EAST HELENA

WASTEWATER MASTER PLAN

Prepared for: **City of East Helena, MT** - May 2020

Prepared by:
Robert Peccia & Associates
Helena, Montana
www.rpa-hln.com

City of East Helena
Wastewater Master Plan - 2020

FINAL

Prepared For: City of East Helena, Montana

May 2020

MONTANA
BRADLEY J.
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14863PE
5/29/20
LICENSED
PROFESSIONAL ENGINEER

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Helena, Montana

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CHAPTER 0: EXECUTIVE SUMMARY

0.A. INTRODUCTION AND BACKGROUND

The City of East Helena has authorized the preparation of this Master Plan. The objectives of this Master Plan include the following:

- Identify the planning area and physical limits of the existing wastewater system;
- Evaluate the condition of the existing facilities;
- Perform a capacity analysis for the existing treatment system;
- Identify any deficiencies with the collection system and treatment facilities;
- Identify and evaluate alternatives for correcting all identified deficiencies;
- Provide cost estimates for all alternatives; and
- Identify a set of recommended improvements for implementation.

The last Wastewater Master Plan was completed in 2010. Over the next 20 years the City of East Helena anticipates a significant increase in wastewater flows. During the next 8 years the population connected to the City's system is expected to increase from 2,273 to 3,873 in the year 2028. This is a 70% increase in the population served by the wastewater system.

During the last planning period wastewater production was limited to the developed area within the City limits generated by current City residents, City businesses, and the Pele Park Trailer Court. This service area and population remained fairly constant for the period of 2002 through 2017.

In 2018, the East Clark Water and Sewer District began contributing. Plans have currently been approved and Agreements are in place which will add additional flow to the WWTP and increase the size of the collection system. Additional flow is anticipated in the near term from the East Clark Street Water & Sewer District, Red Fox Meadows Subdivision, East Helena High School, Vigilante Subdivision, Highland Meadows Subdivision, American Chemet Addition, and the Missouri River Brewery.

0.B. PROBLEM DEFINITION

In addition, and related to the expected increase in wastewater flows, a major issue faced by the City is the large amount of groundwater infiltration entering East Helena's wastewater collection system. Based on estimations of inflow and infiltration as discussed in **Section 2.C.2.2,** approximately **23%** of the influent currently received at the City's treatment plant is clean water entering as inflow and infiltration (I & I). Therefore, approximately 66,386 gpd of the 288,635 gpd is clean water. The undertaking of a project to reduce the amount of clean water that enters the collection system would "free up" hydraulic capacity at the treatment facility and extend its useful life. This would allow the City to serve additional users and delay an inevitable upgrade to the treatment facility. This additional time may allow the City to accumulate more funds to put toward a future treatment project, provide a more clear picture of what reductions in I&I can be realized, and ultimately keep user rates lower.

A majority of the anticipated growth will occur over the next 8 years. With a design capacity of 434,400 gpd and if the I & I is not significantly reduced it is estimated that the existing WWTP will reach capacity by the year 2027. If I & I can be reduced by 50%, the capacity of the WWTP will be extended and will reach capacity by the year 2031.

The existing screening and grit removal systems at the wastewater treatment plant are approximately 20 years old and some components are at the end of their useful life and need to be replaced. These unit processes are necessary to provide reliable wastewater service into the future and need to be replaced.

The Montana Avenue lift station is currently located in the middle of Montana Avenue/Valley Drive. With the addition of the East Helena High School and the anticipated growth north of the City, traffic on Montana Avenue/Valley Drive has and will continue to increase dramatically over the next several years. New developments including the new East Helena High School, Vigilante Subdivision, and the Highland Meadows Subdivision are expected to increase the number of daily trips on Montana Avenue/Valley Drive. The new East Helena High School is expected to generate 1,015 new daily trips on Montana Avenue/Valley Drive, the Vigilante Subdivision is expected to generate an additional 680 daily trips, and the Highland Meadows Subdivision is expected to generate 3,021 daily trips for a total of 4,716 additional daily trips. According to City Operators, the Montana Avenue lift station is prone to plugging which requires the pumps to be removed. The location of this lift station requires the operators to work in the middle of Montana Avenue/Valley Drive, often times during busy peak driving periods. This makes it difficult and unsafe for operators to access and maintain this lift station. While this improvement is not critical at this time, the process of acquiring the land needed for replacement should begin.

0.C. ALTERNATIVES CONSIDERED

0.C.1. COLLECTION SYSTEM ALTERNATIVES

The collection system alternatives considered in this Preliminary Engineering Report include:

- Collection System Alternative 1 – No-Action
- Collection System Alternative 2 – Open-Dig Replacement
- Collection System Alternative 3 – Cured In-Place Pipe (CIPP)

0.C.2. MONTANA AVENUE LIFT STATION ALTERNATIVES

The Montana Avenue lift station alternatives considered in this Preliminary Engineering Report include:

- Montana Avenue Lift Station Alternative 1 – No-Action

- Montana Avenue Lift Station Alternative 2 – W. Dudley Street
- Montana Avenue Lift Station Alternative 3 – King Street Alley
- Montana Avenue Lift Station Alternative 4 – East Helena Cemetery

0.C.3. TREATMENT SYSTEM ALTERNATIVES

The treatment system alternatives considered in this Preliminary Engineering Report include:

Flow Equalization Basin Liner Alternatives:

- Flow Equalization Basin Liner Alternative 1 – No-Action

Screening Alternatives:

- Screening Alternative 1 – No-Action
- Screening Alternative 2 – Install New Mechanical Bar Screen with Washer/Compactor
- Screening Alternative 3 – Install New Drum Screen with Screw Compactor

Grit Removal Alternatives:

- Grit Removal Alternative 1 – No-Action
- Grit Removal Alternative 2 – Install New Vortex Grit Removal System with Grit Washer
- Grit Removal Alternative 3 – Install New Headcell Grit Removal System with Grit Washer

Screw Pump Alternatives:

- Screw Pump Alternative 1 – No-Action
- Screw Pump Alternative 2 – Rehabilitate Existing Screw Pumps
- Screw Pump Alternative 2 – Replace Existing Screw Pumps

RAS Pump Alternatives:

- RAS Pump Alternative 1 – No-Action

0.D. PREFERRED ALTERNATIVES

The preferred alternatives for this project include:

- Collection System Alternative 3 – Cured In-Place Pipe (CIPP)
- Montana Avenue Lift Station Alternative 3 – King Street Alley
- Screening Alternative 2 – Install New Mechanical Bar Screen with Washer/Compactor
- Grit Removal Alternative 2 – Install New Vortex Grit Removal System with Grit Washer
- Screw Pump Alternative 2 – Rehabilitate Existing Screw Pumps

Due to the cost of the needed improvements for the City’s wastewater system, the proposed work will be divided into phases, with the most critical portions considered the top priorities. The ability to fund these improvements, along with the availability of potential funding sources, will also be taken into consideration. The Phased approach to the improvements is summarized below.

Phase 1

- Collection System Alternative 3 – Cured In-Place Pipe (CIPP)
- Screening Alternative 2 – Install New Mechanical Bar Screen with Washer/Compactor
- Grit Removal Alternative 2 – Install New Vortex Grit Removal System with Grit Washer
- Screw Pump Alternative 2 – Rehabilitate Existing Screw Pumps
- Acquire/Purchase land for Montana Avenue Lift Station

Phase 2

- Montana Avenue Lift Station Alternative 3 – King Street Alley

The implementation of Phase 2 of the Wastewater System Improvements will be dependent on future street improvements that are proposed and what land is acquired for the Montana Avenue/Valley Drive. Improvements to the Montana Avenue Lift Station should be completed simultaneously with the Montana Avenue/Valley Drive street improvements.

0.D.1. PHASE 1 IMPROVEMENTS

0.D.1.1. REHABILITATE SEWER MAINS USING CURED IN-PLACE PIPE (CIPP)

The preferred alternative for the collection system includes the rehabilitation of the portions of the collection system that were determined to be contributing a majority of the inflow and infiltration (I & I). The mains would be lined with Cured In-Place Pipe (CIPP). Generally, it is more economical to rehabilitate 8-inch and larger sewers with CIPP if the sewers are in paved streets with utilities or in alleys with tight quarters as long as there are no sags or major damage to the pipe. If it is determined that the sewer main to be lined is severely damaged, that sewer main will need to be replaced instead of rehabilitated.

0.D.1.2. NEW MECHANICAL BAR SCREEN WITH WASHER/COMPACTOR

This alternative includes the installation of a new mechanical bar screen in place of the existing screen utilizing the existing screening channels. This alternative also includes the installation of a new washer/compactor for the removed screenings. The screening structure would be housed in the existing screening building and a new building or addition would be constructed to house the electrical controls for the screening equipment.

0.D.1.3. NEW VORTEX GRIT REMOVAL SYSTEM WITH GRIT WASHER

This alternative includes the installation of a vortex grit removal system which utilizes a rotating agitator which maintains a vortex action, keeping the organics in suspension, and allowing the grit to settle. The grit chamber sloped at the bottom of the system allows for continuous grit settling even during power failures. Separated grit is removed from the storage chamber by a grit pump and is fed to a grit washer which would be installed behind the grit removal process prior to temporary storage/disposal into a dumpster.

0.D.1.4. REHABILIATE EXISTING SCREW PUMPS

This alternative includes the general rehabilitation of the screw pumps in order to extend the operational life of the pumps. The rehabilitation includes replacement of the upper and lower bearing assembly, re-grouting the screw pump troughs, and cleaning and repainting the screws.

0.E. PROJECT COSTS AND BUDGET

The total project cost for the water system improvements are summarized in **Table 0.E.1**. The total project cost includes the construction, engineering, administration of grants and loans, and contingency.

Table 0.E.1: Cost Summary for Wastewater System Improvements

Total Project Cost	$3,172,500.00
Total Annual Operation and Maintenance Cost	$12,185.00

CHAPTER 1: PROJECT PLANNING

1.A. LOCATION

The City of East Helena is located at the southern end of the Helena Valley in Lewis and Clark County. The City is directly east of the City of Helena and is surrounded by the Elkhorn Mountains to the south, the Big Belt Mountains to the east, with smaller hills and mountains to the north and west.

The planning area for the East Helena wastewater system is the current wastewater service area as well as contributors to the wastewater system as shown in **Figure 1.A.1**.

1.B. ENVIRONMENTAL RESOURCES PRESENT

1.B.1. LAND RESOURCES

Current land uses include residential and commercial businesses, agricultural lands and open spaces, and industrial facilities. **Figure 1.B.1** shows the land use categories surrounding and include the City of East Helena. The agricultural and rangelands in the planning area are used primarily for grazing and fallow cropping.

Figure 1.B.2 shows the topography of the area. The terrain around the City of East Helena is gently rolling with surface elevations generally decreasing from south to north towards Lake Helena. Surface elevations in the areas range from about 3,800 feet above sea level at locations along Canyon Ferry Road to about 4,100 feet near the Jefferson County line southeast of the City. The topography within the East Helena City Limits is flat.

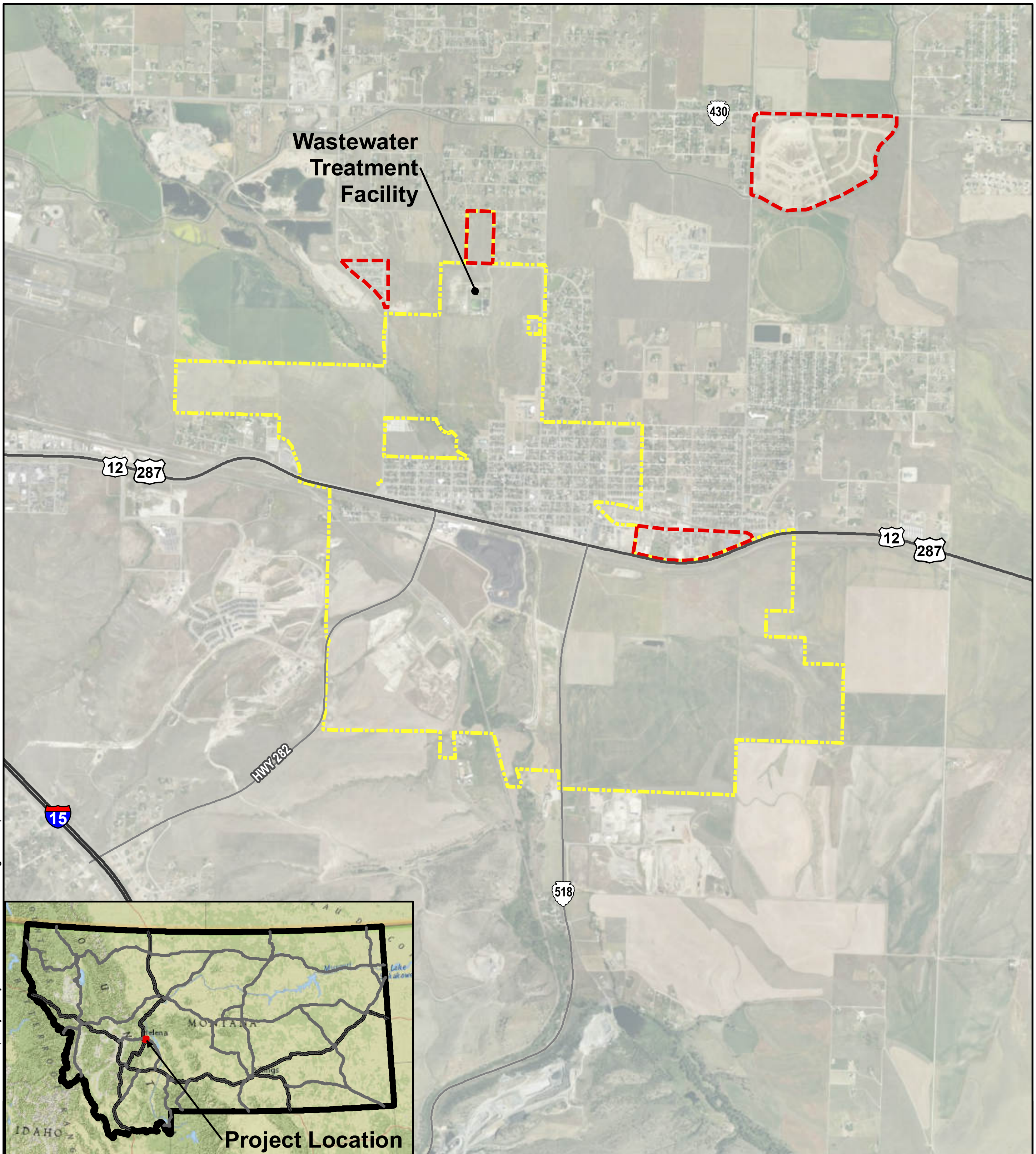
1.B.2. SOIL TYPES

According to the USDA Natural Resources and Conservation Service Web Soil Survey, there are several types of soil around the East Helena area. Most of these soils found consist of varying types of loam with the typical slopes of occurrence varying anywhere from 0 percent to 5 percent.

