flow;
- Potential for backups into homes and businesses.

Infiltration Basins

This option would disconnect the stormwater from the sanitary sewer by capping or removing the direct connections (inlets, sump pumps, etc.) and surface draining the runoff to infiltration basins that would collect the stormwater and allow it to infiltrate into the underlying soil. Concerns associated with this option are adequacy of underlying soils to handle design storm event without flooding. Areas of the city experience higher groundwater levels which would greatly reduce the infiltration capacity of the surrounding soils. There are also areas of the city that have drain tile install to intercept groundwater to minimize its effects on surrounding homes. Infiltration basins would not work in these areas. Lastly, while the city is making efforts to retain its aging sanitary sewer infrastructure, there are areas that still have infiltration issues and allowing the stormwater to infiltrate into the ground does not necessarily mean it won't ultimately end up in the sanitary sewer system.

New Stormwater Infrastructure

New stormwater laterals/pipes would be installed into the areas identified as being cross connected allowing the existing inlets to be disconnected from the sanitary sewer. These new

stormwater laterals would be installed to the nearest existing stormwater conveyance pipe with capacity for the additional flow.

6.1.2 Alternatives Addressing Undersized Infrastructure

No Action

Leaving the existing infrastructure as is means surcharging and localized flooding will continue. This causes unnecessary maintenance cost to the city by having to inspect and make sure manhole covers are on and poses a threat to public safety when lids are off and a potential for someone driving or walking to fall into the hole. Additionally, the existing infrastructure does not have capacity for its current drainage basins, so it would not allow for disconnection of the cross connected storm inlets.

Upsize Existing Infrastructure

This would involve replacing the existing mains and inlets with new ones that are properly sized to handle the design storm. This will eliminate the surcharging issues and allow cross connected drainage basins to be connecting to the stormwater system. This option also takes into consideration types of materials used. As identified above, the existing site soils pose a high risk to corrosion of steel and a moderate risk to concrete. Therefore, concrete structures (manholes and inlets) will be used for these alternatives. A more detailed analysis should be completed during the design to determine if coating of the concrete is warranted. There are three primary options for the stormwater pipe: steel (CMP), concrete (RCP), and plastic (PVC or HDPE). Similar to the structure analysis, steel will not be considered due to service life concerns. The PVC/HDPE is generally more cost competitive for this type of project versus concrete. However, concrete will provide more structural integrity for traffic loading in shallow cover situations. Both pipe materials are viable options for the proposed alternatives.

6.1.3 Alternatives Addressing No Infrastructure

No Action

Areas without any existing stormwater infrastructure are subject to continued complaints from citizens of localized flooding. This will continue if no action is to take place.

Improved Surface Drainage

Improving surface drainage in these areas with roadside ditches and culverts may allow areas with localized flooding to drain to an area with stormwater infrastructure eliminating localized flooding concerns.

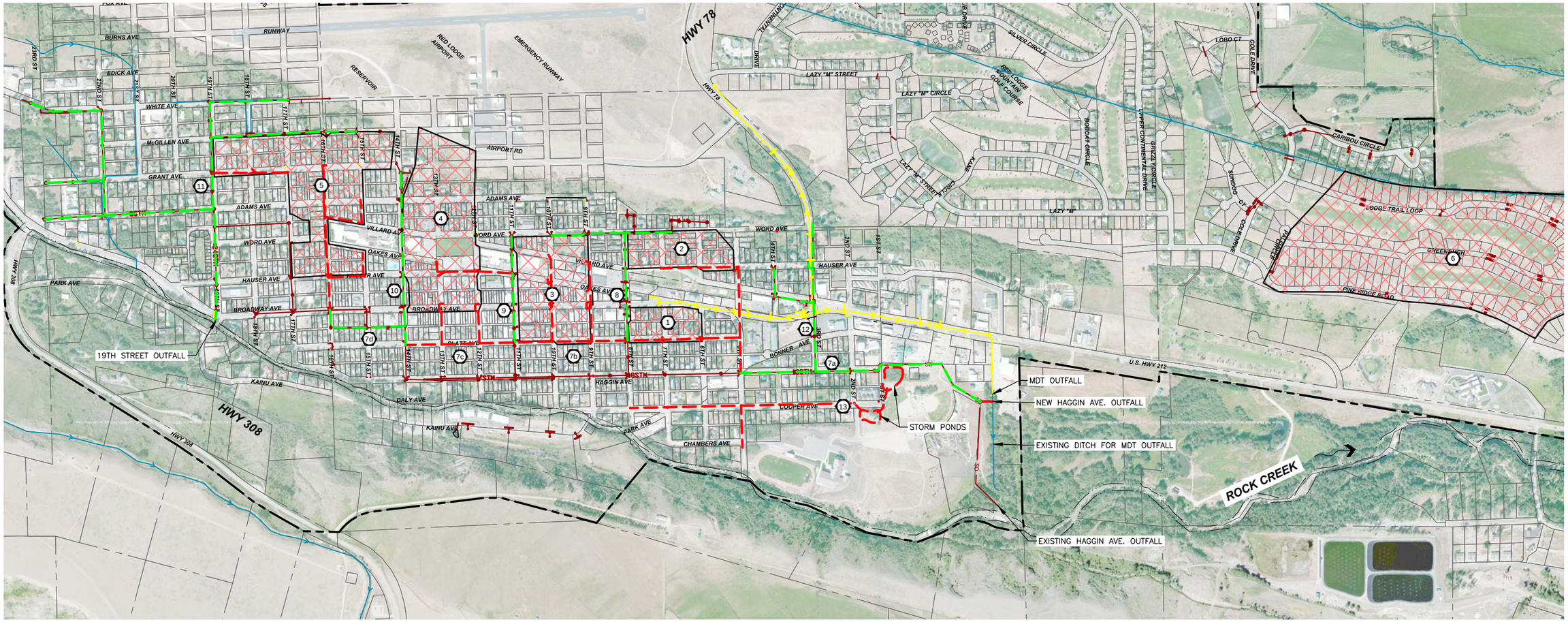
New Stormwater Infrastructure

Extending new stormwater infrastructure (mains, manholes, and inlets) into these areas will allow stormwater to be captured and conveyed offsite to the Rock Creek outfall.

7.0 ALTERNATIVES ANALYSIS

Each of the 16 sites will be analyzed in further detail below. The cost estimates make the following assumptions:

- The ENR 20-year average Construction Cost Index for 1994-2020 is approximately 3.0% annually, therefore, capital costs are projected to an anticipated construction date in 2022 using a 3.0% inflation rate.
- A contingency of 15% was used due to uncertainties associated with the underground construction as well as the possibility of encountering contaminated soil and/or groundwater and the associated costs.
- Initial capital costs were considered instead of 20-year life cycle costs. The O&M of each alternative is very similar and does not help to differentiate between alternatives in the analysis.
- A 10% contractor's mobilization fee, engineering fee, and 5% administrative fee has been added to all cost estimates. The mobilization fee accounts for bonding, insurance, transportation of labor and equipment, and other costs that are typically not included in other bid items. The engineering fee varies depending on the total cost of the project but is typically around 20% of the construction subtotal. This fee accounts for all preliminary design, final design, field surveying, construction documents, and permitting. Engineering fees were not added to certain sites, where the work was purely related to additional inspection and engineering services were not deemed necessary. The administrative fee accounts for all clerical, grant administration, secretarial, and legal costs.



LEGEND

1	SITE ID OF IDENTIFIED PROBLEM AREAS
	RED LODGE CITY LIMITS
SD	EXISTING CITY STORM INFRASTRUCTURE
	EXISTING MDT STORM INFRASTRUCTURE
	PROPOSED NEW STORM INFRASTRUCTURE
	UPSIZE EXISTING INFRASTRUCTURE
	DRAINS TO SANITARY SEWER
	IRRIGATION/DRAINAGE DITCH

NORTH

0 500 1000

SCALE IN FEET

Figure #17
PROPOSED IMPROVEMENTS OF IDENTIFIED SITES

CITY OF RED LODGE
2020 STORMWATER IMPROVEMENTS PER

J:\2-17103 - Red Lodge On-Call 2017\TO 15 - Stormwater PER Update\CADD 2-17103-TO15\Exhibits\PER\2-17103

7.1 Site 1

Site 1 is a drainage basin that has inlets that are cross connected to the sanitary sewer and consists of an area from 6th Street to 8th Street and Platt Avenue to Broadway Avenue. This project would consist of installing new inlets on Platt Avenue at 6th Street and 7th Street and installing new 18" storm main that would connect to infrastructure in Haggin Avenue.

Design Criteria

New stormwater infrastructure shall be designed to handle the 10-year, 24-hour storm event, and maintain the hydraulic grade line below the top of the pipe, along with other pipe sizing criteria specified in Section 5.2.

Map

See Figure 17 for a location map of Site 1.

Environmental Impacts

Temporary impacts associated with construction are anticipated and may require MPDES Stormwater Permit and Construction Dewatering permit. Illegal dumping of pollutants in the storm inlets may impact Rock Creek. This will be mitigated by installing inlets that state "no dumping".

Land Requirements

This project would be located within existing right-of-way; however, temporary construction agreements may be necessary to disconnect sump pumps.

Potential Construction Problems

The primary construction concerns are the unknown of encountering other utilities and groundwater.

Cost Estimates

Table 11 provides a summary of total project costs. Capital costs were derived from communications with material suppliers and review of bid tabulations for similar projects.

Table 11: Site 1, Opinion of Probable Costs

SITE ID 1					
ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	*$8,900*	$8,900
2	Remove and Dispose of Existing Structures	4	EA	*$1,300.00*	$5,200
3	Supply and Install 15" PVC Storm Pipe	300	LF	*$45.00*	$13,500
4	Storm Drain Manhole, 4' barrel	2	EA	*$5,500.00*	$11,000
5	Storm Inlet	8	EA	*$4,250.00*	$34,000
6	Asphalt Surface Restoration	3700	SF	*$5.25*	$19,425
7	Utility Conflicts	1	LS	*$3,800.00*	$3,800
8	Traffic Control	1	LS	*$1,800.00*	$1,800

* Any Gas, power, and fiber relocations are assumed to be completed and paid for by the utility company (if warranted).

Construction Subtotal		$97,625
2022 Construction Costs	3%	$103,570.36
Design Engineering		$12,000
Construction Engineering		$10,000
Administration/Legal	5%	$4,881
Contingency	15%	$14,644
TOTAL PROJECT COST		$145,095

7.2 Site 2

Site 2 is a drainage basin that has inlets that are cross connected to the sanitary sewer and consists of an area from 5th Street to 8th Street and Hauser Avenue to Word Avenue. This project would consist of installing new inlets on Hauser Avenue at 5th, 6th, and 7th Street and installing new 15" storm main down Hauser Avenue and 5th Street that would connect to infrastructure in Haggin Avenue.

Design Criteria

New stormwater infrastructure shall be designed to handle the 10-year, 24-hour storm event, and maintain the hydraulic grade line below the top of the pipe, along with other pipe sizing criteria specified in Section 5.2.

Map

See Figure 17 for a location map of Site 2.

Environmental Impacts

Temporary impacts associated with construction are anticipated and may require MPDES Stormwater Permit and Construction Dewatering permit. Illegal dumping of pollutants in the storm inlets may impact Rock Creek. This will be mitigated by installing inlets that state "no dumping".

Land Requirements

This project would be located within existing right-of-way; however, temporary construction agreements may be necessary to disconnect sump pumps.

Potential Construction Problems

The primary construction concerns are the unknown of encountering other utilities and groundwater.

Cost Estimates

Table 12 provides a summary of total project costs. Capital costs were derived from communications with material suppliers and review of bid tabulations for similar projects.

Table 12: Site 2, Opinion of Probable Costs

SITE ID 2

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	*$30,900*	$30,900
2	Remove and Dispose of Existing Structures	4	EA	*$1,300.00*	$5,200
3	Supply and Install 15" PVC Storm Pipe	2200	LF	*$45.00*	$99,000
4	Storm Drain Manhole, 4' barrel	4	EA	*$5,500.00*	$22,000
5	Storm Inlet	12	EA	*$4,250.00*	$51,000
6	Asphalt Surface Restoration	21400	SF	*$5.25*	$112,350
7	Utility Conflicts	1	LS	*$13,100.00*	$13,100
8	Traffic Control	1	LS	*$6,100.00*	$6,100

* Any Gas, power, and fiber relocations are assumed to be completed and paid for by the utility company (if warranted).

Construction Subtotal		$339,650
2022 Construction Costs	3%	$360,334.69
Design Engineering		$41,000
Construction Engineering		$34,000
Administration/Legal	5%	$16,983
Contingency	15%	$50,948
TOTAL PROJECT COST		$503,265

7.3 Site 3

Site 3 is a drainage basin that has inlets that are cross connected to the sanitary sewer and consists of an area from 9th Street to 11th Street and Platt Avenue to Word Avenue. This project would consist of installing new inlets on 9th and 10th Streets at Platt, Broadway, Oaks, and Villard Avenue and installing new 18" storm main on 9th and 10th Streets that would connect to infrastructure in Haggin Avenue.

Design Criteria

New stormwater infrastructure shall be designed to handle the 10-year, 24-hour storm event, and maintain the hydraulic grade line below the top of the pipe, along with other pipe sizing criteria specified in Section 5.2.

Map

See Figure 17 for a location map of Site 3.

Environmental Impacts

Temporary impacts associated with construction are anticipated and may require MPDES Stormwater Permit and Construction Dewatering permit. Illegal dumping of pollutants in the storm inlets may impact Rock Creek. This will be mitigated by installing inlets that state "no dumping".

Land Requirements

This project would be located within existing right-of-way; however, temporary construction agreements may be necessary to disconnect sump pumps.

Potential Construction Problems

The primary construction concerns are the unknown of encountering other utilities and groundwater.

Cost Estimates

Table 11 provides a summary of total project costs. Capital costs were derived from communications with material suppliers and review of bid tabulations for similar projects.

Table 13: Site 3, Opinion of Probable Costs

SITE ID 3

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	*$46,000*	$46,000
2	Remove and Dispose of Existing Structures	16	EA	*$1,300.00*	$20,800
3	Supply and Install 15" PVC Storm Pipe	1200	LF	*$45.00*	$54,000
4	Supply and Install 18" PVC Storm Pipe	1560	LF	*$48.00*	$74,880
5	Storm Drain Manhole, 4' barrel	6	EA	*$5,500.00*	$33,000
6	Storm Inlet	24	EA	*$4,250.00*	$102,000
7	Asphalt Surface Restoration	27840	SF	*$5.25*	$146,160
8	Utility Conflicts	1	LS	*$19,400.00*	$19,400
9	Traffic Control	1	LS	*$9,100.00*	$9,100

* Any Gas, power, and fiber relocations are assumed to be completed and paid for by the utility company (if warranted).

Construction Subtotal		$505,340
2022 Construction Costs	3%	$536,115.21
Design Engineering		$61,000
Construction Engineering		$51,000
Administration/Legal	5%	$25,267
Contingency	15%	$75,801
TOTAL PROJECT COST		$749,183

7.4 Site 4

Site 4 is a drainage basin that has inlets that are cross connected to the sanitary sewer and consists of an area from 12th Street to 14th Street and Broadway Avenue to the top of hill/Airport Road. This project would consist of installing new inlets on 12th and 13th Streets at Broadway and Hauser Avenue and installing new 15" storm main that would connect to infrastructure in Haggin Avenue.

Design Criteria

New stormwater infrastructure shall be designed to handle the 10-year, 24-hour storm event, and maintain the hydraulic grade line below the top of the pipe, along with other pipe sizing criteria specified in Section 5.2.

Map

See Figure 17 for a location map of Site 4.

Environmental Impacts

Temporary impacts associated with construction are anticipated and may require MPDES Stormwater Permit and Construction Dewatering permit. Illegal dumping of pollutants in the storm inlets may impact Rock Creek. This will be mitigated by installing inlets that state "no dumping".

Land Requirements

This project would be located within existing right-of-way; however, temporary construction agreements may be necessary to disconnect sump pumps.

Potential Construction Problems

The primary construction concerns are the unknown of encountering other utilities and groundwater.

Cost Estimates

Table 14 provides a summary of total project costs. Capital costs were derived from communications with material suppliers and review of bid tabulations for similar projects.

Table 14: Site 4, Opinion of Probable Costs

SITE ID 4

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	*$31,300*	$31,300
2	Remove and Dispose of Existing Structures	15	EA	*$1,300.00*	$19,500
3	Supply and Install 15" PVC Storm Pipe	1880	LF	*$45.00*	$84,600
4	Storm Drain Manhole, 4' barrel	4	EA	*$5,500.00*	$22,000
5	Storm Inlet	16	EA	*$4,250.00*	$68,000
6	Asphalt Surface Restoration	18920	SF	*$5.25*	$99,330
7	Utility Conflicts	1	LS	*$13,300.00*	$13,300
8	Traffic Control	1	LS	*$6,200.00*	$6,200

* Any Gas, power, and fiber relocations are assumed to be completed and paid for by the utility company (if warranted).

Construction Subtotal		$344,230
2022 Construction Costs	3%	$365,193.61
Design Engineering		$42,000
Construction Engineering		$35,000
Administration/Legal	5%	$17,212
Contingency	15%	$51,635
TOTAL PROJECT COST		$511,040

7.5 Site 5

Site 5 is a drainage basin that has inlets that are cross connected to the sanitary sewer and consists of an area from 15th Street to 17th Street from Hauser Avenue to Grant Avenue and 14th Street to 19th Street from Grant Avenue to McGillen Avenue. This project would consist of installing new inlets on 16th Street at Hauser, Oaks, Villard, Adams, and Grant Avenue and installing new 18" and 24" storm main down 16th Street that would connect to infrastructure in Haggin Avenue. An 18" Main down Grant Avenue with inlets at 17th and 18th Streets are included with this site. This main would tie into 19th Street infrastructure.

Design Criteria

New stormwater infrastructure shall be designed to handle the 10-year, 24-hour storm event, and maintain the hydraulic grade line below the top of the pipe, along with other pipe sizing criteria specified in Section 5.2.

Map

See Figure 17 for a location map of Site 5.

Environmental Impacts

Temporary impacts associated with construction are anticipated and may require MPDES Stormwater Permit and Construction Dewatering permit. Illegal dumping of pollutants in the storm inlets may impact Rock Creek. This will be mitigated by installing inlets that state "no dumping".

Land Requirements

This project would be located within existing right-of-way; however, temporary construction agreements may be necessary to disconnect sump pumps.

Potential Construction Problems

The primary construction concerns are the unknown of encountering other utilities and groundwater.

Cost Estimates

Table 15 provides a summary of total project costs. Capital costs were derived from communications with material suppliers and review of bid tabulations for similar projects.

Table 15: Site 5, Opinion of Probable Costs

SITE ID 5

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	*$64,200*	$64,200
2	Remove and Dispose of Existing Structures	18	EA	*$1,300.00*	$23,400
3	Supply and Install 15" PVC Storm Pipe	1935	LF	*$45.00*	$87,075
4	Supply and Install 18" PVC Storm Pipe	735	LF	*$48.00*	$35,280
5	Supply and Install 24" PVC Storm Pipe	1350	LF	*$70.00*	$94,500
6	Storm Drain Manhole, 4' barrel	11	EA	*$5,500.00*	$60,500
7	Storm Inlet	22	EA	*$4,250.00*	$93,500
8	Asphalt Surface Restoration	39480	SF	*$5.25*	$207,270
9	Utility Conflicts	1	LS	*$27,100.00*	$27,100
10	Traffic Control	1	LS	*$12,600.00*	$12,600

* Any Gas, power, and fiber relocations are assumed to be completed and paid for by the utility company (if warranted).

Construction Subtotal		$705,425
2022 Construction Costs	3%	$748,385.38
Design Engineering		$85,000
Construction Engineering		$71,000
Administration/Legal	5%	$35,271
Contingency	15%	$105,814
TOTAL PROJECT COST		$1,045,470

7.6 Site 6

Site 6 involves further investigation with video equipment to determine if existing storm drains are connected to sanitary sewer. The area identified is generally described as Diamond C Estates Subdivision. If cross connections are identified, the City should try and work with original developer to fix the issue(s).

Design Criteria

This site does not require design criteria as it only involves further investigation of existing conditions.

Map

See Figure 17 for a location map of Site 6.

Environmental Impacts

No environmental impacts are anticipated with this work as it is only exploring existing infrastructure and no improvements are proposed.

Land Requirements

This project is only exploring existing infrastructure; therefore, no land requirements are necessary.

Potential Construction Problems

Construction crews need to take care and properly decontaminate equipment as it may come into contact with sanitary sewer.

Cost Estimates

Table 16 provides a summary of total project costs. Capital costs were derived from communications with material suppliers and review of bid tabulations for similar projects.

Table 16: Site 6, Opinion of Probable Costs

SITE ID 6

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	*$800*	$800
2	Inspection Crew	20	HR	*$160.00*	$3,200
3	Equipment	20	HR	*$200.00*	$4,000

* Any Gas, power, and fiber relocations are assumed to be completed and paid for by the utility company (if warranted).