Some soils within the planning area are considered farmland of local importance, farmland of statewide importance and prime farmland if irrigated.

1.B.3. WATER RESOURCES

Water resources in the area include exploitable groundwater as well as Prickly Pear Creek, Helena Valley Canal, and various other unnamed drainages. Prickly Pear Creek heads in the Elkhorn Mountains south of the City of East Helena and runs north west, eventually emptying



Wastewater Service Area
East Helena City Limits

N

0 3,500 7,000
Feet

East Helena Wastewater Master Plan - 2020

Figure 1.A.1. Planning Area Map

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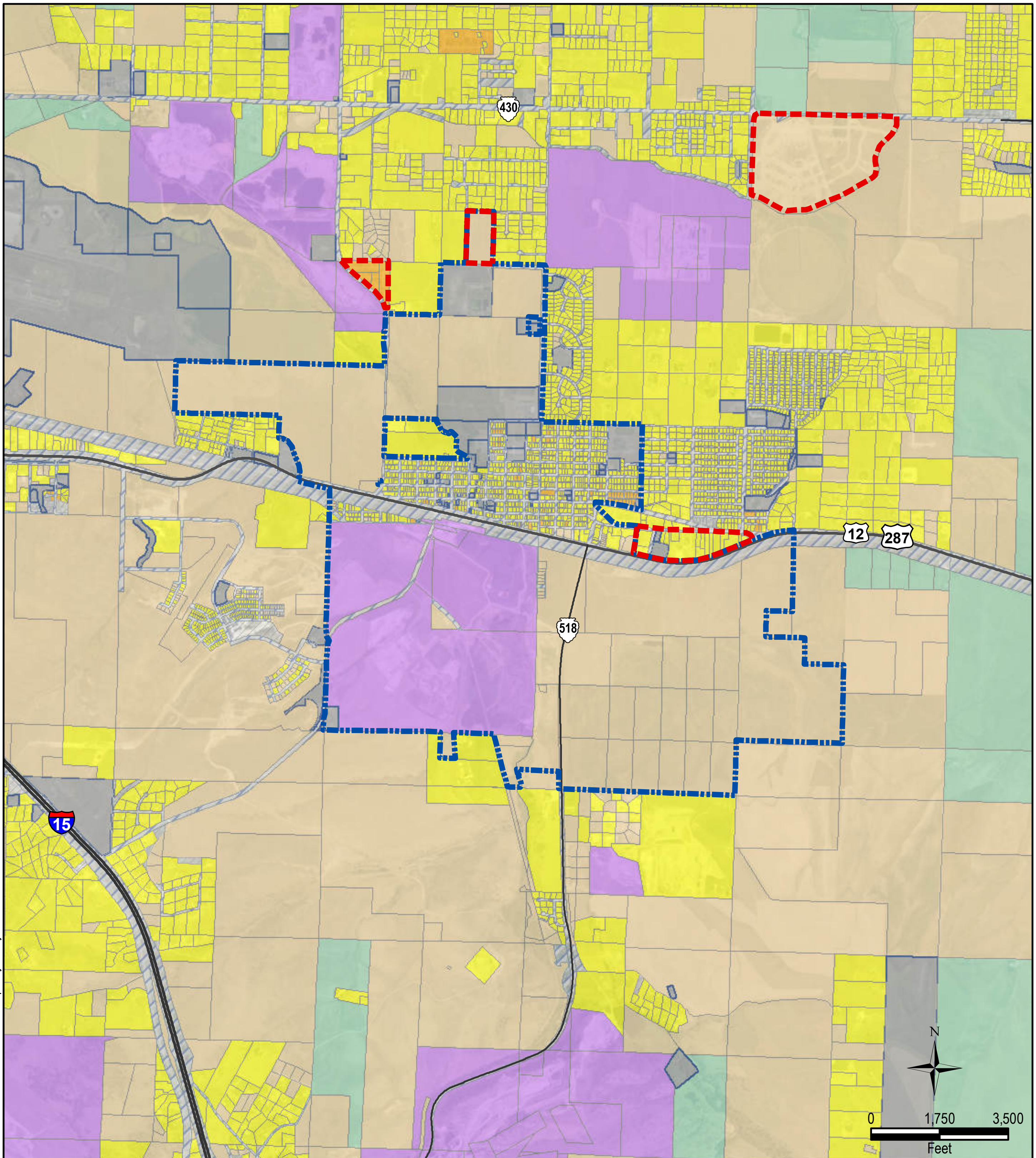

Land Use (from Cadastral Data, November 2019)

- ROW
- Apartment
- Centrally Assessed Non-Valued or Exempt Property
- Farmstead
- Improved Property-Residential
- Industrial
- Manufactured Home Park
- Non-Valued Property
- Vacant Land
- East Helena City Limits
- Wastewater System Service Area

East Helena Wastewater Master Plan - 2020

Figure 1.B.1. Land Use

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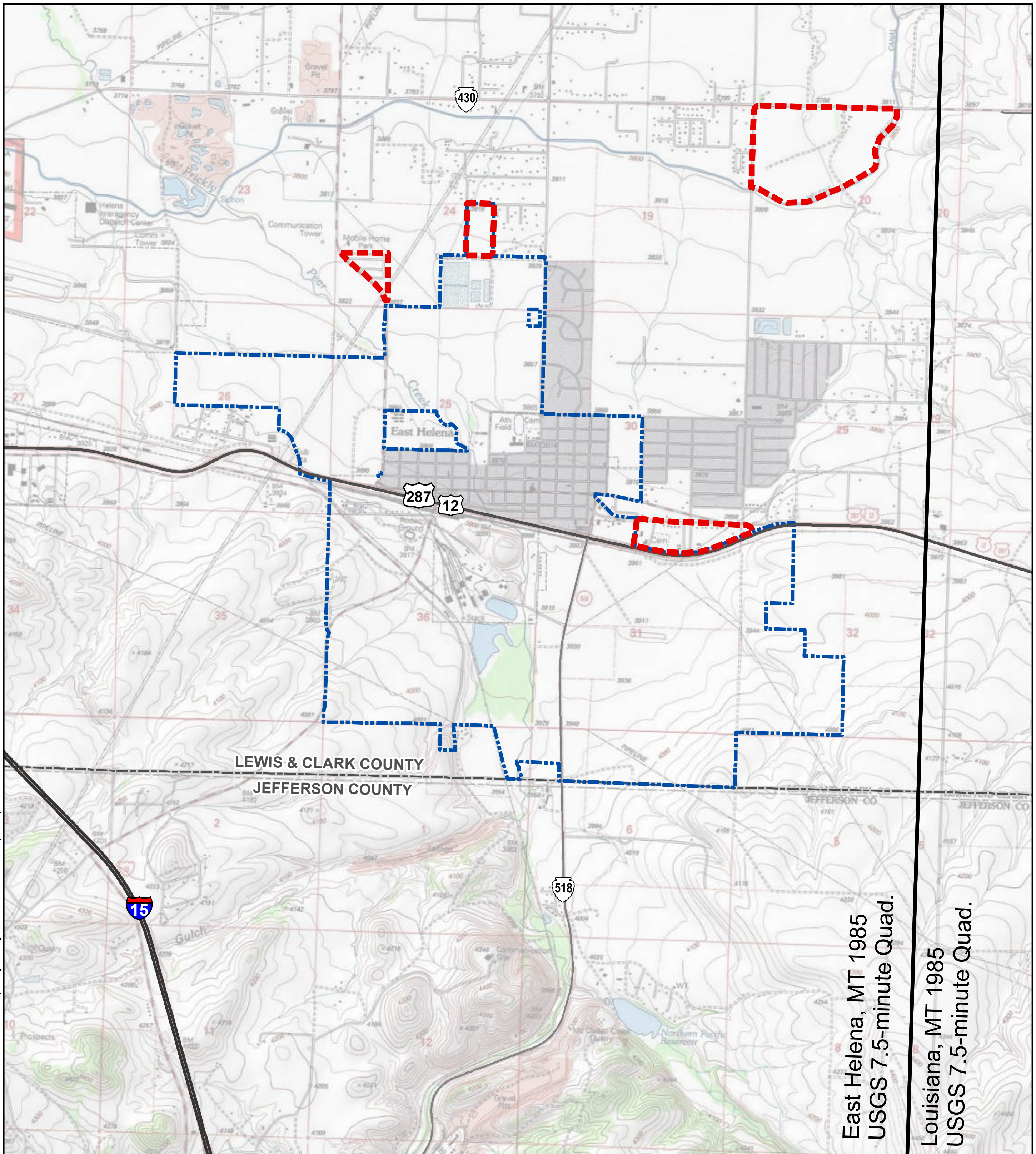

East Helena City Limits
Wastewater System Service Area

N

0 3,500 7,000
Feet

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East Helena Wastewater Master Plan - 2020

Figure 1.B.2. Topographic Map

Date: 5/5/2020 Path: F:\waste\18801 - East Helena Wastewater Capacity Study\GIS\MasterPlan\TopoMap.mxd into Lake Helena. The Helena Valley Canal runs east in the norther part of the planning area to the Regulating Reservoir. Both are part of the Upper Missouri Water Shed.

1.B.3.1. GROUNDWATER

The principal source of groundwater within the study area is an alluvial aquifer known as the Helena Valley aquifer. The aquifer is comprised of discontinuous and variable alluvium that is continuously saturated from the water table to a depth of at least 500 feet. Typical depths to groundwater of most of East Helena range from 17.5 feet to more than 150 feet below the ground surface. However, groundwater depth is considerably shallower on lands adjoining Prickly Pear Creek.

The City of East Helena utilizes two water sources for public water use. The first water source is a set of three wells located north of town along Wylie Drive and is commonly referred to as the “Wylie Source”. These wells have been drilled to depths ranging from 90 feet to more than 150 feet and each well typically produces more than 450 gallons per minute. These wells utilize the Helena Valley Aquifer. The second source is a pair of infiltration galleries that draw water from below McClellan Creek. This second source is the referred to as the “McClellan Source”.

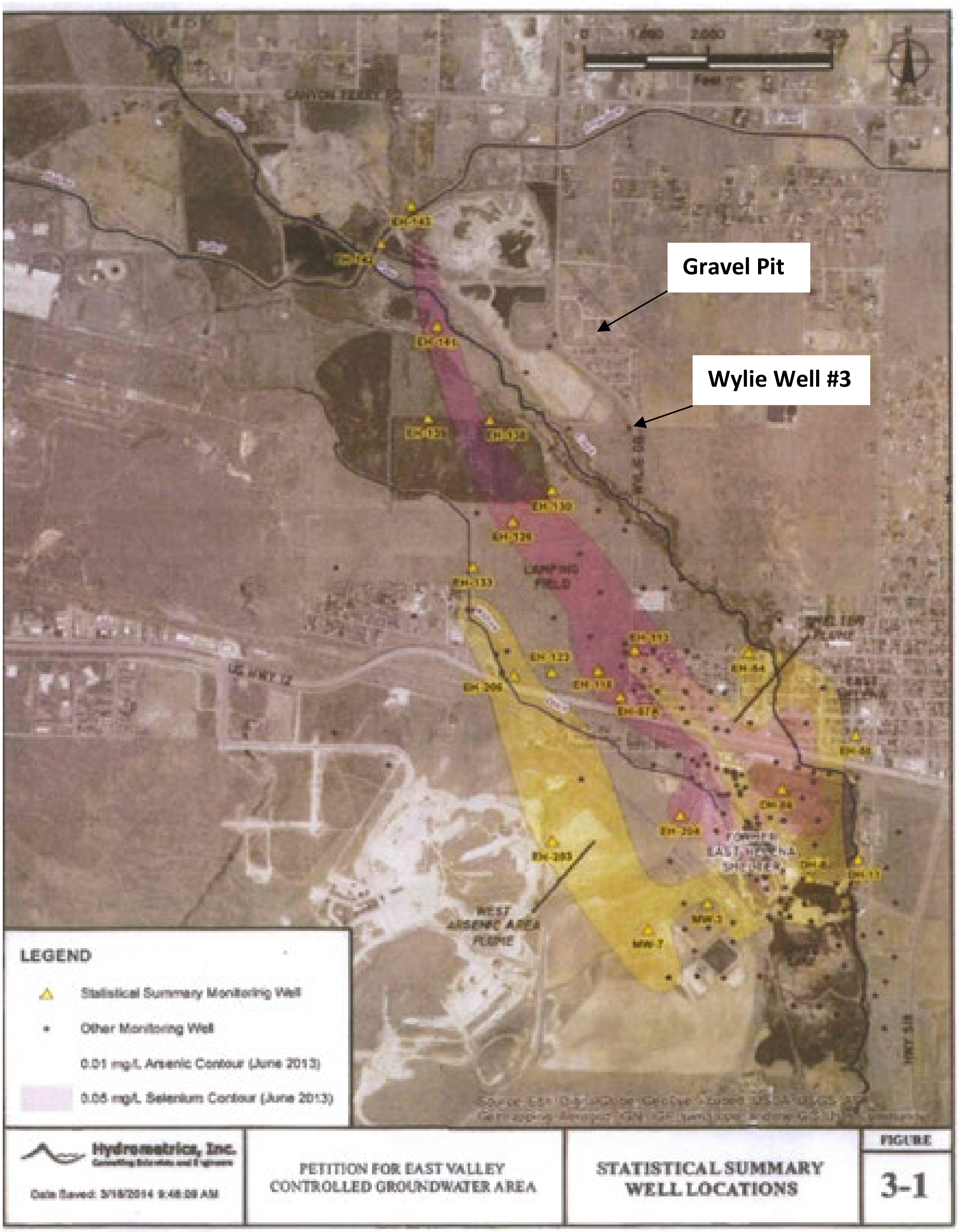
While alluvial aquifers are an excellent water source, they are susceptible to contaminations because coarse-grained deposits may allow for rapid infiltration of surface contaminants. Groundwater contamination from on-site wastewater disposal systems is an ongoing concern. There is a very high density of septic systems concentrated around the perimeter of East Helena.

An extensive well monitoring program has been implemented by ASARCO at the smelter site and at other East Helena area wells. Well testing has shown that a plume of groundwater contaminated by selenium and arsenic extends beyond the boundaries of the ASARCO smelter site as shown in **Figure 1.B.3** and is found in the shallow and intermediate aquifers underlying a portion of East Helena. This selenium and arsenic contamination is likely due to seepage from contaminated water stored on the ASARCO site into the groundwater and from the former acid plant sediment drying area. Testing has shown that concentrations of arsenic in the groundwater near the former smelter are up to 5,000 times the current EPA drinking water standard of 10 parts per billion.

1.B.3.2. SURFACE WATER

Decades ago, ASARCO moved the creek to the east of the plant footprint and diverted the creek into the “Upper Lake” which was used to cool the hot materials that had gone through the smelting process. From there, surface water from Prickly Pear Creek was either sprayed on the plant site or dumped into the “Lower Lake” which is held back by a 14-foot dam, eventually running back into Prickly Pear Creek.

Figure 1.B.3: Contamination Plumes (Hydrometrics Inc., 2014)



In 2013, Prickly Pear Creek, which originally ran through the middle of the ASARCO plant site and underneath a large slag pile, was moved away from the ASARCO as part of reclamation at the plant site in a meandering route that would slow down flow and provide for better fish habitat. The creek was also moved to decrease the amount of groundwater flowing though the ASARCO plant site. With the creek flowing though the plant site, this allowed arsenic and selenium to flow off the site and created underground plumes that are flowing into and around the City. The intent of moving the creek, was to slow down or stop the movement of these plumes.

The Montana Department of Environmental Quality (MDEQ) under the **Montana Water Quality Act** (*75-5-701 M.C.A.*) establishes water use classifications and related water quality standards for all drainages in the state. The water in Prickly Pear Creek from Lump Gulch to Wylie Drive is classified as “B-1” and from Wylie Drive to Lake Helena is classified as “I”. The “B-1” designation means that these waters are 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. The “I” designation means the goal of the State of Montana is to have these waters fully support the following uses: drinking, culinary, and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply. The water in the Helena Valley Irrigation Canal has insufficient data to assess the use-support of any applicable beneficial use.

MDEQ also has the responsibility under **Section 401** of the **Clean Water Act** (*33 U.S.C. 1251-1376*) and the **Montana Water Quality Act** (*75-5-101 M.C.A.*) to monitor and assess the quality of Montana surface waters and to identify impaired or threatened stream segments and lakes. The MDEQ sets limits, known as Total Maximum Daily Loads (TMDLs), for each pollutant entering a body of water. TMDLs are established for streams or lakes that fail to meet certain standards for water quality and describe the amount of each pollutant a water body can receive without violating water quality standards. The planning area lies within the Missouri River and Lake Helena TMDL Planning Area.

The MDEQ has identified water bodies (i.e. streams or lakes) that do not fully meet water quality standards and support the appropriate beneficial uses such as recreation, aquatic life, fisheries, water supply, agriculture and industrial use, or that are fully supporting their uses as stipulated in the standards but are threatened. Such streams or lakes are referred to as “water quality limited”. Section 303(d) of the Clean Water Act requires States to identify waters where quality is impaired or threatened. The MDEQ prepares and submits a list of these impaired or threatened water to the EPA every two years. Prickly Pear Creek is on MDEQ’s Section 303(d) list for 2018 of waters that do not meet State water quality standards for: drinking water and aquatic life from Lump Gulch to Wylie Drive; aquatic life, recreation, drinking water, and agriculture from Wylie Drive to the Helena WWTP; and aquatic life, recreation and drinking water from the Helena WWTP to Lake Helena. Water quality impairments applicable to these areas of Prickly Pear Creek are summarized in **Table 1.B.1**. The Helena Valley Canal is on the Section 303(d) list for 2018 but has not been assessed.

Table 1.B.1: Summary of Water Quality Data

<table>
<tr><th rowspan="2">Surface Water</th><th colspan="3">Montana 303(d) Listed - 2018</th></tr>
<tr><th>Total Miles</th><th>Probably Causes</th><th>Probable Sources</th></tr>
<tr><td>Prickly Pear Creek – Lump Gulch to Wylie Drive</td><td>10.84</td><td>Alteration in stream-side or littoral vegetative cover
Arsenic
Cadmium
Copper
Lead
Zinc
Physical substrate habitat alteration
Sedimentation-siltation
Temperature</td><td>Highways, roads, bridges, infrastructure, channelization
Impacts from abandoned mine lands, acid mine drainage, contaminated sediments, industrial point discharge, loss of riparian habitat, water diversions</td></tr>
<tr><td>Prickly Pear Creek – Wylie Drive to Helena WWTP</td><td>6.54</td><td rowspan="2">Alteration in stream-side or littoral vegetative covers
Ammonia, un-ionized
Arsenic
Cadmium
Copper
Lead
Zinc
Nitrate-Nitrite (Helena WWTP to Lake Helena only)
Flow regime modifications
Nitrogen
Phosphorus
Physical substrate habitat alterations
Sedimentations-siltation
Water temperature</td><td rowspan="2">Grazing in riparian or shoreline zones, impacts from abandoned mines, acid mine drainage, habitat modifications, water diversions, irrigated crop production, on-site treatment systems, acid mine drainage, contaminated sediments, municipal and industrial point source discharge</td></tr>
<tr><td>Prickly Pear Creek – Helena WWTP to Lake Helena</td><td>4.15</td></tr>
</table>

1.B.4. FLOODPLAINS

Portions of the planning area are located within the 100-year floodplains associated with Prickly Pear Creek and an unnamed drainage. Map numbers 30049C2327, 30049C2331, 30049C2332, 30049C2333 effective September 19, 2012 identifies the 100-year floodplain and other flood prone areas within and surrounding the City of East Helena. These floodplain maps are located in **Appendix A**.

Any new development in these floodplains must be coordinated with the City of East Helena and Lewis & Clark County's Floodplain Coordinator(s) and a Floodplain Development Permit would be required.

1.B.5. WETLANDS

The Clean Water Act and Executive Order 11990, *Protection of Wetlands*, establish the Federal Government's authority over activities that occur within wetlands. Federal agencies must ensure their actions minimize the destruction, loss, or degradation of wetlands. It also assures the protection, preservation, and enhancement of the Nation's wetlands to the fullest extent practicable.

According to the National Wetlands Inventory Wetlands Mapper (http://www.fws.gov/wetlands/Data/Mapper.html), various wetlands are located within the planning area as shown in **Figure 1.B.4**. These wetlands include Freshwater Pond and Riverine wetlands. Some of these wetlands in the planning area have been excavated by humans or are present for only brief periods.

It is not anticipated that any designated wetlands will be impacted as part of the proposed project.

1.B.6. BIOLOGICAL RESOURCES

Common mammals that may be found in and around the project area include: mule deer, white-tailed deer, eastern fox squirrel, mountain cottontail, white-tailed jack rabbit, muskrat, red fox and meadow vole. Commonly observed birds in the area include House Finch, Ring-Billed Gull, Red-winged Blackbird, Tree Swallows, Yellow Warbler, American Crow, American Robin, Canada Goose, Black-Capped Chickadee and the Black-Billed Magpie.

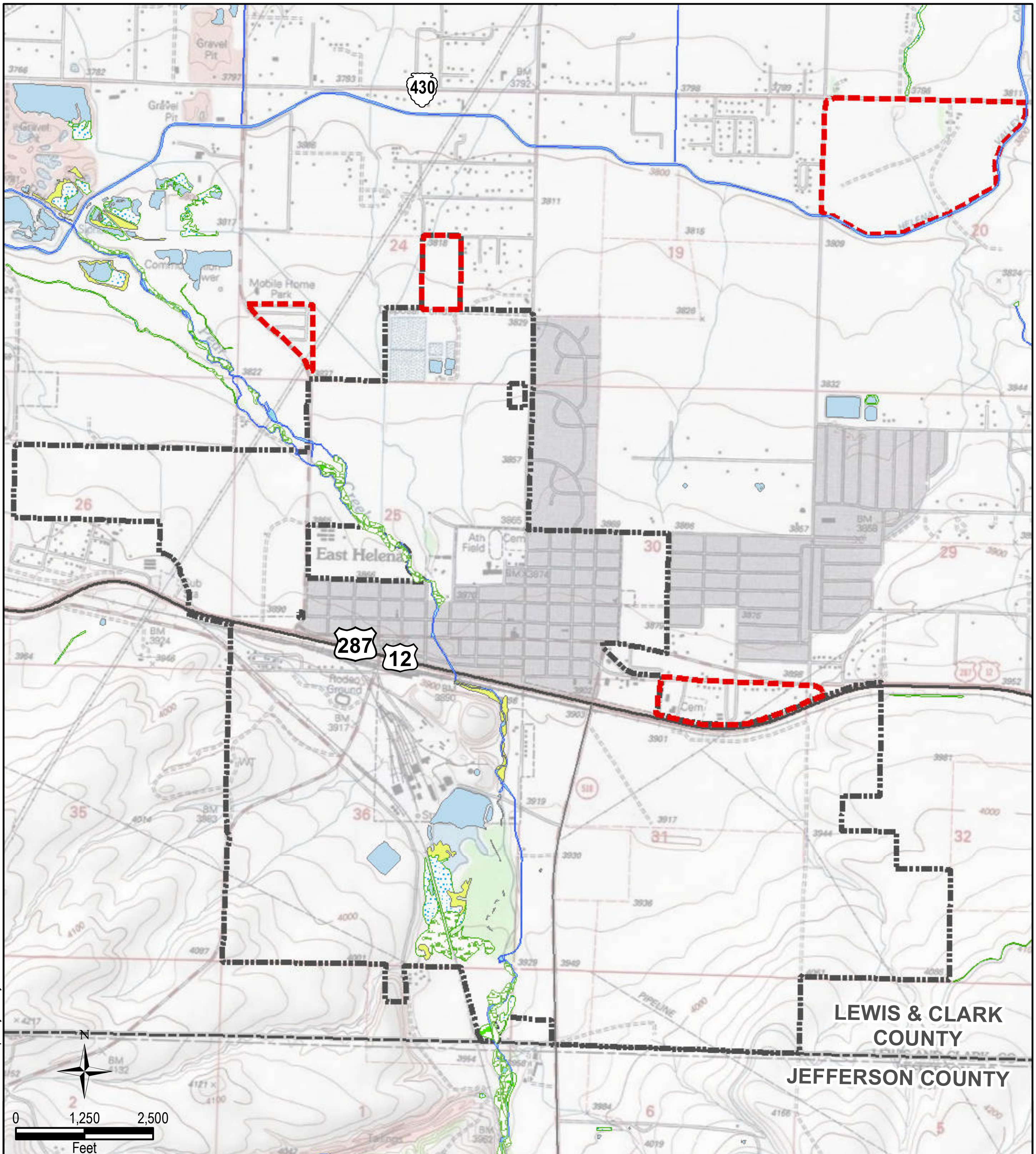
Amphibians and reptiles likely to occur in the planning area include gopher snake, garter snake, painted turtle, western toad, and boreal chorus, and Columbia spotted frogs.

Prickly Pear Creek provides a variety of fish species including brook trout, brown trout, common carp, kokanee, mountain whitefish, rainbow trout, walleye, white sucker and yellow perch.

1.B.7. ENDANGERED SPECIES AND CRITICAL HABITATS

The United States Fish and Wildlife Service lists the following species as endangered, threatened, proposed or candidate species for Lewis and Clark County (December 12, 2019):

- Grizzly Bear (*Ursus arctos horribilis*) – Threatened;
- Canada Lynx (*Lynx canadensis*) – Threatened, Designated Critical Habitat;
- Bull Trout (*Salvelinus confluentus*) – Threatened, Designated Critical Habitat;
- Red Knot (*Calidris canutus rufa*) – Threatened;



East Helena City Limits
Wastewater System Service Area

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

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Figure 1.B.4. Wetlands

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- Wolverine (*Gulo gulo luscus*) – Proposed; and
- Whitebark Pine (*Pinus albicaulis*) – Candidate.

The Montana Natural Heritage Program lists 24 animal species and 4 plant species of special concern, 1 animal species of special status and 1 plant species considered a potential species of concern that have been observed within the areas quarter-quarter lat. long. that includes the East Helena project.

1.B.8. HAZARDOUS FACILITIES

A large lead smelter was built on the banks of the Prickly Pear Creek and operated from 1888 to April 2001. ASARCO took ownership of the smelter in 1895 and continued to operate it until its closing. During its operation the smelter produced lead bullion, but also recovered copper, gold, silver, and platinum for refining at other ASARCO facilities. The lead smelting operation deposited lead, arsenic, copper, zinc, cadmium and some 15 other hazardous materials into the soil, surface water, and groundwater in the area.

The ASARCO site was proposed for addition to EPA's Superfund National Priorities List (NPL) in September 1983 and listing became final one year later. The East Helena Superfund site consists of the smelter, all of the City of East Helena, nearby residential subdivisions, numerous rural developments and the surrounding undeveloped and rural agricultural lands.

ASARCO conducted the required remedial actions for the process ponds from 1990 until it was completed in 1996. Under the direction of the EPA and MDEQ, ASARCO has excavated and replaced numerous residential yards the surface material from sections of adjacent alleys, road aprons, public parks, day-care centers, schools, gas stations, parking lots, an irrigation ditch, and a field planned for development. In addition to this clean-up, a long-term monitoring program has been put into effect.

In 1995, the Resource Conservation and Recovery Act (RCRA) Program became responsible for the disposal of process ponds cleanup residues, process ponds, ground and surface water, the slag pile, and former ore storage areas.

1.B.9. CULTURAL AND HISTORIC RESOURCES

The National Register of Historic Places lists 50 National Historic Register properties within Lewis and Clark County (http://www.nationalregisterofhistoricplaces.com/mt/lewis+and+clark/state.html). None of these properties are located within the planning area. No impacts to historic resources or properties are likely to occur from improvements to the wastewater system.

The State Historic Preservation Office (SHPO) was contacted on February 21, 2020 to conduct a cultural resource file search for Township-10-North, Range-2-West, Section 30 and Township-10-North, Range-3-West, Sections 24 and 25.

Several previously recorded sites are located within the search locales. In addition to these sites, few previously conducted cultural resource inventories have been done. A listing of these sites is located in **Appendix A**. According to SHPO, as long as there will be no disturbance or alteration to structures over fifty years of age and kept to previously disturbed areas, there is a low likelihood cultural properties will be impacted. Therefore, a cultural resource inventory is not necessary. However, should structures need to be altered or if cultural materials are inadvertently discovered, SHPO must be contacted and the site investigated further.

1.B.10. SOCIO-ECONOMIC ENVIRONMENTAL JUSTICE

Title VI of the U.S. Civil Rights Act of 1964, as amended, **Executive Order 12898** (*Federal Actions to Address Environmental Justice Minority and Low-Income Populations*) and **Order DOT 5610.2** (*Environmental Justice*) require that no minority, or, by extension, low-income person shall be disproportionately adversely impacted by any project receiving federal funds. The project would not adversely affect any social or ethnic groups and it would not isolate or divide existing residential areas. The project would not cause disproportionately high adverse human health or environmental effects on minority and low-income populations and would not have any significant impact on the location, distribution, density or growth rate of the population of East Helena or Lewis and Clark County.