Construction Subtotal		$8,000
2022 Construction Costs	3%	$8,487.20
Design Engineering		$1,000
Construction Engineering		$0
Administration/Legal	5%	$400
Contingency	15%	$1,200
TOTAL PROJECT COST		$11,087

7.7 Site 7a

Site 7a involves upsizing existing mains on Haggin Avenue from the new outfall to 8th Street. This section will consist of 54" PVC/HDPE pipe with a concrete flared end section from the outfall to 1st Street, then 48" PVC/HDPE will continue from there to 3rd Street. 42" PVC/HDPE will extend from 3rd Street to the end of the project at 8th Street. New manholes will be installed at all intersections, changes in direction or changes in grade. Inlets will be installed at all intersections. This project also includes upsizing the culvert crossing in the existing MDT ditch to handle increased flows.

Design Criteria

New stormwater infrastructure shall be designed to handle the 10-year, 24-hour storm event, and maintain the hydraulic grade line below the top of the pipe, along with other pipe sizing criteria specified in Section 5.2. Preliminary sizes of this main to convey this design event has been described above. Manholes need to be of appropriate barrel diameter to handle pipe penetrations for size of pipe proposed.

Map

See Figure 17 for a location map of Site 7a.

Environmental Impacts

Temporary impacts associated with construction are anticipated and may require MPDES Stormwater Permit and Construction Dewatering permit. Work around the outfall may cause short-term turbidity generated by construction and will need to be permitted and mitigated through the use of BMP's during construction. No other impacts are anticipated as this project is replacing existing infrastructure.

Land Requirements

This project would be located within existing right-of-way; however, temporary construction agreements may be necessary to disconnect sump pumps.

Potential Construction Problems

The primary construction concerns are the unknown of encountering other utilities and groundwater.

Cost Estimates

Table 17 provides a summary of total project costs. Capital costs were derived from communications with material suppliers and review of bid tabulations for similar projects.

Table 17: Site 7a, Opinion of Probable Costs

SITE ID 7a

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	*$124,400*	$124,400
2	Remove and Dispose of Existing Structures	15	EA	*$1,300.00*	$19,500
3	Supply and Install 15" PVC Storm Pipe	1200	LF	*$45.00*	$54,000
4	Supply and Install 42" PVC Storm Pipe	2160	LF	*$118.00*	$254,880
5	Supply and Install 48" PVC Storm Pipe	905	LF	*$135.00*	$122,175
6	Supply and Install 54" PVC Storm Pipe	1250	LF	*$175.00*	$218,750
7	Storm Drain Manhole, Special Structure	4	EA	*$16,000.00*	$64,000
8	Storm Drain Manhole, 6' barrel	9	EA	*$9,550.00*	$85,950
9	Storm Inlet	32	EA	*$4,250.00*	$136,000
10	Outfall Protection	1	LS	*$20,000.00*	$20,000
11	Asphalt Surface Restoration	44085	SF	*$5.25*	$231,446
12	Utility Conflicts	1	LS	*$24,200.00*	$24,200
13	Traffic Control	1	LS	*$12,400.00*	$12,400

* Any Gas, power, and fiber relocations are assumed to be completed and paid for by the utility company (if warranted).

Construction Subtotal		$1,367,701
2022 Construction Costs	3%	$1,450,994.26
Design Engineering		$151,000
Construction Engineering		$137,000
Administration/Legal	5%	$68,385
Contingency	15%	$205,155
TOTAL PROJECT COST		$2,012,535

7.8 Site 7b

Site 7b involves upsizing existing mains on Haggin Avenue from 8th Street to 11th Street. This section will consist of 42" PVC/HDPE. New manholes will be installed at all intersections, changes in direction or changes in grade. Inlets will be installed at all intersections.

Design Criteria

New stormwater infrastructure shall be designed to handle the 10-year, 24-hour storm event, and maintain the hydraulic grade line below the top of the pipe, along with other pipe sizing criteria specified in Section 5.2. Preliminary sizes of this main to convey this design event have been described above. Manholes need to be of appropriate barrel diameter to handle pipe penetrations for size of pipe proposed.

Map

See Figure 17 for a location map of Site 7b.

Environmental Impacts

Temporary impacts associated with construction are anticipated and may require MPDES Stormwater Permit and Construction Dewatering permit. No other impacts are anticipated as this project is replacing existing infrastructure.

Land Requirements

This project would be located within existing right-of-way; however, temporary construction agreements may be necessary to disconnect sump pumps.

Potential Construction Problems

The primary construction concerns are the unknown of encountering other utilities and groundwater.

Cost Estimates

Table 18 provides a summary of total project costs. Capital costs were derived from communications with material suppliers and review of bid tabulations for similar projects.

Table 18: Site 7b, Opinion of Probable Costs

SITE ID 7b

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	*$35,000*	$35,000
2	Remove and Dispose of Existing Structures	13	EA	*$1,300.00*	$16,900
3	Supply and Install 15" PVC Storm Pipe	450	LF	*$45.00*	$20,250
4	Supply and Install 42" PVC Storm Pipe	1100	LF	*$118.00*	$129,800
5	Storm Drain Manhole, 6' barrel	3	EA	*$9,550.00*	$28,650
6	Storm Inlet	12	EA	*$4,250.00*	$51,000
7	Asphalt Surface Restoration	15450	SF	*$5.25*	$81,113
8	Utility Conflicts	1	LS	*$14,800.00*	$14,800
9	Traffic Control	1	LS	*$6,900.00*	$6,900

* Any Gas, power, and fiber relocations are assumed to be completed and paid for by the utility company (if warranted).

Construction Subtotal		$384,413
2022 Construction Costs	3%	$407,823.22
Design Engineering		$47,000
Construction Engineering		$39,000
Administration/Legal	5%	$19,221
Contingency	15%	$57,662
TOTAL PROJECT COST		$570,706

7.9 Site 7c

Site 7c involves upsizing existing mains on Haggin Avenue from 11th Street to 14th Street. This section will consist of 36" PVC/HDPE from 11th Street to 14th Street. New manholes will be installed at all intersections, changes in direction or changes in grade. Inlets will be installed at all intersections.

Design Criteria

New stormwater infrastructure shall be designed to handle the 10-year, 24-hour storm event, and maintain the hydraulic grade line below the top of the pipe, along with other pipe sizing criteria specified in Section 5.2. Preliminary sizes of this main to convey this design event have been described above. Manholes need to be of appropriate barrel diameter to handle pipe penetrations for size of pipe proposed.

Map

See Figure 17 for a location map of Site 7c.

Environmental Impacts

Temporary impacts associated with construction are anticipated and may require MPDES Stormwater Permit and Construction Dewatering permit. No other impacts are anticipated as this project is replacing existing infrastructure.

Land Requirements

This project would be located within existing right-of-way; however, temporary construction agreements may be necessary to disconnect sump pumps.

Potential Construction Problems

The primary construction concerns are the unknown of encountering other utilities and groundwater.

Cost Estimates

Table 19 provides a summary of total project costs. Capital costs were derived from communications with material suppliers and review of bid tabulations for similar projects.

Table 19: Site 7c, Opinion of Probable Costs

SITE ID 7c

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	*$33,300*	$33,300
2	Remove and Dispose of Existing Structures	11	EA	*$1,300.00*	$14,300
3	Supply and Install 15" PVC Storm Pipe	450	LF	*$45.00*	$20,250
4	Supply and Install 36" PVC Storm Pipe	1060	LF	*$112.00*	$118,720
5	Storm Drain Manhole, 6' barrel	3	EA	*$9,550.00*	$28,650
6	Storm Inlet	12	EA	*$4,250.00*	$51,000
7	Asphalt Surface Restoration	15090	SF	*$5.25*	$79,223
8	Utility Conflicts	1	LS	*$14,100.00*	$14,100
9	Traffic Control	1	LS	*$6,600.00*	$6,600

* Any Gas, power, and fiber relocations are assumed to be completed and paid for by the utility company (if warranted).

Construction Subtotal		$366,143
2022 Construction Costs	3%	$388,440.58
Design Engineering		$44,000
Construction Engineering		$37,000
Administration/Legal	5%	$18,307
Contingency	15%	$54,921
TOTAL PROJECT COST		$542,669

7.10 Site 7d

Site 7d involves upsizing existing mains on 14th Street from Platt to the alley, along the alley from 14th Street to 16th Street, and 16th Street from the Alley to Broadway. This section will consist of 36" PVC/HDPE from 14th and Platt to the Alley then 30" pipe for the remainder. New manholes will be installed at all intersections, changes in direction or changes in grade. Inlets will be installed at all intersections.

Design Criteria

New stormwater infrastructure shall be designed to handle the 10-year, 24-hour storm event, and maintain the hydraulic grade line below the top of the pipe, along with other pipe sizing criteria specified in Section 5.2. Preliminary sizes of this main to convey this design event have been described above. Manholes need to be of appropriate barrel diameter to handle pipe penetrations for size of pipe proposed.

Map

See Figure 17 for a location map of Site 7d.

Environmental Impacts

Temporary impacts associated with construction are anticipated and may require MPDES Stormwater Permit and Construction Dewatering permit. No other impacts are anticipated as this project is replacing existing infrastructure.

Land Requirements

This project would be located within existing right-of-way; however, temporary construction agreements may be necessary to disconnect sump pumps.

Potential Construction Problems

The primary construction concerns are the unknown of encountering other utilities and groundwater.

Cost Estimates

Table 20 provides a summary of total project costs. Capital costs were derived from communications with material suppliers and review of bid tabulations for similar projects.

Table 20: Site 7d, Opinion of Probable Costs

SITE ID 7d

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	*$37,000*	$37,000
2	Remove and Dispose of Existing Structures	20	EA	*$1,300.00*	$26,000
3	Supply and Install 15" PVC Storm Pipe	600	LF	*$45.00*	$27,000
4	Supply and Install 30" PVC Storm Pipe	900	LF	*$85.00*	$76,500
5	Supply and Install 36" PVC Storm Pipe	185	LF	*$112.00*	$20,720
6	Storm Drain Manhole, 6' barrel	4	EA	*$9,550.00*	$38,200
7	Storm Inlet	16	EA	*$4,250.00*	$68,000
8	Asphalt Surface Restoration	17165	SF	*$5.25*	$90,116
9	Utility Conflicts	1	LS	*$15,600.00*	$15,600
10	Traffic Control	1	LS	*$7,300.00*	$7,300

* Any Gas, power, and fiber relocations are assumed to be completed and paid for by the utility company (if warranted).