1.C. POPULATION TRENDS

In 1888, the smelter was constructed on the banks of the Prickly Pear Creek, causing a migration of people to the City of East Helena. The smelter was purchased in 1895 by the American Smelting and Refining Company (ASARCO) and originally processed ore mined in places throughout the area. This smelter created an economic base for the East Helena and led to the early attraction of over 1,000 people.

The City of East Helena was officially incorporated in 1927. The first official census was taken in 1930 and placed the population at 1,030. With the exception of 1980 and 1990, the City has seen growth since its incorporation. This slight decrease was likely due to the movement of people from inside the City limits to new housing developments surrounding the city.

Table 1.C.1 summarizes the historical population data for Lewis and Clark County and the City of Helena.

Although the City of East Helena Growth Policy estimated that the City population would increase by 1.45% per year, there has been no significant population growth within the City limits over the past 10 years. Therefore, RPA estimates the City of East Helena population remains at 1,984 people in 2020.

Table 1.C.1: Population Trends for Lewis and Clark County and the City of East Helena

Census Year	Population Data	
	Lewis and Clark County [(1)]	City of East Helena [(1)]
1960	28,006	1,490
1970	33,281	1,651
1980	43,039	1,647
1990	47,495	1,538
2000	55,716	1,642
2010	63,395	1,984

(1) Source: U.S. Bureau of the Census. Decennial Census of Population (Title Varies per Census), 1890-2010. Compiled June 2013 by the Census & Economic Information Center, MT Department of Commerce (www.ceic.mt.gov).

Table 1.C.2: Population Projections for Lewis and Clark County and the City of East Helena

Census Year	Population Data			
	Lewis and Clark County Population [(1)]	Lewis and Clark County Population Percent Change	City of East Helena	East Helena Wastewater Service Area
2020	70,264	2.1%	**1,984**	**2,273** [(3)]
2028	73,921	1.0%	**3,003** [(2)]	**3,873**
2030	77,357	0.9%	**3,091**	**3,961**
2035	79,728	0.6%	**3,322**	**4,192**
2040	80,668	0.2%	**3,570**	**4,440**

(1) eREMI – A Product of Regional Economic Models, Inc. (www.remi.com) – Released July 2019. Compiled by the Census & Economic Information Center, MT Department of Commerce (www.ceic.mt.gov).
(2) Includes Vigilante Subdivision and Highland Meadows Subdivision
(3) Population total includes City of East Helena, Pele Park, and East Clark Street residents.

Table 1.C.2 above shows the population projections of Lewis and Clark County and the City of East Helena and the East Helena Wastewater Service Area. The City of East Helena population includes the Vigilante Subdivision and the Highland Meadows subdivision that are located within city limits. The wastewater service area includes the City of East Helena as well as existing and future wastewater contributors to the City's wastewater treatment facility. These wastewater contributors include the Pele Park Trailer Court, East Clark Street Water & Sewer District, Red Fox Meadows Subdivision, the East Helena High School, Vigilante Subdivision, Highland Meadows Subdivision, Missouri River Brewery, and American Chemet. These wastewater contributors are further discussed in **Chapter 2**, **Section 2.E**. Full build-out of the

anticipated wastewater contributors is expected by 2028. After 2028, it is expected that the City of East Helena will see an additional growth rate of 1.45% until 2040.

1.D. COMMUNITY ENGAGEMENT

The City of East Helena has been actively including the community in the development of this Master Plan and the recommended improvements. The following lists the ways the City has kept the community engaged in the project:

- City personnel updated the City website to keep the public informed of the project and provide the public with information on upcoming meetings.
- A public meeting was held on March 5, 2020 to discuss the development of the Master Plan and possible recommendations. This meeting was advertised twice in the Independent Record in order to inform the public. Copies of the presentation materials that were presented at the March 5th public meeting are located in **Appendix B**.
- The City had intended to hold a second public meeting on the project prior to the submittal of any funding applications. However, due to COVID-19 restrictions imposed by Governor Bullock, the City was unable to hold any further public meetings. While restrictions on public meeting are expected to be lifted, the second public meeting could not be held prior to the Preliminary Engineering Report being submitted to the funding agencies. However, once the second public meeting is held on the project, all new public involvement materials will be submitted to the funding agencies as requested.

CHAPTER 2: EXISTING FACILITIES

2.A. LOCATION MAP

The City of East Helena is located on the southern border of Lewis and Clark County, approximately 5 miles east of Helena, Montana. **Figure 1.A.1** in **Chapter 1** shows the location of East Helena and the City limits. The wastewater treatment plant is located north of town on City owned property.

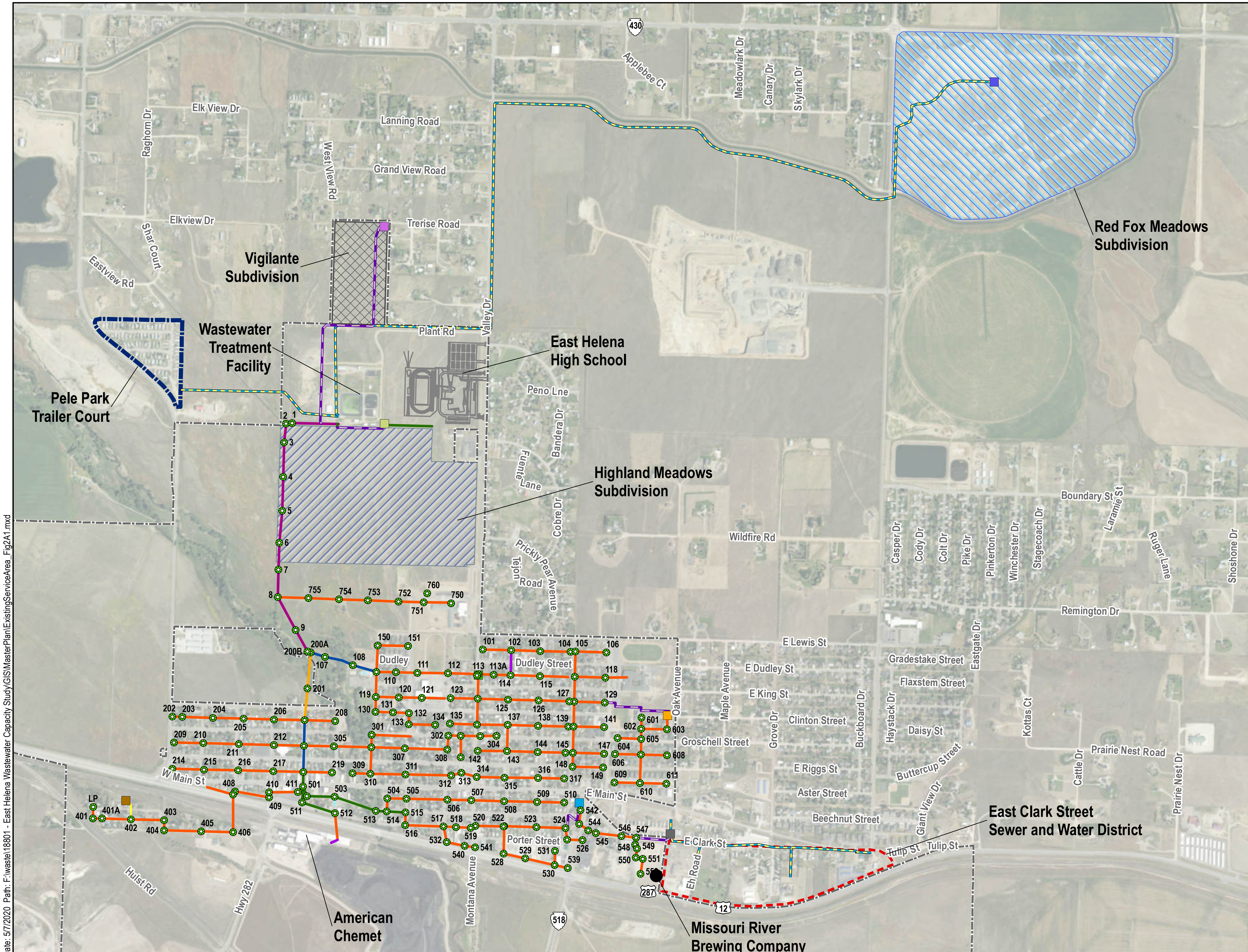
The existing users of the City of East Helena's Wastewater Treatment Plant (WWTP) include the City of East Helena's residents and businesses. In additions to the wastewater generated by the City residents and businesses, the wastewater treatment plant also receives wastewater from areas outside the City limits. These areas include Pele Park Trailer Court, East Clark Street Water & Sewer District, and recently the Red Fox Meadows Subdivision. Currently there is significant growth planned in the previously undeveloped northern part of the City. This growth includes the East Helena High School (scheduled to open in August of 2020), the Vigilante Subdivision (currently under construction), and the Highland Meadows Subdivision (currently under construction). Additionally, a local brewery (Missouri River Brewing Company) is under construction adjacent to Highway 12. The locations of these entities are shown on **Figure 2.A.1**.

2.B. HISTORY

The City of East Helena owns and operates the wastewater system that serves the City which includes the gravity collection mains, force mains, lift stations, and the wastewater treatment plant (WWTP). The City's wastewater system was first developed in the mid-1930's and has been expanded several times to accommodate the City's growth. The most significant expansions were completed in 1950's, 1980's, early 2000's and again in 2014.

In 2003, the City of East Helena upgraded their wastewater treatment plant from an aerated lagoon system to its current extended aeration activated sludge treatment process. The wastewater treatment system in general utilizes an extended aeration activated sludge process. Wastewater is treated in an earthen-lined aeration basin which is followed by an upflow clarifier. Treated effluent discharges to Prickly Pear Creek. The system was designed to remove Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS), and Ammonia ($NH3$).

In 2014, a new metals removal process was added to the wastewater treatment plant in order for the City to meet very low Montana Pollutant Discharge Elimination System (MPDES) permit limits for metals. This metals removal process consists of four (4) upflow sand filters for the purpose of removing copper, lead, and zinc. **Figure 2.B.1** shows only the City of East Helena's collection system and wastewater system as it currently exists. This figure excludes the growth areas under construction and the areas outside of the City that contribute or will contribute in the near future.



East Clark Street Lift Station
East Helena High School Lift Station
Highland Meadows Lift Station
K & R Lift Station
Lane Avenue Lift Station
Montana Avenue Lift Station
Moontown Lift Station
Red Fox Meadows Lift Station
Vigilante Lift Station
Sanitary Sewer Manhole

Sewer Pipe Diameter
- 2 in
- 4 in
- 8 in
- 10 in
- 12 in
- 15 in
- 18 in
- 21 in
- Force Main
- External Forcemains

City of East Helena
East Clark Street Sewer and Water District
Highland Meadows Subdivision
Red Fox Meadows Subdivision
Vigilante Subdivision
Pele Park Trailer Court

N

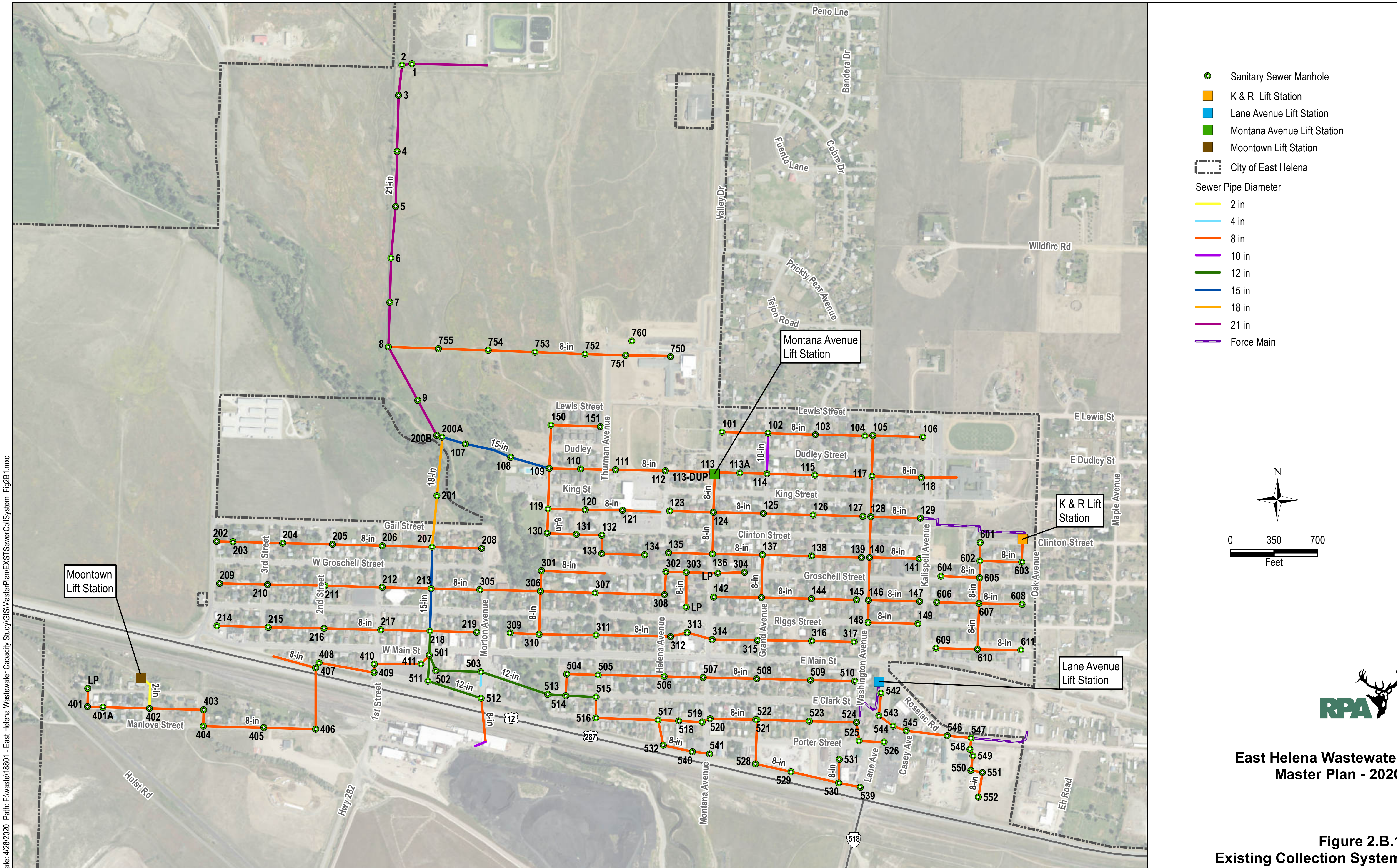
0 600 1,200
Feet

RPA

East Helena Wastewater Master Plan - 2020

Figure 2.A.1
Wastewater Service Area

Date: 5/7/2020 Path: F:\waste\18801 - East Helena Wastewater Capacity Study\GIS\MasterPlan\ExistingServiceArea_Fig2A1.mxd



East Helena Wastewater Master Plan - 2020

Figure 2.B.1
Existing Collection System

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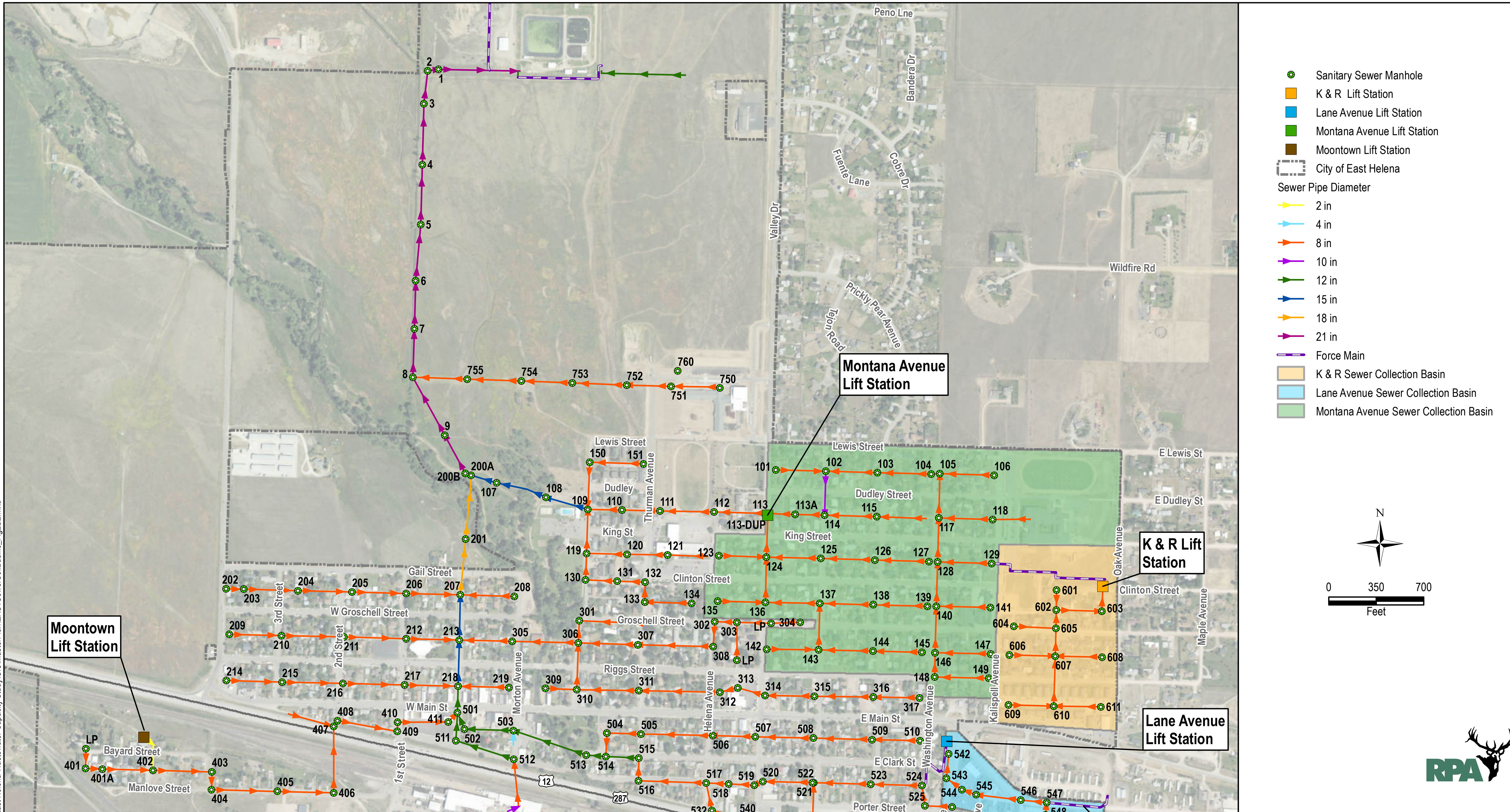
The wastewater collection system currently operated by the City of East Helena consists of gravity mains, force main, manholes, and four lift stations. The gravity mains range in size from 6-inch to 21-inch and are a mix of clay and PVC. Currently, all the wastewater generated by the City flows by gravity to a fifth lift station located at the wastewater treatment plant (the WWTP Primary Lift Station). The force main from the Pele Park Trailer Park and the force main from the Red Fox Meadows Subdivision connect to the system downstream from the Primary Lift Station, but upstream from the Headworks at the WWTP. Two additional lift stations (one from Highland Meadows and one from the Vigilante Subdivision) are in various stages of construction and will connect to the 21-inch sewer main upstream of the Primary Lift Station.

Figure 2.B.2 shows the lift stations that are in operation at the time of this writing along with the area served by each pumping station. Remaining areas flow to the WWTP by gravity. The 4 pumping station basins include: K & R Lift Station, Montana Avenue Lift Station, Lane Avenue Lift Station, and Moontown Lift Station. The Moontown Lift Station located on North 5th Street serves only 3 homes. Ultimately, all the wastewater in each collection area flows by gravity to the Primary Lift Station at the wastewater treatment plant.

Prior to 2012, the City of East Helena had storm water inlets along Main Street that had been connected to the sanitary sewer system by MDT sometime in the past. Main Street in East Helena previously functioned as part of Highway 12 and is still owned and maintained by MDT. During high intensity rainfall events and snow melting, the sanitary sewer mains received flows beyond their capacity which backed up and occasionally flooded nearby basements. A storm drain was added on Main Street to alleviate this problem. Inlets on Main Street now are connected to this new storm drain. This project was constructed in two halves in 2009 and 2012.

Flows to the wastewater treatment plant during wet periods have been increasing over the past 10 years. These increased flows are problematic for both the collection system and treatment plant. These are particularly apparent and problematic during spring run-off and when Prickly Pear Creek is high (Prickly Pear Creek runs north-south through the center of East Helena). There have been several instances where the grit chamber at the wastewater treatment plant would become overwhelmed and wastewater would flow out of the chamber and onto the ground. These high flow events have historically been seasonal or could be correlated to an event such as a rainstorm or snow melting. For unknown reasons, these high flows persisted at the WWTP in 2018 from the normal spring run-off period and did not taper off until well into September.

The City of East Helena received a new discharge permit effective December 1, 2019. In 2014, MDEQ adopted general nutrient standard variances due to the fact that "*the treatment of wastewater to base numeric nutrient standards in 2011 would have resulted in substantial and widespread economic impacts on a statewide basis (75-5-313(5)(b) M.C.A.)*" This decision allows a permittee to apply for a general nutrient standard variance ("general variance"). As part of this permit update, the City has received a variance for meeting Montana's nitrogen and phosphorus limits for smaller mechanical treatment facilities. These nutrient limits will need to be met in the future as the variance process caps the term to 10 years. These future limits as they would require a Total Nitrogen (TN) limit of 10 mg/l and Total Phosphorus Limit of 1 mg/l.



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East Helena Wastewater Master Plan - 2020

Figure 2.B.2
Lift Station Collector Areas

2.C. CONDITION OF EXISTING FACILITIES

2.C.1. WASTEWATER COLLECTION SYSTEM OVERVIEW

The current sanitary sewer collection system in East Helena consists of gravity mains, force mains, manholes, and four lift stations. The gravity mains range in size from 6-inch to 21-inch and are a mix of clay and PVC. The four lift stations include the Montana Avenue Lift Station, K&R Lift Station, Moontown Lift Station, and the Lane Avenue Lift Station. All of the gravity mains outfall to the Primary Lift Station located at the wastewater treatment plant. The Primary Lift Station utilizes two screw pumps to lift sewage to the wastewater treatment Plant.

While some of the City's collection system has been upgraded to PVC over the years, a majority of the City's collection system consists of clay pipe. Clay pipe has a propensity to lose its structural integrity over time and is often damaged by root intrusion. The clay pipe in the City's collection system either was installed without gasketed joints or the gaskets have deteriorated. These factors have led the clay piping to allow water to enter these mains as inflow and infiltration. Minor collapses caused by root intrusions have created some obstructions in the gravity sewer collection system which require constant maintenance and contribute to sewer back-ups.

Root Intrusion In City's Sewer Main

The collection system manholes are primarily constructed of concrete and generally in adequate condition with some exceptions.

Flows to the wastewater treatment plant during wet periods have been increasing over the past 10 years. These increased flows are problematic for both the collection system and treatment plant. These are particularly apparent and problematic during spring run-off and when Prickly Pear Creek is high (Prickly Pear Creek runs north-south through the center of East Helena). There have been several instances where the grit chamber at the wastewater treatment plant would become overwhelmed and wastewater would flow out of the chamber and onto the ground. These high flow events have historically been seasonal or could be correlated to an event such as a rainstorm or snow melting. For unknown reasons, these high flows persisted at the WWTP in 2018 from the normal spring run-off period and did not taper off until well into September. Additionally, this additional "clean water" decreases the hydraulic capacity of the plant. With the growth planned in East Helena, salvaging the hydraulic capacity of the treatment plant available to serve planned growth is a high priority for the City. It is typically cheaper to undertake projects to improve the collection system for the purposes of excluding clean water than it is to construct additional capacity at the treatment plant to accommodate this water. For these reasons, an infiltration study completed as part of this Preliminary Engineering Report.

There is concern regarding the existing 8-inch sewer main that services the area in the southwest portion of the City commonly referred to as “Moontown”. This is the area south of Highway 12 and west of American Chemet and Highway 282. The sewer main that crosses Montana Highway 12 is the segment of concern. This 8-inch collection main appears to be steel and has corroded over time. City Operators are not able to inspect and adequately clean the main (they are unable to get a camera or jetting equipment into this main). This sewer main serves approximately 24 structures (primarily homes). Flows through the pipe appear adequate and back-ups are not documented. However, if there is any additional growth in this area or as the condition of this main deteriorates, some improvements will be needed. It is not likely that this main could accommodate any appreciable increase in flow.

2.C.2. COLLECTION SYSTEM ANALYSIS

2.C.2.1. INFLOW & INFILTRATION

Inflow is water that enters the collection system from above-ground sources, typically stormwater. For example, stormwater may flow into the wastewater collection system through leaky manhole covers or private residences may have drains or sump pumps inappropriately connected to the wastewater collection system.

Infiltration is excess water that enters the collection system by damaged and unsealed pipes and joints. High groundwater or soil saturated by snow melt or storm events can infiltrate mainline pipe, service connections, joints, and manholes that are old and deteriorated.

While some inflow and infiltration (I & I) is expected in wastewater system, excessive I & I can significantly increase the operations and maintenance of a wastewater treatment plant and decrease the hydraulic capacity. All water entering the wastewater treatment plant must be treated as wastewater. Treating unnecessary amounts of I & I increases the cost of operating the wastewater treatment plant and decreases the hydraulic capacity of the WWTP. Clean water also inhibits biological treatment, particularly when the volume of this clean water is not constant. High amounts of I & I can overload sewer mains and contribute to sewer back-ups. High flow events can consolidate or free debris causing it to accumulate at obstructions and cause back-ups and wastewater to enter basements and other structures. The time available for operators to diagnose and address sewer back-ups is decreased or diminished during high flow events. Overflows that back-up into nearby residences can be a significant health and safety issue. Collection systems can be damaged when forced to handle more flow than they were designed for. In extreme cases, excessive I & I can lead to structural failure and collapse of the sewer pipe due to soil erosion underneath the pipe, possibly causing paved roads and alleyways to buckle and sag.

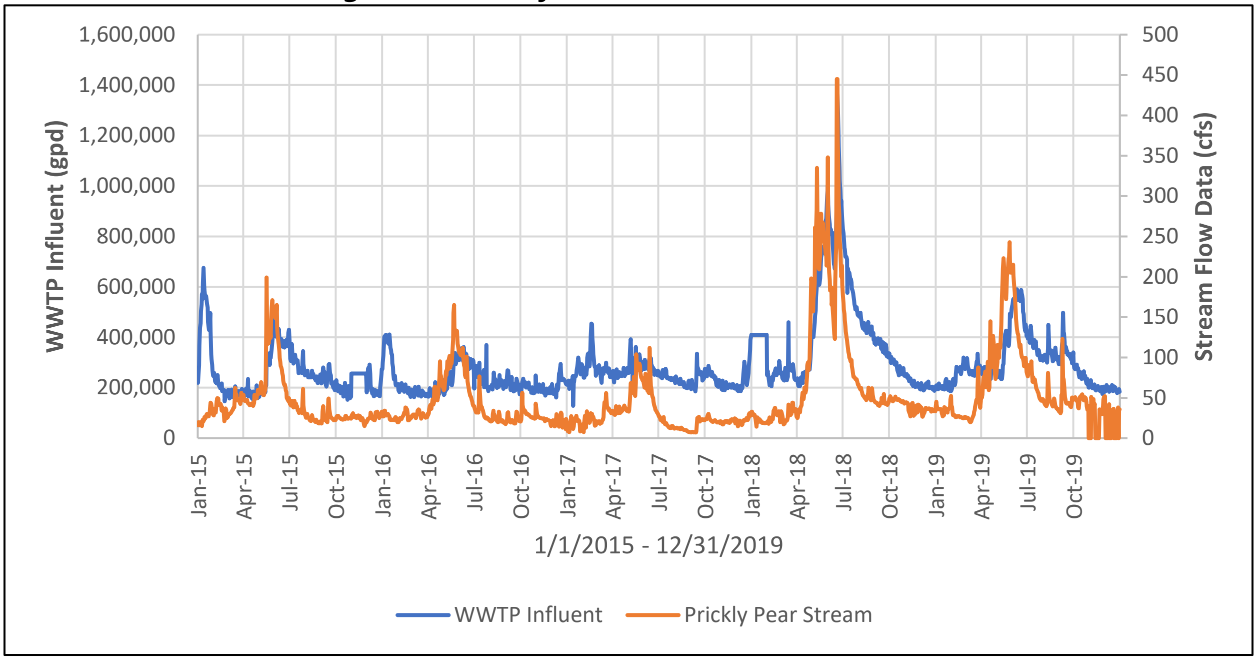
The total volume of wastewater influent received at the WWTP varies annually. As discussed in **Section 2.C.1**, seasonal wastewater flows have been steadily increasing at the wastewater treatment plant over the past 10 years. No significant growth has occurred in the City during this period. Most recently, the annual volume of wastewater received has increased. Wastewater influent is measured at the WWTP and wastewater flows per month from 2015 to 2019 are show below in **Table 2.C.1**.