Construction Subtotal		$406,436
2022 Construction Costs	3%	$431,188.22
Design Engineering		$49,000
Construction Engineering		$41,000
Administration/Legal	5%	$20,322
Contingency	15%	$60,965
TOTAL PROJECT COST		$602,475

7.11 Site 8

Site 8 involves upsizing existing mains on 8th Street from Platt to Word Street and along Word Street from 10th Street to 7th Street. This section will consist of 24" PVC/HDPE from Platt to Broadway, then 18" PVC/HDPE for the rest of the project. New manholes will be installed at all intersections, changes in direction or changes in grade. Inlets will be installed at all intersections.

Design Criteria

New stormwater infrastructure shall be designed to handle the 10-year, 24-hour storm event, and maintain the hydraulic grade line below the top of the pipe, along with other pipe sizing criteria specified in Section 5.2. Preliminary sizes of this main to convey this design event have been described above. Manholes need to be of appropriate barrel diameter to handle pipe penetrations for size of pipe proposed.

Map

See Figure 17 for a location map of Site 8.

Environmental Impacts

Temporary impacts associated with construction are anticipated and may require MPDES Stormwater Permit and Construction Dewatering permit. No other impacts are anticipated as this project is replacing existing infrastructure.

Land Requirements

This project would be located within existing right-of-way; however, temporary construction agreements may be necessary to disconnect sump pumps.

Potential Construction Problems

The primary construction concerns are the unknown of encountering other utilities and groundwater.

Cost Estimates

Table 21 provides a summary of total project costs. Capital costs were derived from communications with material suppliers and review of bid tabulations for similar projects.

Table 21: Site 8, Opinion of Probable Costs

SITE ID 8					
ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	*$60,800*	$60,800
2	Remove and Dispose of Existing Structures	20	EA	*$1,300.00*	$26,000
3	Supply and Install 15" PVC Storm Pipe	1200	LF	*$45.00*	$54,000
4	Supply and Install 18" PVC Storm Pipe	1830	LF	*$48.00*	$87,840
5	Supply and Install 24" PVC Storm Pipe	390	LF	*$70.00*	$27,300
6	Storm Drain Manhole, 4' barrel	10	LF	*$5,500.00*	$55,000
7	Storm Inlet	32	EA	*$4,250.00*	$136,000
8	Asphalt Surface Restoration	34980	SF	*$5.25*	$183,645
9	Utility Conflicts	1	LS	*$25,700.00*	$25,700
10	Traffic Control	1	LS	*$12,000.00*	$12,000

* Any Gas, power, and fiber relocations are assumed to be completed and paid for by the utility company (if warranted).

Construction Subtotal		$668,285
2022 Construction Costs	3%	$708,983.56
Design Engineering		$81,000
Construction Engineering		$67,000
Administration/Legal	5%	$33,414
Contingency	15%	$100,243
TOTAL PROJECT COST		$990,641

7.12 Site 9

Site 9 involves upsizing existing mains on 11th Street from Platt to Word. This section will consist of 24" PVC/HDPE from Platt to word and 15" PVC/HDPE for inlet connections. New manholes will be installed at all intersections, changes in direction or changes in grade. Inlets will be installed at all intersections.

Design Criteria

New stormwater infrastructure shall be designed to handle the 10-year, 24-hour storm event, and maintain the hydraulic grade line below the top of the pipe, along with other pipe sizing criteria specified in Section 5.2. Preliminary sizes of this main to convey this design event have been described above. Manholes need to be of appropriate barrel diameter to handle pipe penetrations for size of pipe proposed.

Map

See Figure 17 for a location map of Site 9.

Environmental Impacts

Temporary impacts associated with construction are anticipated and may require MPDES Stormwater Permit and Construction Dewatering permit. No other impacts are anticipated as this project is replacing existing infrastructure.

Land Requirements

This project would be located within existing right-of-way; however, temporary construction agreements may be necessary to disconnect sump pumps.

Potential Construction Problems

The primary construction concerns are the unknown of encountering other utilities and groundwater.

Cost Estimates

Table 22 provides a summary of total project costs. Capital costs were derived from communications with material suppliers and review of bid tabulations for similar projects.

Table 22: Site 9, Opinion of Probable Costs

SITE ID 9					
ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	*$34,300*	$34,300
2	Remove and Dispose of Existing Structures	29	EA	*$1,300.00*	$37,700
3	Supply and Install 15" PVC Storm Pipe	600	LF	*$45.00*	$27,000
4	Supply and Install 24" PVC Storm Pipe	1035	LF	*$70.00*	$72,450
5	Storm Drain Manhole, 4' barrel	5	EA	*$5,500.00*	$27,500
6	Storm Inlet	16	EA	*$4,250.00*	$68,000
7	Asphalt Surface Restoration	16815	SF	*$5.25*	$88,279
8	Utility Conflicts	1	LS	*$14,500.00*	$14,500
9	Traffic Control	1	LS	*$6,800.00*	$6,800

* Any Gas, power, and fiber relocations are assumed to be completed and paid for by the utility company (if warranted).

Construction Subtotal		$376,529
2022 Construction Costs	3%	$399,459.35
Design Engineering		$46,000
Construction Engineering		$38,000
Administration/Legal	5%	$18,826
Contingency	15%	$56,479
TOTAL PROJECT COST		$558,765

7.13 Site 10

Site 10 involves upsizing existing mains on 14th Street from Alley to Grant Avenue. This section will consist of 15" PVC/HDPE. New manholes will be installed at all intersections, changes in direction or changes in grade. Inlets will be installed at all intersections.

Design Criteria

New stormwater infrastructure shall be designed to handle the 10-year, 24-hour storm event, and maintain the hydraulic grade line below the top of the pipe, along with other pipe sizing criteria specified in Section 5.2. Preliminary sizes of this main to convey this design event have been described above. Manholes need to be of appropriate barrel diameter to handle pipe penetrations for size of pipe proposed.

Map

See Figure 17 for a location map of Site 10.

Environmental Impacts

Temporary impacts associated with construction are anticipated and may require MPDES Stormwater Permit and Construction Dewatering permit. No other impacts are anticipated as this project is replacing existing infrastructure.

Land Requirements

This project would be located within existing right-of-way; however, temporary construction agreements may be necessary to disconnect sump pumps.

Potential Construction Problems

The primary construction concerns are the unknown of encountering other utilities and groundwater.

Cost Estimates

Table 23 provides a summary of total project costs. Capital costs were derived from communications with material suppliers and review of bid tabulations for similar projects.

Table 23: Site 10, Opinion of Probable Costs

SITE ID 10

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	*$42,200*	$42,200
2	Remove and Dispose of Existing Structures	18	EA	*$1,300.00*	$23,400
3	Supply and Install 15" PVC Storm Pipe	2395	LF	*$45.00*	$107,775
4	Storm Drain Manhole, 4' barrel	6	EA	*$5,500.00*	$33,000
5	Storm Inlet	24	EA	*$4,250.00*	$102,000
6	Asphalt Surface Restoration	24555	SF	*$5.25*	$128,914
7	Utility Conflicts	1	LS	*$17,800.00*	$17,800
8	Traffic Control	1	LS	*$8,300.00*	$8,300

* Any Gas, power, and fiber relocations are assumed to be completed and paid for by the utility company (if warranted).

Construction Subtotal		$463,389
2022 Construction Costs	3%	$491,609.12
Design Engineering		$56,000
Construction Engineering		$47,000
Administration/Legal	5%	$23,169
Contingency	15%	$69,508
TOTAL PROJECT COST		$687,287

7.14 Site 11

Site 11 involves upsizing existing mains on the 19th Street storm main system. This section will consist of 36" PVC/HDPE with an RCP flared end section from the outfall at 19th Street and Rock Creek to Adams Avenue, 30" PVC/HDPE will continue up 19th Street to Grant Avenue, 18" PVC will be installed on 19th Street from Grant to White Avenue and along Adams from 19th to 22nd Street, the remainder of the mains will be 15" PVC/HDPE. New manholes will be installed at all intersections, changes in direction or changes in grade. Inlets will be installed at all intersections.

Design Criteria

New stormwater infrastructure shall be designed to handle the 10-year, 24-hour storm event, and maintain the hydraulic grade line below the top of the pipe, along with other pipe sizing criteria specified in Section 5.2. Preliminary sizes of this main to convey this design event have been described above. Manholes need to be of appropriate barrel diameter to handle pipe penetrations for size of pipe proposed.

Map

See Figure 17 for a location map of Site 11.

Environmental Impacts

Temporary impacts associated with construction are anticipated and may require MPDES Stormwater Permit and Construction Dewatering permit. Work around the outfall may cause short-term turbidity generated by construction and will need to be permitted and mitigated through the use of BMP's during construction. No other impacts are anticipated as this project is replacing existing infrastructure.

Land Requirements

This project would be located within existing right-of-way; however, temporary construction agreements may be necessary to disconnect sump pumps.

Potential Construction Problems

The primary construction concerns are the unknown of encountering other utilities and groundwater.

Cost Estimates

Table 24 provides a summary of total project costs. Capital costs were derived from communications with material suppliers and review of bid tabulations for similar projects.

Table 24: Site 11, Opinion of Probable Costs

SITE ID 11

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	*$79,900*	$79,900
2	Remove and Dispose of Existing Structures	21	EA	*$1,300.00*	$27,300
3	Supply and Install 15" PVC Storm Pipe	2365	LF	*$45.00*	$106,425
4	Supply and Install 18" PVC Storm Pipe	1750	LF	*$48.00*	$84,000
5	Supply and Install 30" PVC Storm Pipe	350	LF	*$85.00*	$29,750
6	Supply and Install 36" PVC Storm Pipe	1090	LF	*$112.00*	$122,080
7	Storm Drain Manhole, 4' barrel	8	EA	*$5,500.00*	$44,000
8	Storm Drain Manhole, 6' barrel	5	EA	*$9,550.00*	$47,750
9	Storm Inlet	36	EA	*$4,250.00*	$153,000
10	Asphalt Surface Restoration	25685	SF	*$5.25*	$134,846
11	Utility Conflicts	1	LS	*$33,800.00*	$33,800
12	Traffic Control	1	LS	*$15,700.00*	$15,700

* Any Gas, power, and fiber relocations are assumed to be completed and paid for by the utility company (if warranted).