Table 2.C.1: Monthly Wastewater Influent Flows (Gallons) for 2015 – 2019

Month	Year				
	2015	**2016**	**2017**	**2018**	**2019**
January	14,076,416	9,767,770	7,371,877	12,717,904	6,311,817
February	5,758,241	5,556,950	8,685,140	6,799,059	7,236,058
March	5,538,527	5,500,817	8,152,004	8,159,642	8,535,834
April	5,257,364	5,609,970	7,634,558	7,730,100	8,091,841
May	8,166,085	7,770,235	9,283,667	20,162,939	10,496,248
June	11,874,104	9,622,406	8,367,035	27,293,685	15,794,727
July	9,144,151	7,345,677	7,620,547	18,984,612	11,422,784
August	7,569,392	6,475,066	6,764,395	13,730,363	10,279,177
September	6,998,897	6,371,499	7,047,579	10,958,274	10,231,269
October	5,770,570	6,311,263	7,528,035	8,781,673	7,798,064
November	7,704,793	5,645,902	6,111,200	6,461,832	5,958,356
December	6,400,631	6,690,546	7,453,784	6,259,658	6,002,802
Total	94,536,236	83,083,553	92,019,821	149,033,814	108,158,977

As shown in **Table 2.C.1** above, in 2018 there was a large increase in the amount of wastewater received at the facility. This increase is attributed to a large amount of I & I entering the collection system from either groundwater or surface water. The City of East Helena collection system includes numerous sewer mains that cross or are located adjacent to Prickly Pear Creek. High influent flows may likely be caused by increased flow levels in Prickly Pear Creek. To analyze this correlation, the discharge levels of Prickly Pear Creek measured from U.S. Geological Survey (USGS) gauging station 06061500, located near Clancy, MT. Gauging station 06061500 were compared to the measured influent flows. This gauging station was used because it is the closest and most accurate gauging station for measuring the flow in Prickly Pear Creek passing through East Helena. **Figure 2.C.1** shows the correlation between the flow of Prickly Pear Creek and the WWTP influent.

Figure 2.C.1: Influent Flow vs. Stream Flow

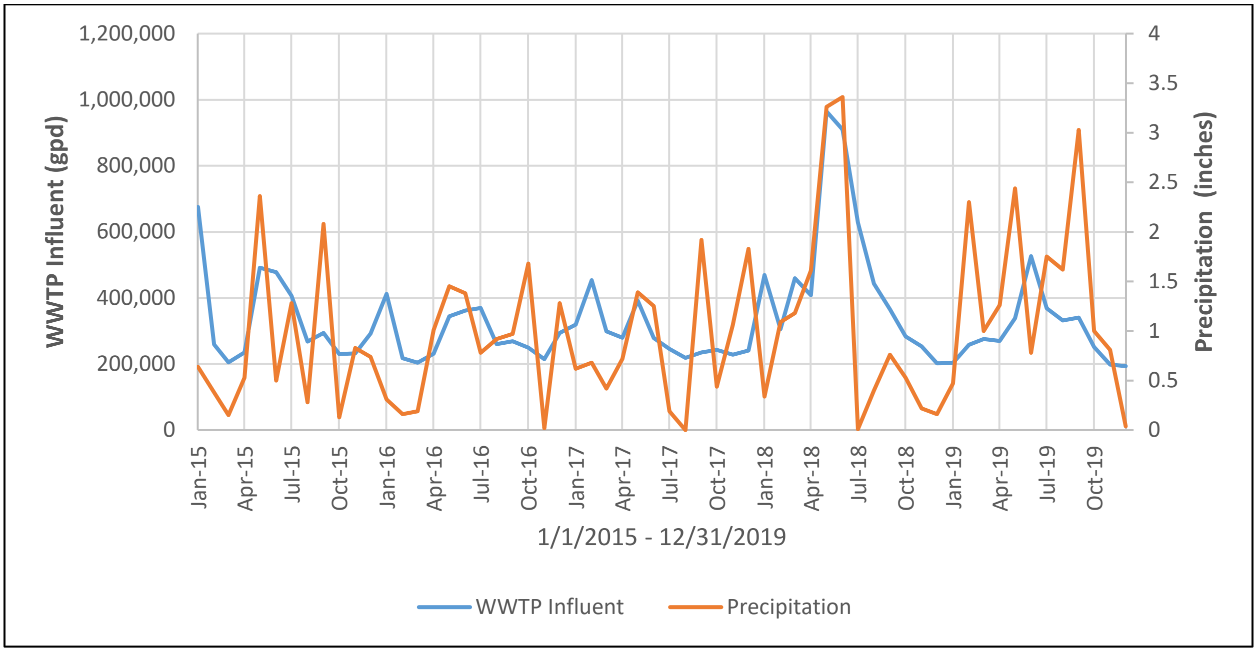


As shown in **Figure 2.C.1** above, the discharge of Prickly Pear Creek closely correlates to the fluctuation of influent at the WWTP, especially in 2018.

Precipitation can also lead to an increase in influent at the WWTP as I & I. Precipitation records for the area from the Western Regional Climate Center were also compared to the WWTP influent records. **Figure 2.C.2** also shows a correlation between the high precipitation records and the influent at the WWTP, specifically in 2018.

The total volume of wastewater influent received by the WWTP varies annually, however, in 2018 there was a large increase in the amount of wastewater received at the facility. This large increase correlates to the increase in discharge of Prickly Pear Creek versus previous years as shown in **Figure 2.C.1** above and the increase in precipitation for 2018 versus previous years as shown in **Figure 2.C.2** above.

Figure 2.C.2: Influent Flow vs. Precipitation



2.C.2.2. ESTIMATION OF INFLOW AND INFILTRATION

Infiltration and Inflow (I&I) can be estimated in several ways. One way to estimate I & I is by comparing billed water data with metered influent flows at the treatment plant during non-irrigation months. **Table 2.C.2** compares the metered billed water monthly from 2015-2018 to the influent flows at the treatment plant for non-irrigation months. Water billed in 2016 was deemed inaccurate by City staff and therefore not used in further in this evaluation.

Table 2.C.2: Estimated I & I for 2015 – 2019 Based on Billed Water Usage

Year	Water Billed* (gal/year)	Influent at WWTF* (gal/year)	I&I (gal/year)	I&I % of Influent
2015	50,773,000	65,671,524	14,898,524	23%
2017	51,936,000	69,267,844	17,331,844	25%
2018	68,508,286	88,031,081	19,522,795	22%
2019	51,321,917	58,701,131	7,379,214	13%
Total	**222,539,203**	**281,671,580**	**59,132,377**	**21%**

Note: water billed for 2016 was deemed inaccurate by City Staff and not included

** Data used for non-irrigating months. Does not include June-August.*

According to **Table 2.C.2**, it can be approximated that 21% of the influent received at the WWTP can be attributed to inflow and infiltration. **Figure 2.C.3** below shows a graphical interpretation of the influent flows at the treatment plant compared to the billed water for non-irrigation month in 2015, 2017, 2018, and 2019. Again, 2016 data was not used as stated above.

In **Figure 2.C.3** above, the data shows a large increase in billed water usage and WWTP influent. In consultation with the City, there is no known explanation for the increase in water usage for these months.

I & I can also be estimated using typical per capita wastewater generation. Based on the City's population, an approximation of wastewater generation was calculated for the City using typical and compared to the actual volume measured at the treatment plant. This method is not accurate as per capita usage can vary for Montana communities, but it can offer some indication of I & I. The Montana Department of Environmental Quality (MDEQ) uses a standard usage of 100 gpcpd. Using a standard usage of 100 gpcpd and comparing it to the calculated per capita usage at the City of East Helena's WWTP, **Table 2.C.3** shows between 13% and 44% of the influent coming into the WWTP is infiltration with an average of 24% over the 5-year period.

Figure 2.C.3: Influent Flow vs. Billed Water Usage

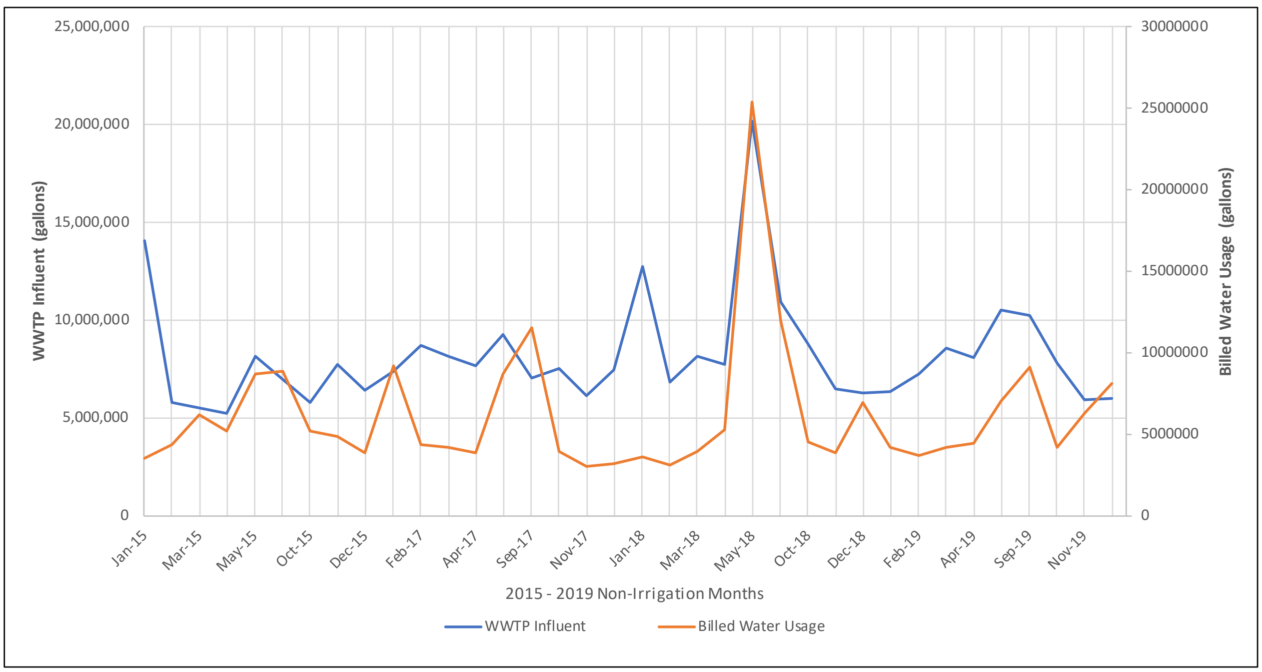


Table 2.C.3: Estimated I & I for 2015 – 2019 Using Per Capita Data

Year	Population	Average Daily Flow (gal)	Per Capita Usage at WWTF	I&I (gpcpd)	I&I (gpd)	I & I (gallons/yr)	I&I % of Influent
2015	2,205	259,003	117	17	38,503	14,053,736	15%
2016	2,205	204,118	93	0	0	0	0%
2017	2,205	252,700	115	15	32,200	11,752,845	13%
2018	2,273	408,312	180	80	181,012	66,069,314	44%
2019	2,273	296,326	130	30	69,026	25,194,477	23%
				Total	**320,741**	**117,070,372**	**24%**

Both **Table 2.C.2** and **Table 2.C.3** show there is significant infiltration entering the wastewater system, especially in 2018. This relates to **Figures 2.C.1** and **Figure 2.C.2** above that show the correlation with the stream flow and precipitation data to the measured wastewater influent received at the treatment plant. Influent data for each month shows an increase in flow between May and August. This could correlate to seasonal precipitation and to spring-runoff that occurs that year as shown in **Figure 2.C.1** and **Figure 2.C.2**. While precipitation and spring-runoff events seems to correlate to the I & I entering the WWTP, there may be other contributing factors. For instance, in 2017 Prickly Pear Creek was re-aligned by METG across the ASARCO property and have impacts on groundwater in the area.

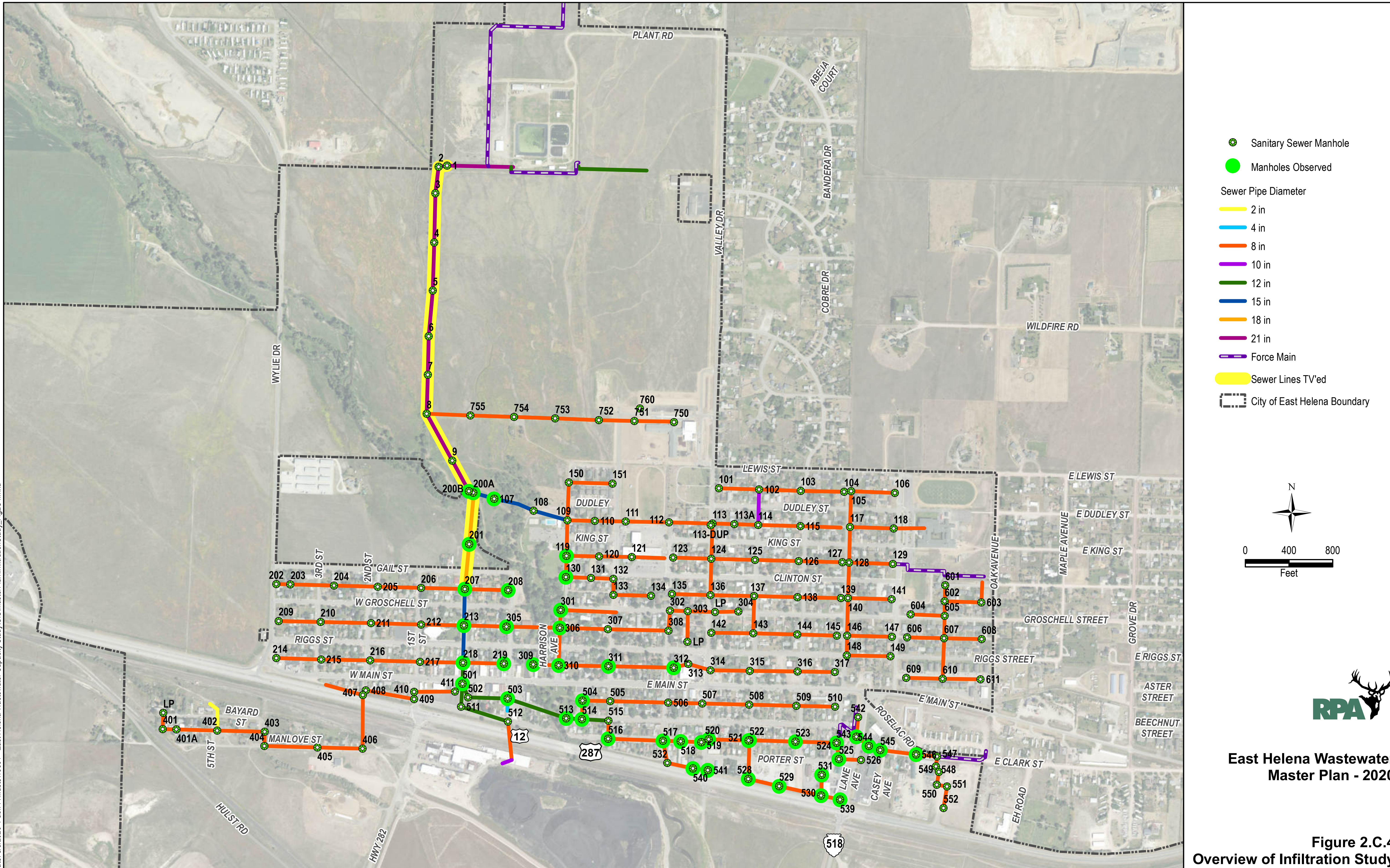
Analyzing **Table 2.C.2** and **Table 2.C.3** above, it is reasonable to assume that approximately **23%** of the influent coming into the wastewater treatment plant is inflow and infiltration which is significant. Influent flow records for the WWTP for the years 2015 through 2019 show an average daily flow of 288,635 gallons per day coming into the plant. If it is assumed that 23% of this influent is I & I, there is approximately 66,386 gallons per day of I & I entering the WWTP or 24,230,890 gallons per year.