Construction Subtotal		$878,551
2020 Construction Costs	3%	$932,055.02
Design Engineering		$106,000
Construction Engineering		$88,000
Administration/Legal	5%	$43,928
Contingency	15%	$131,783
TOTAL PROJECT COST		$1,301,765

7.15 Site 12

Site 12 involves upsizing existing mains on 3rd Street from Haggin to Broadway. This site was looked at as a potential route to mitigate cross connections at site 2, but due to construction impacts with the existing roundabout on Broadway and 3rd Street, a different route is proposed. The existing infrastructure is sized to handle the existing flows, but if additional flows are added to this system, the mains will need to be upsized. At this point no improvements are proposed for this site.

Design Criteria

Should the City decide to add additional drainage basins to this system, the new stormwater infrastructure shall be designed to handle the 10-year, 24-hour storm event, and maintain the hydraulic grade line below the top of the pipe, along with other pipe sizing criteria specified in Section 5.2. Preliminary sizes of this main to convey this design event have been described above. Manholes need to be of appropriate barrel diameter to handle pipe penetrations for size of pipe proposed.

Map

See Figure 17 for a location map of Site 12.

Environmental Impacts

Temporary impacts associated with construction are anticipated and may require MPDES Stormwater Permit and Construction Dewatering permit. No other impacts are anticipated as this project is replacing existing infrastructure.

Land Requirements

This project would be located within existing right-of-way; however, temporary construction agreements may be necessary.

Potential Construction Problems

The primary construction concerns are the unknown of encountering other utilities and groundwater.

Cost Estimates

No costs are associated with this project at this time.

7.16 Site 13

Site 13 involves installing new stormwater infrastructure on Cooper Avenue from 1st Street to 8th Street and on 5th Street from Chambers to Cooper Avenue. New infrastructure will consist of a combination of surface and subsurface improvements. Surface improvements will be roadside ditches/bio-swales with culverts to convey most of the runoff down Cooper Avenue to inlets that will utilize 24" PVC/HDPE pipe to convey the stormwater to a stormwater retention/detention pond on City property adjacent to the baseball fields. The detention facility is necessary to mitigate the peak flow and allow connection to Haggin Avenue Outfall without requiring additional increase in pipe size on Haggin Outfall. New manholes will be installed at all intersections, changes in direction or changes in grade. Inlets will be installed at all intersections.

Design Criteria

New stormwater infrastructure shall be designed to handle the 10-year, 24-hour storm event, and maintain the hydraulic grade line below the top of the pipe, along with other pipe sizing criteria specified in Section 5.2. Preliminary sizes of this main to convey this design event have been described above. Manholes need to be of appropriate barrel diameter to handle pipe penetrations for size of pipe proposed. The pond needs to be sized to handle the stormwater inflow with two feet of freeboard, while the outflow is restricted to a maximum of an 8" diameter pipe. The approximate pond size based on these requirements is 1.5-acre area and 3.5' deep. This pond sizing does not account for infiltration.

Map

See Figure 17 for a location map of Site 13.

Environmental Impacts

Temporary impacts associated with construction are anticipated and may require MPDES Stormwater Permit and Construction Dewatering permit. No other impacts are anticipated as this project is located within city limits.

Land Requirements

This project would be located within existing right-of-way; however, temporary construction agreements may be necessary.

Potential Construction Problems

The primary construction concerns are the unknown of encountering other utilities and groundwater.

Cost Estimates

Table 25 provides a summary of total project costs. Capital costs were derived from communications with material suppliers and review of bid tabulations for similar projects.

Table 25: Site 13, Opinion of Probable Costs

SITE ID 13

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	*$19,600*	$19,600
2	Remove and Dispose of Existing Structures	0	EA	*$1,300.00*	$0
3	Supply and Install 15" PVC Storm Pipe	150	LF	*$45.00*	$6,750
4	Supply and Install 24" PVC Storm Pipe	500	LF	*$70.00*	$35,000
5	Stormwater Swales/Ditch	2400	LF	*$35.00*	$84,000
6	Storm Drain Manhole, 4' barrel	1	EA	*$5,500.00*	$5,500
7	Storm Drain Manhole, 5' barrel	1	EA	*$7,000.00*	$7,000
8	Storm Inlet	4	EA	*$4,250.00*	$17,000
9	Storm Pond & Outlet Structure	1	LS	*$25,000.00*	$25,000
10	Asphalt Surface Restoration	600	SF	*$5.25*	$3,150
11	Utility Conflicts	1	LS	*$8,300.00*	$8,300
12	Traffic Control	1	LS	*$3,900.00*	$3,900

* Any Gas, power, and fiber relocations are assumed to be completed and paid for by the utility company (if warranted).

Construction Subtotal		$215,200
2022 Construction Costs	3%	$228,305.68
Design Engineering		$26,000
Construction Engineering		$22,000
Administration/Legal	5%	$10,760
Contingency	15%	$32,280
TOTAL PROJECT COST		$319,346

8.0 SELECTION OF AN ALTERNATIVE(S)

The Alternatives Analysis presents numerous possible approaches to address identified deficiencies in areas of the City's stormwater system. Ideally, the City of Red Lodge could simply choose the alternative identified that most completely addresses the deficiencies and proceed with plans to complete the necessary improvements. However, the City maintains other infrastructure throughout the community, such as municipal water, sanitary sewer, and streets and is constrained by budget and manpower limitations.

Therefore, the alternatives will be compared to one another and prioritized to assist the City in long-term planning. Each alternative will be scored for technical feasibility, environmental impacts, financial feasibility, public health and safety, operational and maintenance considerations, public opinion, and City priorities, and a matrix will be developed to rank each alternative in comparison to the other and to assist in the selection of a preferred alternative or alternatives.

8.1 Ranking Criteria

A matrix to compare each alternative objectively against the other will be developed to select the preferred alternative. Each alternative will be given a score ranging from 0 to 10 for a number of criteria, with 0 representing a negative impact and 10 representing the maximum benefit to the City. The alternatives will begin with a score of 5 for each criterion, and then the score will be adjusted up or down relative to the benefit of the particular alternative in relation to the other alternatives.

In addition to scoring each alternative, the criteria themselves with be weighted in relation to one another. Weighting factors ranging from 1 to 10 will be used to give greater importance to items such as cost. This is appropriate, as often times higher investments are made to overcome many other problems such as reliability or to mitigate problems with technical feasibility or environmental concerns.

8.1.1 Technical Feasibility

Alternatives that were not technically feasible were removed from consideration during the alternatives screening. Consequently, the alternatives discussed in this Alternatives Analysis would be scored very similarly in a decision matrix based solely on engineering.

However, other technical issues often supersede the black-and-white world of engineering. This ranking category will also include the considerations for whether the facility is on public or private land.

This criterion will be provided with a weighting factor of 4.

8.1.2 Environmental Impacts

Environmental impacts for each alternative, whether detrimental or beneficial, need to be considered in the final selection of a preferred alternative. Considerations must go beyond the more traditional areas of "environment" and include impacts to the human population and the community's health.

This criterion will be provided with a weighting factor of 5.

8.1.3 Financial Feasibility

The cost of extensive capital improvements to meet minimum health and safety requirements, applicable regulations, and environmental impacts is a great concern to small communities with limited budgets and resources.

Albeit important, it would be unwise to let cost overshadow the imminent threat to public health and safety faced by the City. Accordingly, this criterion will be provided with a weighting factor of 3.

A method must be utilized to provide an objective comparison of costs for each alternative relative to one another and not just an overall comparison. Given a range of costs for various alternatives, the relative cost of any alternative can be determined using the lowest cost and the highest cost from the range of costs and the following equation.

$$5 \times [(\text{Lowest Cost}) / (\text{Cost}) + (\text{Highest Cost} - \text{Cost}) / (\text{Highest Cost})]$$

For example, if a number of alternatives were compared having costs of $500,000, $1,000,000 and $2,000,000, the above equation would provide scores of 8.8, 5.0, and 1.3, respectively. The utilization of a formula to score the capital costs in the matrix eliminates any subjectivity and provides a consistent, relative comparison of costs.

8.1.4 Public Health and Safety

Alternatives that do not meet the public health and safety requirements were eliminated during the Alternative Development. The alternatives retained for the Alternative Analysis are designed to meet public health and safety laws, so the scoring for each alternative under this criterion would be expected to be fairly consistent. To provide a better comparison of the alternatives, the degree that each alternative addresses the imminence of the treat of human interaction with sanitary sewer will be factored into the scoring.

This criterion will be provided with a maximum weighting factor of 10 due to its importance and state of the existing system.

8.1.5 Social Impacts

Social impacts will be considered in the final alternative selection as a project poorly supported by the community will have a limited chance of success. Efforts such as public hearings are ways to identify public opinion and perceptions. Costs are always a concern with consumers, but the health and safety of their families is just as important.

This criterion will be provided with a weighting factor of 7.

8.2 Scoring of Collection System Alternatives

Each alternative considered in the Alternatives Analysis will be scored for each Ranking Criteria in accordance with the following guidelines.

8.2.1 Technical Feasibility

Numerous issues are included in the scoring considerations for technical feasibility that may impact the schedule and/or cost of the alternative, including required construction techniques, permitting, negotiations with other entities, and land acquisition. Scoring will be based upon the following general guidelines, with individual scores being adjusted up or down by as appropriate.

1.0 Major difficulties with the design and/or construction of the improvements, including such items: highly specialized construction methods; extensive permitting in addition to standard permitting for construction activities; facilities owned or operated by other entities; or major land acquisition or right-of-way negotiations.

3.0 Minor difficulties with the design and/or construction of the improvements, including such items: somewhat specialized construction methods; some permitting in addition to standard permitting for construction activities; facilities owned or operated by other entities but improvements in-line with existing planning; or minor land acquisition.

9.0 No technical feasibility considerations (essentially the No Action alternatives).

8.2.2 Environmental Impacts

The environmental impacts of each alternative will be scored based upon based on the following guidelines.

1.0 Potentially major detrimental environmental impacts.

3.0 Potentially minor detrimental environmental impacts.

5.0 No environmental impacts anticipated.

7.0 Potentially minor beneficial environmental impacts.

9.0 Potentially major beneficial environmental impacts.

8.2.3 Financial Feasibility

The scoring for the financial feasibility was calculated using the formula presented in the discussion of the Ranking Criteria. As the PER is a community-wide planning document, all alternatives were compared to one another in the calculations as opposed to comparing only alternatives for a specific area of the system against one another.

8.2.4 Public Health and Safety

The major deficiency identified with Red Lodge's stormwater facilities was the cross connections to sanitary sewer. Lack of capacity to handle runoff from precipitation events was secondary. Consequently, alternatives will be scored in the matrix for Public Health and Safety based upon the degree to which the suggested improvements do or do not address the cross connections. It is also important to consider that in order to disconnect the areas that are cross connected to sanitary sewer, the downstream mains must have the capacity to handle additional flow. The scoring will generally be as follows, with the score for individual alternatives being adjusted up or down by one point depending on the immediacy of the problem or similar considerations.

1.0 Does not address or rectify cross connections to sanitary sewer

5.0 No impact to addressing cross connections to sanitary sewer system.

9.0 Addresses or rectifies cross connections to sanitary sewer

8.2.5 Social Impacts

Public Opinion scoring will be based upon the following general guidelines, with individual scores being adjusted up or down by a point as appropriate.

1.0 Strongly opposed by community-wide public opinion.

3.0 Mildly opposed by community-wide public opinion or strongly opposed by a specific area of the community.

5.0 There is no positive or negative public opinion for the alternative.

7.0 Mildly supported by community-wide public opinion or strongly supported by a specific area of the community.

9.0 Strongly supported by community-wide public opinion.

8.3 Decision Matrix and Selection of Preferred Alternative

The scores and weighted scores for each alternative are tabulated in Table 26. The alternatives are listed below in order of prioritization from the ranking.

Table 26: Prioritization of Alternative

Site ID	Total Score	Rank
1	218.4	1
2	214.3	2
4	200.6	3
3	199.4	4
5	197.4	5
7a	193.1	6
6	191.9	7
7b	188.7	8
7c	182.2	9
7d	167.2	10
9	157.2	11
13	151.7	12
11	147.2	13
10	145.6	14
8	143.2	15

The results of the ranking highlight the importance of disconnecting the cross connections to sanitary sewer. It should be noted that site 12 was left out of the ranking matrix as the existing system has adequate capacity for its current drainage area and no improvements are proposed.

Table 27: Decision Matrix

	Technical Feasibility		Environmental Impacts		Financial Feasibility		Public Health and Safety		Social Impacts			
	Weight:	4	Weight:	5	Weight:	3	Weight:	10	Weight:	7		
Site ID	**Score**	**Wtd.**	**Score**	**Wtd.**	**Score**	**Wtd.**	**Score**	**Wtd.**	**Score**	**Wtd.**	**TOTAL**	**RANK**
1	6	24	7	35	5.0	15.1	9	90	8	56	**220.1**	**1**
2	6	24	7	35	3.9	11.6	9	90	8	56	**216.6**	**2**
3	6	24	7	35	3.2	9.6	9	90	6	42	**200.6**	**4**
4	6	24	7	35	3.8	11.5	9	90	6	42	**202.5**	**3**
5	6	24	7	35	2.5	7.4	9	90	6	42	**198.4**	**5**
6	8	32	7	35	10.0	29.9	6	60	5	35	**191.9**	**7**
7a	3	12	7	35	0.0	0.1	9	90	8	56	**193.1**	**6**
7b	4	16	7	35	3.7	11.0	8	80	7	49	**191.0**	**8**
7c	4	16	7	35	3.8	11.3	8	80	6	42	**184.3**	**9**
7d	4	16	7	35	3.6	10.8	7	70	6	42	**173.8**	**10**
8	4	16	7	35	2.6	7.8	5	50	5	35	**143.8**	**15**
9	4	16	6	30	3.7	11.1	6	60	6	42	**159.1**	**11**
10	4	16	7	35	3.4	10.1	5	50	5	35	**146.1**	**14**
11	4	16	5	25	1.8	5.4	6	60	6	42	**148.4**	**13**
12	0	0	0	0	0.0	0.0	0	0	0	0	**0.0**	**16**
13	3	12	7	35	4.4	13.1	5	50	6	42	**152.1**	**12**

9.0 PROPOSED PROJECT

The decision matrix allowed the projects to be prioritized, with more weight given to the public health and safety criteria. Sites 1 thru 5 pose an imminent risk to public health and safety due to their sanitary sewer cross connections and cause for human contact at the headworks of the sewer treatment plant during rain events. Much of the existing stormwater infrastructure is undersized with the current drainage basins (already experiencing surcharging and flooding at 2-year, 24-hour event) and would not be able to accommodate additional flows from the cross connected drainage basins (sites 1-5), therefore, it is necessary to upsize the appropriate downstream stormwater infrastructure to accommodate these additional flows. It is not financially feasible to upsize all the mains in order to disconnect all areas of cross connections; therefore, phasing of the improvements is necessary. The Haggin Avenue Drainage basin was identified as the priority because it contains sites 1, 2, 3, 4, and approximate seventy-five percent of site 5. As with any gravity system, it is necessary to start at the downstream end and work upstream. The proposed project has been broken out into four phases with each phase being completed during each successful TSEP biennium. The phases are broken out as follows:

Phase 1: Sites 1, 2, 7a, & 6.

Phase 2: Sites 3 & 7b.

Phase 3: Sites 4, 7c, & 9.

Phase 4: Sites 5, 7d, & 11.

Future Phase(s): Sites 8, 10, & 13.

9.1 Preliminary Project Design

9.1.1 Site Location and Characteristics

Based on preliminary investigations, each site is located within the public right-of-way. However, some temporary construction agreements may need to be obtained in order to accommodate construction operations to disconnect sump pumps (if needed). Refer to Figure 18 below for a map of the proposed phases.

9.1.2 Operational Requirements

The new segments of the storm sewer system will provide ease of operational maintenance with adequate access points and properly sized mains which will reduce surcharging issues. Disconnecting sanitary sewer cross connections will reduce inflow into sanitary sewer treatment facility reducing flooding concerns and operational costs.

9.1.3 Impact on Existing Facilities

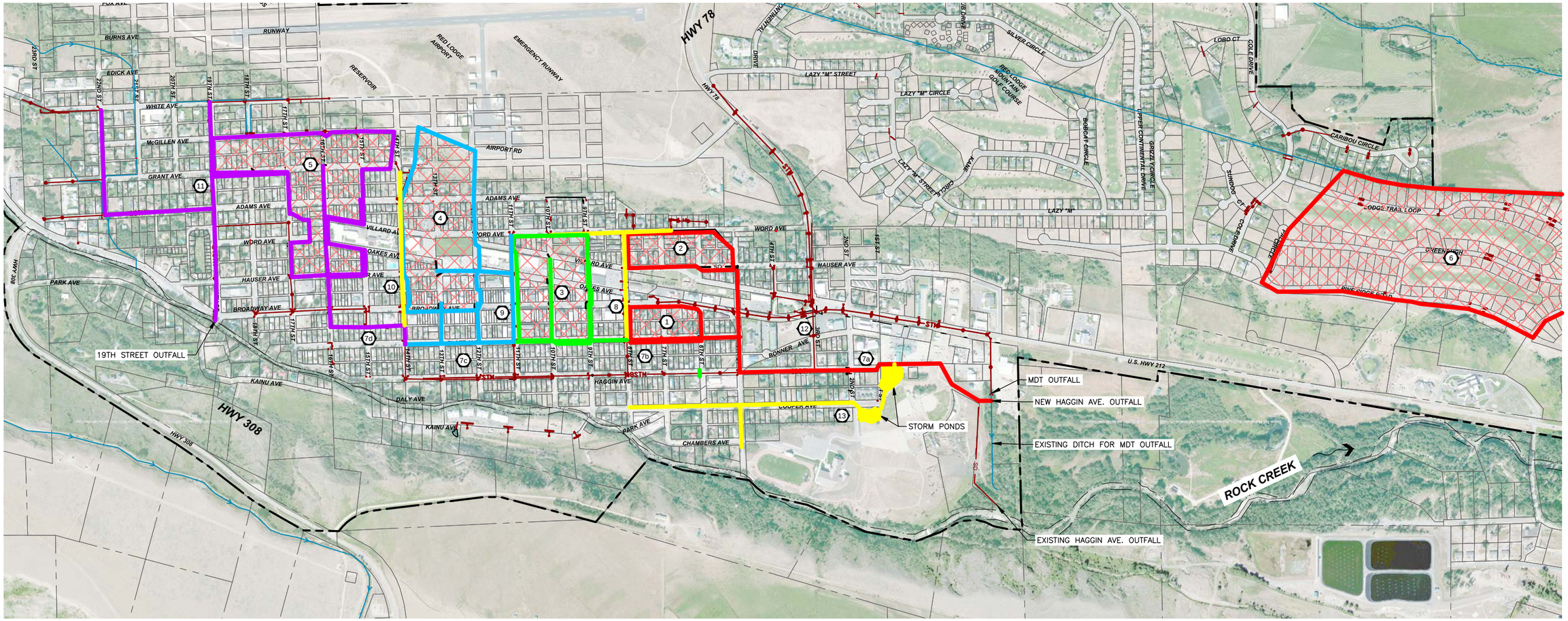
The proposed improvements will increase the capacity of the system. Improving the downstream sections of piping will help to reduce pressure on the upstream infrastructure currently caused by surcharging and backing up of existing stormwater flows from undersized mains.

9.1.4 Design Criteria

The proposed improvements will be designed to convey the 10-year, 24-hour rainfall event and meet slope and velocity criteria. These criteria have been previously mentioned in Section 5.