2.C.2.3. INFLOW AND INFILTRATION STUDY AND RESULTS

Realizing the significant amount of I & I entering the City of East Helena's WWTP, an inflow and infiltration (I & I) study was conducted as part of this Master Plan to help the City determine what sewer mains and/or manholes may be allowing clean water to enter the City's wastewater system. Once these areas were identified, a cost effective and corrective action plan was developed.

With the increase in influent entering the WWTP during an increase of discharge in Prickly Pear Creek as discussed in **Section 2.C.2.1**, and based on reports by City Personnel, RPA started the study with a focus on sewer mains located closest to Prickly Pear Creek. In the spring of 2019, during peak discharge of Prickly Pear Creek, RPA staff observed flows in manholes within the collection system. Flows were visually noted and crude depth measurements were taken that did not require entering the confined space. Manholes were observed during normal daytime hours (during normal usage periods) and then again between 2:30 am and 5:00 am. During the early morning hours flow in the wastewater collection system should be minimal. Where flows visually appeared to be similar or equal during both inspections, it was assumed that some I&I was present at this location. Manholes in "downstream" locations were observed first to identify areas with higher than expected flows. Where it appeared flows were higher than expected (based on the contributing area), these flows were followed "upstream" in an attempt to determine specific locations and the extent of infiltration. The manholes observed as part of this study are shown in **Figure 2.C.4**.

RPA took photos and recorded videos in a number of the manholes studied. These videos are located on a DVD in **Appendix C**. Some photos of these manholes are shown below.



East Helena Wastewater Master Plan - 2020

Figure 2.C.4
Overview of Infiltration Study

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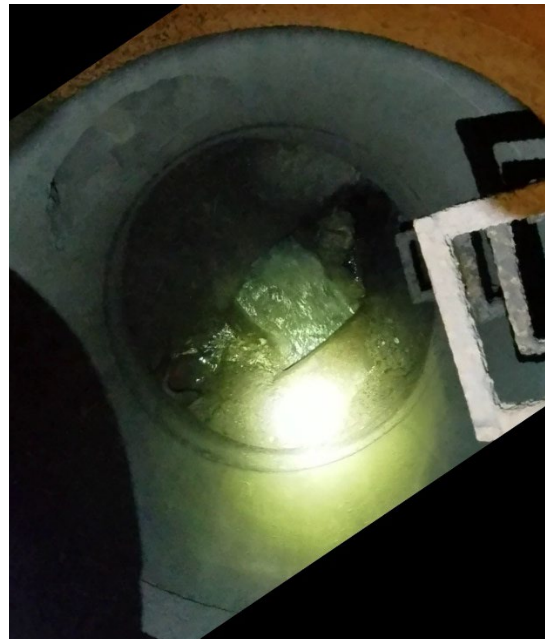
Manhole 200A

Manhole 200A-nighttime

Manhole 201-daytime

Manhole 201-nighttime

Manhole 207-daytime



Manhole 207-nighttime

As part of this study, Planned and Engineered Construction (PEC) cleaned and TV'd a portion of the City's collection system from Manhole 1 to Manhole 207 in June of 2019. The portion of the collection system that were cleaned and TV'd are shown on **Figure 2.C.4** as well.

Comparing the videos of the manholes along with the videos supplied by PEC, it was determined that the following sewer mains contribute a significant amount of I & I. Repair or replacement should be considered to the following collection mains to prevent infiltration into the collection system and reduce the annual flow of clean water received at the City's WWTP:

- Manhole 517 to Manhole 503;
- Manhole 306 to Manhole 213;
- Manhole 307 to Manhole 306;
- Manhole 301 to Manhole 306;
- Manhole 310 to Manhole 306;
- Manhole 130 to Manhole 119;
- Manhole 525 to Manhole 517; and
- Manhole 207 to Manhole 9.

It was observed that a majority of the manholes were in good condition and signs of water entering was not readily apparent. Therefore, it is assumed that the majority of the I & I entering the collection system is coming from the piping between the manholes. However, a few manholes showed leakage themselves and should be replaced. These manholes include:

- Manhole 208; and
- Manhole 541.

Figure 2.C.5 shows these existing collection mains and manholes that should be repaired as a result of the Infiltration Study performed.

City personnel were then asked to TV the listed collection mains. Videos of these collection mains were reviewed to determine if these mains were in fact damage and contributing to the I & I.

2.C.1. EXISTING LIFT STATIONS

The City of East Helena currently has three (4) existing lift stations within the wastewater collection system. The service area for each of these lift stations is shown in **Figure 2.B.2**. There is also a small lift station located in the Moontown area southwest of the City that serves only 3 houses for that area and will not be discussed further.

2.C.1.4. MONTANA AVENUE LIFT STATION

The Montana Avenue Lift Station is the largest of the 3 City lift stations. This lift station was replaced in its entirety in 2003 in part to provide additional capacity for the planned K & R subdivision which was constructed in 2004 and 2005 and partially due to the age and condition of the pre-existing lift station.

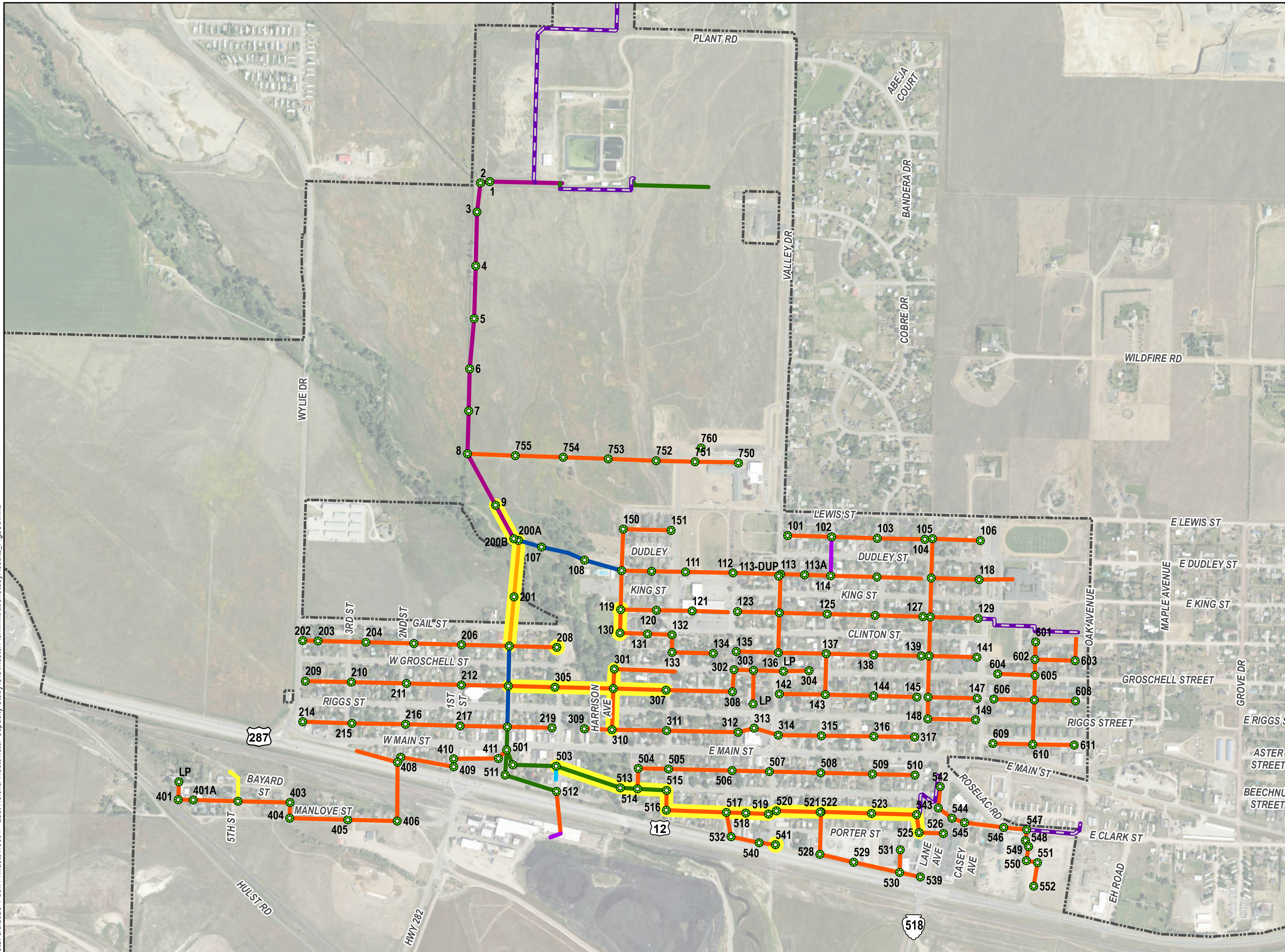
Figure 2.C.6 shows a schematic flow of the existing Montana Avenue lift station. This lift station consists of 2 submersible 5 horsepower pumps. Each of the two pumps at the Montana Avenue Lift Station have a capacity of slightly more than 500 gallons per minute. The Montana Avenue lift station does not have a flow meter to measure average daily flow. According to pump run times for the Montana Avenue lift station provided by the City Operator, pump #1 runs an average of 200 seconds 10 times per day and alternates with pump #2 that runs 350 seconds 10 times a day. Using this information, the average daily flow of the Montana Avenue lift station is calculated as follows:

Pump #1: 200 seconds x 10 = 2000 seconds per day / 60 seconds per minute = 33 minutes
500 gpm x 33 minutes = 16,500 gpd

Pump #2: 350 seconds x 10 = 3,500 seconds per day / 60 seconds per minute = 58 minutes
500 gpm x 58 minutes = 29,000 gpd

Therefore, the average daily flow for the Montana Avenue lift station is approximately 45,500 gpd.

As shown in **Figure 2.B.2**, the Montana Avenue lift station is currently located in the middle of Montana Avenue/Valley Drive. With the addition of the East Helena High School and the anticipated growth north of the City, traffic on Montana Avenue/Valley Drive has and will continue to increase dramatically over the next several years. As discussed in more detail in **Section 2.E.**, new developments including the new East Helena High School, Vigilante Subdivision, and the Highland Meadows Subdivision are expected to increase the number of daily trips on



Sanitary Sewer Manhole

Sewer Pipe Diameter

- 2 in
- 4 in
- 8 in
- 10 in
- 12 in
- 15 in
- 18 in
- 21 in
- Force Main
- Identified Areas Where I & I is Prevalent
- City of East Helena Boundary

N

0 400 800

Feet

RPA

East Helena Wastewater Master Plan - 2020

Figure 2.C.5
Locations Identified from the Infiltration Study for Repair or Replacement

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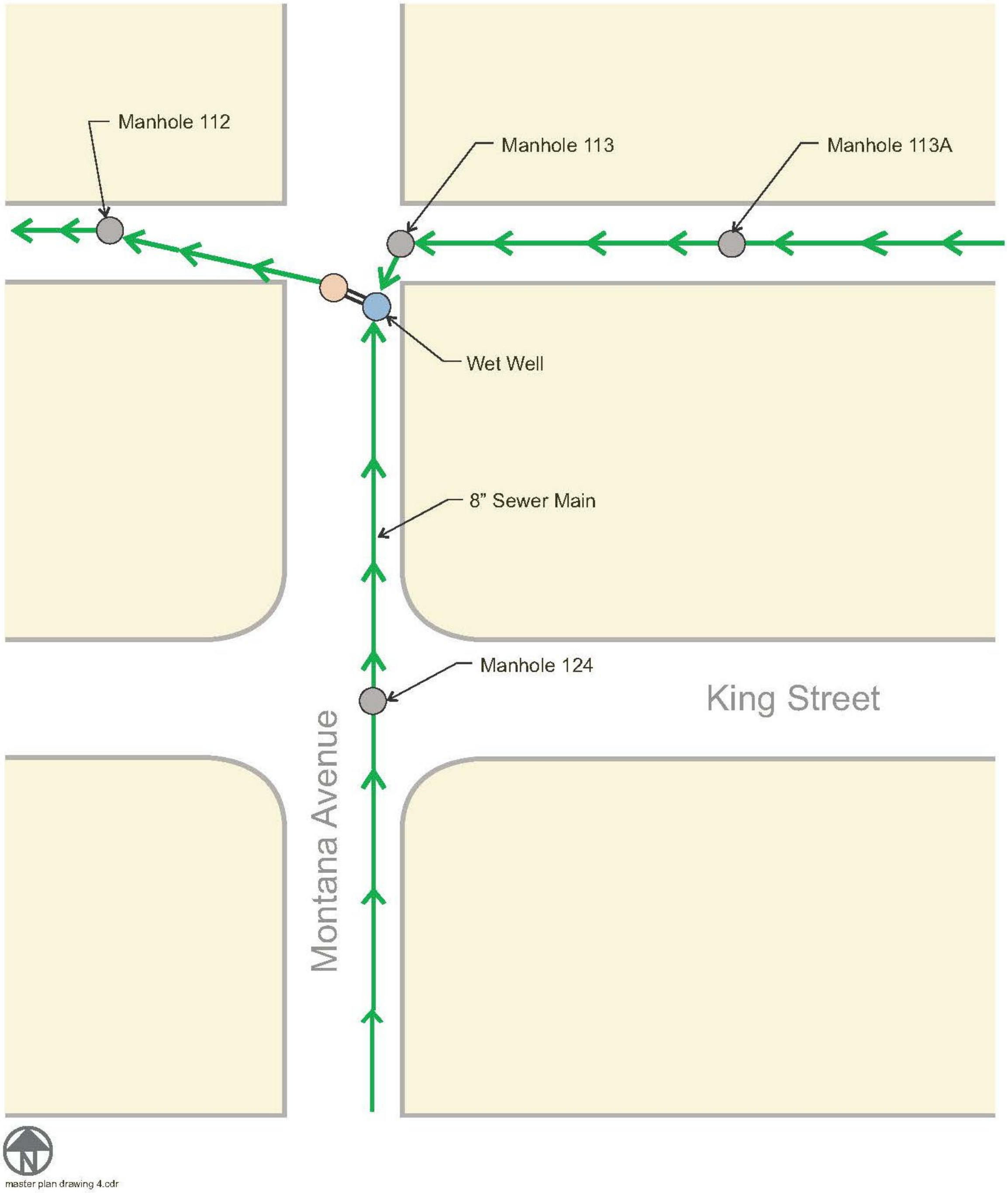
Figure 2.C.6: Montana Avenue Lift Station Schematic



Montana Avenue/Valley Drive. The new East Helena High School is expected to generate 1,015 new daily trips on Montana Avenue/Valley Drive, the Vigilante Subdivision is expected to generate an additional 680 daily trips, and the Highland Meadows Subdivision is expected to generate 3,021 daily trips for a total of 4,716 additional daily trips. Locations of these new developments are shown in Figure 2.B.1. According to City Operators, the Montana Avenue lift station has historically been prone to plugging which requires the pumps to be removed. The location of this lift station requires the operators work in the middle of Montana Avenue/Valley Drive, often times during busy peak driving periods. This makes it difficult and unsafe for operators to access and maintain this lift station.