Table 28: Identification of Problem Areas by Priority/Phases

PRIORITY /PHASE	SITE ID	AREA	EXISTING STRUCTURE TYPE	EXISTING SIZE	DESCRIPTION	TYPE OF IMPROVEMENT	PROPOSED STRUCTURE TYPE	PROPOSED SIZE	ESTIMATED TOTAL COST
PHASE 1									
1	1	6th St. to 8th St. & Platt to Broadway	N/A	N/A	Drainage basin drains to sanitary sewer	New Storm Infrastructure	PVC or HDPE	18"	$145,095
1	2	5th St. to 8th St. & Hauser to Word	N/A	N/A	Drainage basin drains to sanitary sewer	New Storm Infrastructure	PVC or HDPE	15"	$503,265
1	7a	Haggin Ave: Outfall to 8th St.	PVC/Vitrified Clay pipe	24" & 18"	Main is undersized	Replace existing main, New main along Platt, add additionalal inlets	PVC or HDPE	42", 48" & 54"	$2,012,535
1	6	Diamond C Estates Subdivision	N/A	N/A	Potential for some storm inlets to be tied into sanitary sewer system.	Further Investigation	PVC or HDPE	TBD	$11,087
								Phase 1 Total:	**$2,671,982**
PHASE 2									
2	3	9th St. to 11 St. & Platt to Word	N/A	N/A	Drainage basin drains to sanitary sewer	New Storm Infrastructure	PVC or HDPE	18"	$749,183
2	7b	Haggin Ave: 8th St. to 11th St.	PVC/Vitrified Clay pipe	18"	Main is undersized	New main in Platt, add additional inlets	PVC or HDPE	42"	$570,706
								Phase 2 Total:	**$1,319,889**
PHASE 3									
3	4	Broadway to top of hill/airport rd.	N/A	N/A	Drainage basin drains to sanitary sewer	New Storm Infrastructure	PVC or HDPE	15"	$511,040
3	7c	Haggin Ave: 11th St. to 14th St.	PVC/Vitrified Clay pipe	15"	Main is undersized	New main in Platt, add additional inlets	PVC or HDPE	36"	$542,669
3	9	11th St.: Haggin to Word	PVC/Vitrified Clay pipe	12"	Main is undersized	Replace existing main, add additional inlets	PVC or HDPE	24" & 15"	$558,765
								Phase 3 Total:	**$1,612,474**
PHASE 4									
4	5	15th St. to 17th St/Hauser to Grant & 14th St. to 19th St./Grant to Mcgillen	N/A	N/A	Drainage basin drains to sanitary sewer	New Storm Infrastructure	PVC or HDPE	24" & 18"	$1,045,470
4	7d	14th St. to 16th St., & 16th St.: alley to Broadway	PVC/Vitrified Clay pipe	15" & 12"	Main is undersized	Replace existing main, add additional inlets	PVC or HDPE	36" & 30"	$602,475
4	11	19th St Storm Main System	PVC/Vitrified Clay pipe	24" & 8"	Main is undersized	Replace existing main, add additional inlets	PVC or HDPE	36", 30", & 18"	$1,301,765
								Phase 4 Total:	**$2,949,711**
FUTURE PROJECTS									
F	8	8th St.: Haggin to Word, & Word: 10th to 7th	PVC/Vitrified Clay pipe	12" & 8"	Main is undersized	Replace existing main, add additional inlets	PVC or HDPE	24", 18", & 15"	$990,641
F	10	14th St.: 7d issues to Grant	PVC/Vitrified Clay pipe	12"	Main is undersized	Replace existing main, add additional inlets	PVC or HDPE	15"	$687,287
F	13	Cooper Ave: 9th St. to 1st St.	N/A	N/A	no storm infrastructure	New Mains, Inlets, stormwater pond	PVC or HDPE	24"	$319,346
								Future Projects Total:	**$1,997,273**



LEGEND	
(1)	SITE ID OF IDENTIFIED PROBLEM AREAS
	RED LODGE CITY LIMITS
	PHASE 1 IMPROVEMENTS
	PHASE 2 IMPROVEMENTS
	PHASE 3 IMPROVEMENTS
	PHASE 4 IMPROVEMENTS
	FUTURE PHASE(S) IMPROVEMENTS

NORTH

0 500 1000

SCALE IN FEET

Figure #18
PHASING OF PROPOSED IMPROVEMENTS

CITY OF RED LODGE
2020 STORMWATER IMPROVEMENTS PER

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9.1.5 Pumping Stations

No pumping stations are included as part of the preferred alternative.

9.1.6 Storage

No storage or detention facilities are included in the preferred alternative, refer to Section 5 for additional discussion on storage.

9.1.7 Treatment

Current regulations do not require the treatment of stormwater associated with the preferred alternative, however BMPs such as grass ditches, natural infiltration, sumps in manholes, and routine maintenance will be utilized to alleviate sediment and trash in stormwater runoff.

9.2 Project Schedule

Should the City of Red Lodge want to move forward, grants and/or loans would be submitted June 12, 2020, for Phase 1 improvements with anticipated design and construction in 2021 & 2022. An updated PER and TSEP grant application would be submitted for Phase 2 in 2022 with design and construction in 2023 & 2024. An updated PER and TSEP grant application would be submitted for Phase 3 in 2024 with design and construction in 2025 & 2026. Phase 4 improvements will be submitted in 2026 with an updated PER and TSEP grant.

9.3 Permit Requirements

Currently, Red Lodge is not classified as a MS4, so an MPDES permit is not required.

A Section 404 permit from the ACOE, SPA 124 permit from MT FWP, and 318 Permit from DEQ may be required for work adjacent to Rock Creek. This is only necessary for Phase 1 improvements. These agencies will be consulted during the final design phase to ensure that the proper permits are obtained.

Other permits required may include a MPDES permit for stormwater discharges associated with construction, if the project disturbs more than one acre.

9.4 Total Project Cost Estimate

The total capital cost for Phase 1 is shown in Table 29 below.

Table 29: Total Capital Costs for Phase 1 (Sites 1, 2, 6, & 7a)

TOTAL PROJECT COST					
ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	*$165,000.00*	$165,000
2	Inspection Crew	20	HR	*$160.00*	$3,200
3	Equipment	20	HR	*$200.00*	$4,000
4	Remove and Dispose of Existing Structures	23	EA	*$1,300.00*	$29,900
5	Supply and Install 15" PVC Storm Pipe	3700	LF	*$45.00*	$166,500
6	Supply and Install 42" PVC Storm Pipe	2160	LF	*$118.00*	$254,880
7	Supply and Install 48" PVC Storm Pipe	905	LF	*$135.00*	$122,175
8	Supply and Install 54" PVC Storm Pipe	1250	LF	*$175.00*	$218,750
9	Storm Drain Manhole, Special Structure	4	EA	*$16,000.00*	$64,000
10	Storm Drain Manhole, 4' barrel	6	EA	*$5,500.00*	$33,000
11	Storm Drain Manhole, 6' barrel	9	EA	*$9,550.00*	$85,950
12	Storm Inlet	52	EA	*$4,250.00*	$221,000
13	Outfall Protection	1	LS	*$20,000.00*	$20,000
14	Asphalt Surface Restoration	69185	SF	*$5.25*	$363,221
15	Utility Conflicts	1	LS	*$41,100.00*	$41,100
16	Traffic Control	1	LS	$20,300.00	$20,300
		Construction Subtotal			$1,812,976
		2022 Construction Cost		3%	$1,923,387
		Design Engineering			$205,000
		Construction Engineering			$181,000
		Administration/Legal		5%	$90,649
		Contingency		15%	$271,946
		TOTAL PROJECT COST			$2,671,982

9.5 Annual Operating Budget

9.5.1 Income

The City currently receives no income specifically related to stormwater facilities. The minimal operation and maintenance of existing facilities is currently covered by the City's general fund or the water and sewer enterprise funds. The City intends to form a stormwater district to pay for operation and maintenance of the stormwater facilities and any loan obligations related to the proposed capital improvements. Additional information about forming the stormwater utility district is included in Appendix Q. Revenue generated by the stormwater district will be used for administration costs, maintaining existing infrastructure, building new infrastructure, and operation and maintenance costs associated with the stormwater infrastructure.

Additionally, the City decided to request a 1% increase in the resort tax for stormwater and street infrastructure improvements after it was approved by the 2019 State Legislature. This initiative was added to the June 2, 2020 primary election ballot for consideration by voters. Per the Secretary of States website on June 8, 2020 the levy passed with 63% in favor of the levy. The City may elect to use the funds generated from this resort tax to offset debt from the infrastructure improvements or to concurrently construct curb and pavement street improvements.

Unfortunately, it is currently unclear what the direct financial benefits will be as COVID-19 restrictions had a significant impact on the 2nd quarter of the existing resort tax for the City. The City is very concerned about resort tax income for the current and upcoming quarters as well since COVID-19 concerns have greatly reduced tourism to the area and resulted in the Home of Champions Rodeo and other events being cancelled this summer. Consequently, consideration of the new 1% resort tax funds was excluded from the funding scenarios in order to provide a conservative opinion of rate increased needed to fund the improvements in this PER.

9.5.2 Annual O&M Costs

Stormwater systems typically have negligible operation and maintenance costs when compared to municipal water or sanitary sewer systems. There are no day-to-day operational duties associated with gravity stormwater systems and maintenance typically consists of periodic cleaning of grate inlets and manholes and cleaning sediment and debris from the main lines and laterals.

9.5.3 Debt Repayments

The City has no debt repayment or coverage requirements for the existing stormwater system.

9.5.4 Reserves

The City has no reserve requirements or short-lived assets associated with the stormwater system.

10.0 CONCLUSIONS AND RECOMMENDATIONS

The preferred alternative includes extensive capital improvements. The City needs to give careful consideration to financing the improvements and long-term scheduling, including acquiring funding, design, and construction. The following section will present recommendations for the financing and implementation of the project.

10.1 Funding

Due to the high cost of the proposed improvements, the City will try to obtain outside assistance to fund the project. The outside assistance may be in the form of a grant and/or loan. Possible sources of funding are:

- Treasure State Endowment Program (TSEP)
- Renewable Resource Grant and Loan Program (DNRC)
- Community Development Block Grant (CDBG)
- State Revolving Fund (SRF)
- USDA Rural Development (RD)
- Montana Coal Board
- Economic Development Administration (EDA)
- INTERCAP

Each funding program has different eligibility requirements. Community income levels are considered as part of the eligibility review for most of the grant programs, either as a primary qualifier or, as in the case of TSEP, as a basis for determining the level of financial responsibility the applicant must meet before they qualify for grant funds.

10.1.1 Funding Sources

The following sections provide a brief description of the potential funding sources and whether the City of Red Lodge would be eligible for those funds.

Treasure State Endowment Program (TSEP)

TSEP is a state funded grant program, which is administered by the Montana Department of Commerce (MDOC). TSEP provides financial assistance to local governments for infrastructure improvements. Grants can be obtained from TSEP for up to $500,000 if the projected user rates

are less than 125% of the target rate, for up to $625,000 if projected user rates are between 125% and 150% of the target rate, and for up to $750,000 if the projected user rates are over 150% of the target rate. TSEP grant recipients are required to match the grant dollar for dollar, but the match may come from a variety of sources including other state grants, federal grants, loans, or cash contributions.

The City of Red Lodges' combined water/sewer/stormwater rate is greater than 100% but less than 125% of the target rate, so the City is eligible for a $500,000 grant.

TSEP grants are typically awarded to municipal water, sanitary sewer or bridge projects, but a stormwater project is an eligible activity for which a community can apply for funding. Public Health and Safety concerns are heavily weighted in the selection process and are well demonstrated for this project. The phase 1 improvements were previously awarded a TSEP grant in 2019 under house bill 652, but were unable to meet startup conditions in time before monies were gone. The City then decided to update the PER and reapply for funding this cycle.

Renewable Resource Grant and Loan Program (RRGL)

RRGL is a state program that is funded through interest accrues on the Resource Indemnity Trust Fund and the sale or Coal Severance Tax Bonds and is administered by the Montana Department of Natural Resources and Conservation (DNRC). The primary purpose of the RRGL is to enhance Montana's renewable resources. For public facilities projects that conserve, manage, develop, or protect renewable resources, grants of up $125,000 are available.

Since the goal of the program is to enhance natural resources, the proposed stormwater project would not likely qualify for funding.

Community Development Block Grant (CDBG)

CDBG is a federally funded program that is also administered by the Montana Department of Commerce (MDOC). The primary purpose of CDBG funds is to benefit low to moderate income (LMI) families. Hence, a municipality must have an LMI of 51% or greater. This is usually determined by the current Census. However, under certain circumstances, the MDOC may allow an income survey to be completed (such as there have been major economic changes since the Census or if a community is only slightly under the required LMI percentage).

Low and Moderate Income Percent is calculated by U.S. Housing and Urban Development (HUD) using data from the U.S. Census Bureau's Decennial Census, specifically for the Community

Development Block Grant Program (CDBG). LMI families are defined as those families whose income does not exceed 80% of the county median income for the previous year or 80% of the median income of the entire non-metropolitan area of the State of Montana, whichever is higher. The LMI for the City of Red Lodge is 48.97%.

The CDBG grant funds can be applied for in an amount of up to $450,000 with a limit of $20,000 per LMI household, so a community needs at least 22 LMI households to apply for the maximum grant amount. Applicants must contribute matching funds equal to at least 25% of the total CDBG funds requested for administrative and public facilities activities unless the MDOC approves a request for a waiver. Sources of eligible matching funds include local general funds or other cash, proceeds from the sale of bonds, entitlement or formula-based federal or state funds, state or federal grant or loan funds, value of land or materials provided by the applicant, the value of labor provided by the applicant to the project after the CDBG project has been approved for funding and a CDBG contract has been signed, and the value of machinery used in the process of constructing the project that is owned (or leased) and operated by the applicant. The value of the machinery will be determined using the Federal Emergency Management Agency (FEMA) equipment rate schedules.

CDBG funds are not planned to be utilized because the population of Red Lodge is only 49% LMI according to the Department of Commerce. Therefore, the City is not currently eligible to apply for CDBG funds.

State Revolving Fund (SRF)

SRF provides low-interest loan funds for water, wastewater, and stormwater projects through the Drinking Water State Revolving Fund (DWSRF) and the Water Pollution Control State Revolving Fund (WPCSRF), respectively. The SRF program is administered by the Montana Department of Environmental Quality. The current interest rate is 2.5% with terms up to 30 years.

To acquire SRF Funds, the City would first need to complete a Priority List Survey for any proposed project, which would then be used to rank the project on the program's priority list. An application for funds could be submitted at any time once the project was included on the priority list. Stormwater projects are not eligible for SRF principal forgives; therefore the City would have to take out $2,172,000 in loans. The draw for the City of Red Lodge to use SRF funding is the shorter terms. The City would prefer to have a 20-year loan term vs the 40-year term provided by

RD funding. Though this results in a higher initial cost to users it provides a long-term cost savings to the City and its users.

USDA Rural Development (RD)

RD provides grant and loan funding to municipalities for water, wastewater and stormwater projects that improve the quality of life and promote economic development in Rural America. Municipalities with a population of less than 10,000 are eligible to apply, though; priority is given to those with a population of less than 5,500.

Grant eligibility and loan interest rates are based on the community's median household income (MHI) and user rates. With a median household income of $42,500, Red Lodge is eligible for the Intermediate Rate offered by RD for loan funding. The Intermediate Rate is currently 1.875% with a 40-year term. The City may also be eligible for grant funding from RD and for planning purposes it was assumed the City would not receive a grant to provide conservative user rate estimates.

Montana Coal Board

The Coal Board provides grant funding to municipalities to adequately provide for the expansion of public services or facilities needed as a direct consequence of coal development activities. There is no maximum limit to the amount the Coal Board can fund, but available funding is very limited, so it can be difficult to receive any funds from the Coal Board, especially large sums. Coal Board funding is available for Red Lodge, but it would be hard to show direct benefit with this project, therefore this funding was not included in funding scenarios.

Economic Development Administration (EDA)

The EDA Public Works Program provides grant funding to communities to revitalize, expand, or upgrade their physical infrastructure to attract new industry, encourage business expansion, diversify local economies and generate long-term, private sector jobs and investment. The type of stormwater project proposed by Red Lodge is not a good fit for the Public Works Program and it is unlikely the EDA would approve an application for funding.

INTERCAP

INTERCAP provides loan funds at a low cost, variable interest rate to local governments. INTERCAP is administered by the Montana Board of Investments and is very flexible in the variety of funding which would include both water and wastewater projects. There is no funding cycle (funds are always available), however, the maximum loan term is 15 years.

Due to the relatively large amount of financing required, an INTERCAP loan with the shorter loan term would cause extremely high user rates for the City and is not recommended for long-term financing. The City may utilize INTERCAP for interim financing.

10.1.2 Funding Strategy

Several options have been identified as potential funding sources for the City of Red Lodge. By knowing the options available and having a thorough knowledge of the criteria associated with each funding source, many different possible funding scenarios were considered. This process is important to fully understand the details and sensitivity of these funding sources over time. For example, one scenario may have a slightly better user rate, but the interest paid over the life of the loan is much higher.

After calculating rates and weighing-out the likelihood of Red Lodge's eligibility, four options are considered and shown below in Table 30. Due to the shorter term and associated savings in interest over the life of the loan, the preferred funding scenario would be to utilize TSEP funds in conjunction with an SRF loan/grant with a term of up to 20-years.

Table 30: Possible funding options

FUNDING OPTIONS FOR				
ITEM	PHASE 1	PHASE 1	PHASE 1	PHASE 1
	TSEP and RD Loan only (1.875% for 40 years*)	TSEP and SRF (2.5% for 20 years)	SRF Only (2.5% for 20 years)	RD Loan only (1.875% for 40 years*)
Project Total	$2,671,982	$2,671,982	$2,671,982	$2,671,982
Rounded Total	$2,672,000	$2,672,000	$2,672,000	$2,672,000
TSEP Grant	$500,000	$500,000		
SRF Loan		$2,172,000	$2,672,000	
RD Loan	$2,172,000			$2,672,000
Total Project Funds	$2,672,000	$2,672,000	$2,672,000	$2,672,000
SRF Bond Reserve (1/2 year payment)	$0	$69,721	$85,771	$0
Total Loan Amount	$2,172,000	$2,241,721	$2,757,771	$2,672,000
Annual Loan Payment	$77,840	$143,920	$177,050	$95,760
Total Loan Payments Over Life of Loan	$3,113,600	$2,878,400	$3,541,000	$3,830,400
Total Interest Paid Over Life of Loan	$941,600	$636,679	$783,229	$1,158,400
Annual Loan Coverage	$7,784	$14,392	$17,705	$9,576
TOTAL ANNUAL CAPITAL DEBT SERVICE COST	$85,624	$158,312	$194,755	$105,336
User Capital Cost/Month	*$3.43*	*$6.34*	*$7.80*	*$4.22*
Annual O&M for Storm Utility	$50,000	$50,000	$50,000	$50,000
Storm Utility Administration Fee	$15,000	$15,000	$15,000	$15,000
Storm Utility Reserve	$20,000	$20,000	$20,000	$20,000
TOTAL ANNUAL O&M COSTS to NEW USERS	$85,000	$85,000	$85,000	$85,000
New User O&M Cost/Month	*$3.40*	*$3.40*	*$3.40*	*$3.40*
USER COST/MONTH FOR STORM UTILITY	$6.83	$9.74	$11.20	$7.62
Existing Average User Cost/Month/EDU	$0.00	$0.00	$0.00	$0.00
COST/MONTH INCREASE/EDU	$6.83	$9.74	$11.20	$7.62
Existing Other System Cost/Month	$91.00	$91.00	$91.00	$91.00
Total Proposed Water/Sewer/Storm Cost/Month	$97.83	$100.74	$102.20	$98.62
Combined Systems Target Rate	$81.46	$81.46	$81.46	$81.46
PERCENT OF COMBINED TARGET RATE	120.1%	123.7%	125.5%	121.1%

10.2 Public Participation

A public hearing was held on May 26, 2020 to present the findings of the PER and the Draft Environmental Assessment. The Mayor and five council members in addition to other city staff were in attendance, members of the public participated using go-to-meeting. Council meeting minutes and slides of the presentation are included in Appendix P. It was also discussed during this meeting that an additional public meeting will need to be held to meet MEPA guidelines for the EA. This meeting will be completed in July and documentation submitted to TSEP before August 3, 2020.

The City Council convened on June 9, 2020 to discuss the grant application, PER, and to sign resolutions adopting each. Signed resolutions are included in the TSEP application.

10.3 Implementation

Before the project can be implemented, the funding must first be in place. As noted earlier, the best funding strategy for the City would be to utilize TSEP and SRF loan funds. The TSEP grant application is due on June 12, 2020 and the SRF loan may be submitted any time but should be submitted quickly in order to maintain the proposed project schedule. Thus, it is recommended that the City submit the TSEP and SRF applications accordingly. Upon securing all funding, the project start-up for the grant program is expected to be about a two-month process. The City should also start the process of setting up the Utility District for Stormwater Improvements, so funds can begin accruing before loan payments begin.

The engineering could begin prior to applying or receiving any grants. If the engineering did begin prior to grant submittal or award, it would not be eligible for reimbursement from the grant programs. However, due to the significant cost of this project, matching funds for grant dollars will not be an issue. All grant dollars received by the City could easily be used for construction.

Table 31: Quarterly Project Implementation Schedule

TASK	QUARTERS, 2021				QUARTERS, 2022			
	1st J F M	2nd A M J	3rd J A S	4th O N D	1st J F M	2nd A M J	3rd J A S	4th O N D
PROJECT DESIGN								
Advertise for & Select Engineer	**COMPLETED**							
Commence Project Design			X					
Complete Final Design			X X	X				
Submit Plans to TSEP				X				
Prepare Bid Documents				X X				
Finalize Acquisition	N/A							
ADVERTISEMENT FOR CONST. BID								
Review Contract Requirements					X			
Public Bid Advertisement					X X			
Open Bids & Examine Proposals					X			
Request Contr. Debarment Review					X			
Select Contractor & Award Bid					X			
Conduct Pre-Const. Conference					X			
Issue Notice to Proceed to Contractor					X			
PROJECT CONSTRUCTION								
Begin Construction					X			
Monitor Engineer & Contractor					X	X X X		
Conduct Labor Compliance Reviews					X	X X X		
Hold Const. Progress Meetings					X	X X X		
Final Inspection						X		
PROJECT CLOSE OUT								
Submit Final Drawdown						X	X	
Project Completion Report						X	X	
Submit Final Certification						X	X	

11.0 REFERENCES

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