With the Montana Avenue lift station being located in the roadway, controls for the lift station are located on a rack in the road right-of-way. This lift station does not have a permanent generator and instead shares a portable trailer mounted generator with the City's water system. The City of East Helena recently published design standards that includes all lift stations include a permanent building for the controls and an on-site generator. The Montana Avenue lift station does not adhere to these regulations.

The lift station wet well is significantly deep and cannot be fenced off from the public which is also a safety concern.

2.C.1.5. K&R LIFT STATION

The K&R Lift Station was constructed as part of this development in 2004 to serve the subdivision. The lift station was upgraded with a building and generator in 2007. The lift station location is shown in **Figure 2.B.2**. The K & R Lift Station conveys all sewer generated by the K&R Subdivision to a gravity sewer main that flows to the Montana Avenue Lift Station.

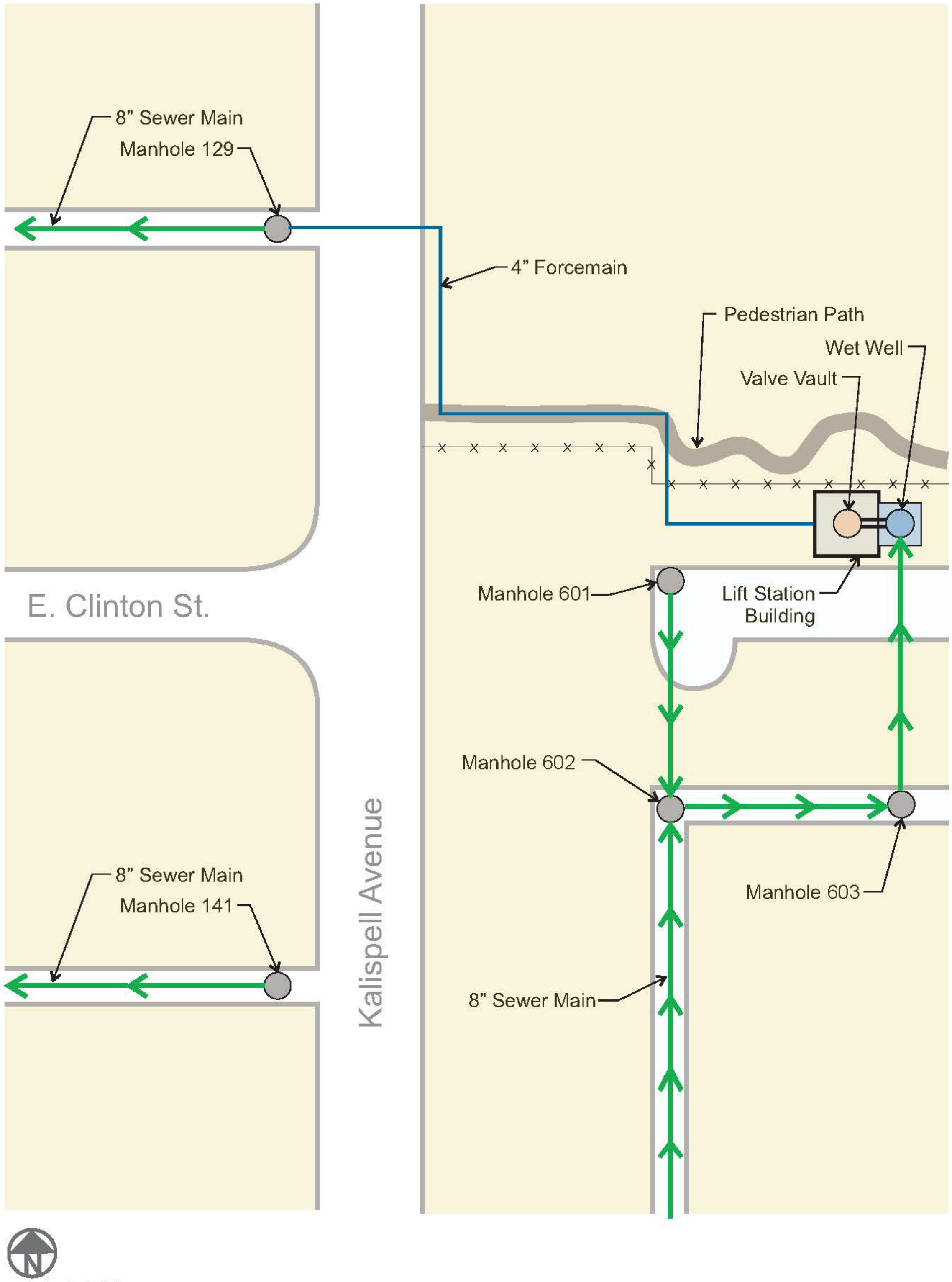
Figure 2.C.7 shows a schematic flow of the K & R lift station. This lift station consists of 2 submersible 5 horsepower chopper pumps. These pumps have a flow rate of approximately 80 gpm. The K & R lift station does not have a flow meter to measure average daily flow. According to pump run times for the K & R lift station provided by the City Operator, pump #1 runs an average of 193 seconds 18 times per day and alternates with pump #2 that runs 182 seconds 17 times a day. Using this information, the average daily flow of the K & R lift station is calculated as follows:

Pump #1: 193 seconds x 18 = 3,474 seconds per day / 60 seconds per minute = 58 minutes
80 gpm x 58 minutes = 4,640 gpd

Pump #2: 182 seconds x 18 = 3,276 seconds per day / 60 seconds per minute = 55 minutes
80 gpm x 55 minutes = 4,400 gpd

Therefore, the average daily flow for the K & R lift station is approximately 9,040 gpd.

Figure 2.C.7: K & R Lift Station Schematic



2.C.1.6. LANE AVENUE LIFT STATION

The Lane Avenue Lift Station was constructed in 2008 to collect wastewater from the south east area of the City and pump wastewater into an 8-inch gravity collection system main. The Lane Avenue lift station serves a small area within the city limits that was previously not served by the City's wastewater treatment system. The lift station was sized to accommodate anticipated growth and system expansion on the eastern edge of the City.

As shown in **Figure 2.B.2**, the Lane Avenue Lift Station currently serves approximately 8 service connections as well as the wastewater from the East Clark Street Sewer District. The East Clark Street Sewer District has a reserved capacity of 24,000 gpd although records show currently they are pumping approximately 6,570 gpd to the City.

Figure 2.C.8 shows a schematic flow of the Lane Avenue Lift Station. This lift station consists of 2 submersible pumps. Each of the two pumps have a pumping rate of 250 gpm.

The Lane Avenue Lift Station does have a flow meter to measure average daily flow through the lift station. According to flow data provided by the City, the Lane Avenue lift station has an average daily flow of 7,711 gpd.

The Missouri River Brewery is currently being constructed on East Clark Street that will contribute additional flow to the Lane Avenue Lift Station. It is estimated that the brewery, tap room, and restaurant will add an additional 7,640 gpd of wastewater to the Lane Avenue Lift Station. The addition of the Brewery to the East Helena wastewater system is further described in **Section 2.E.3.3**.

With the addition of the Missouri River Brewery to the Lane Avenue Lift Station, flows are expected to total approximately 15,351 gpd. As stated above, contracts are in place that allow for the East Clark Street Sewer District to contribute 24,000 gpd. Therefore, the District is still allowed to contribute 17,430 gpd to the system. If the District was to add the additional flow to the Lane Avenue lift station that is contracted, the Lane Avenue Lift Station would receive approximately 32,780 gpd. At 250 gpm, this would equate to pump operation times of 131 minutes per day (65.5 minutes per pump) or an average of 2.73 minutes/hour. This lift station has sufficient capacity to accommodate the flows anticipated through the planning period.

2.C.2. WASTEWATER TREATMENT PLANT

2.C.2.1. WASTEWATER TREATMENT PLANT – GENERAL PROCESS DESCRIPTION

The City of East Helena's wastewater treatment plant utilizes an extended aeration activated sludge process. In 2003, the City of East Helena upgraded their wastewater treatment plant from an aerated lagoon system to its current extended aeration activated sludge treatment process due to ammonia limits in the City's MPDES Permit. In the late 1990's, Prickly Pear Creek was reclassified to an "I" class stream which prompted a reduction in the amount of ammonia allowed to be discharged to the stream in order to prevent ammonia toxicity.

Figure 2.C.8: Lane Avenue Lift Station Schematic

With the City's extended aeration activated sludge process, wastewater is treated in an earthen-lined aeration basin which is followed by an upflow clarifier. **Figure 2.C.9** shows the general flow diagram of the facility. The system constructed is generally known as the Biolac® System with the equipment manufactured or packaged by the Parkson Corporation. The system was designed to remove Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS), and Ammonia (NH3).

Wastewater is first pre-treated after being lifted by two screw pumps (Primary Lift Station) to the headworks of the treatment process. The raw wastewater is subjected first to the screening process which utilizes a mechanical screen to remove and partially dewater much of the inorganic material in the wastewater. A manually cleaned screen is provided if the mechanical screen ever needs to be taken offline for maintenance or other reasons. Directly following the screening unit is a horizontal flow gravity grit chamber to remove solids with larger specific densities. Grit that accumulates in the bottom of the basin is transported to the drying beds for dewatering. Following grit removal, the wastewater flows through a Parshall flume fitted with an ultrasonic transducer to measure the plant influent flow rate. The flow then passes through a flow equalization manhole where the flow is either directed into the flow equalization basin or into the reaction basin. During normal operation, the influent is directed into the reaction basin.

Parshall Flume

The wastewater is stabilized by oxidation from a microbial population (biomass) that is constantly regenerated and recirculated through the reaction basin. The extended aeration treatment process allows for a long aeration time (24 hours at 435,000 gpd). From the reaction basin, flow enters the clarifier where settled sludge (biomass) is pumped by use of an airlift pump back into the reaction basin as return activated sludge (RAS) or wasted to the sludge holding pond as waste activated sludge (WAS). The mixture of incoming wastewater and RAS is referred to as mixed liquor. This mixed liquor flows through the aerated basin and allows the bacteria contact time with the waste for oxidation and nitrification. Providing these bacteria with the oxygen is paramount for proper treatment. The oxygen is added to the system through the diffusers as air from the reaction blowers located in the blower building.

The treated water flows over the clarifier's weir and to the disinfection building where it is disinfected by ultraviolet light from April 1st to October 31st. From here, water flows to the Metals Filtration Building.

East Helena Wastewater
Master Plan - 2020

Figure 2.C.9
East Helena Wastewater Treatment
Plant - Normal Flow Path

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A portion of the microbial population is wasted each day to maintain process quality and maintain the appropriate quantity of solids in the treatment process. The solids wasted from the clarifier are held in the sludge holding basin, which serves as the plant's digester. Aeration of the top five feet of this basin ensures control of objectionable odors. As the sludge settles within the basin, it is collected by a sludge hopper located at the middle of the sloped basin. Periodically, sludge from the bottom of the sludge hopper flows by gravity through the sludge thickening building. Operators have the option of piping these solids directly to the sludge drying beds or thickening these solids and pumping them to the sludge drying beds. Thickening is performed by use of a rotary drum thickener where polymer is used to form a flocculate that is separated from liquid using a rotating wedge wire screen. In either case (thickened or non-thickened), sludge is dewatered using drying beds and ultimately disposed of at the Lewis and Clark County Landfill.

Table 2.C.5 below shows the general plant design criteria as it was constructed.

Table 2.C.5: General Plant Design Criteria

Target Design Year	2021
Design Population	3,576
Design Number of Services	1,485
Design Flow (gpd)	434,400 (302 gpm)
Peak Hourly Design Flow (gpd)	1,476,960 (1026 gpm)
Design Effluent BOD (mg/L)	15 (576 lb/day)
Design Effluent TSS (mg/L)	10 (608 lb/day)
Design Effluent Ammonia (mg/L)	1-2

Clarified and disinfected effluent flows from the UV building to the metals removal process. Water first enters clear well located in the Metals Building on the west side of the campus. Caustic is added in the clear well to increase the pH for more effective filtration. Polymer and ferric chloride can be added to water as a metals coagulant as it is pumped up to the filter distribution trough. Cleaned effluent flows from the filter distribution trough into the Blue Water Technologies Blue PRO® upflow sand filter process. The filtered effluent flows to a portion of the existing outfall and into Prickly Pear Creek. Filter reject materials flows to the reject wet well and is pumped to the digester. The effluent metals removal treatment process design criteria is listed in **Table 2.C.6**. A more detailed discussion on the effluent metals filtration process is located in **Section 2.C.5**.

Table 2.C.6: Effluent Metals Removal Treatment Process Design Criteria

Target Design Year	2021
Design Population	3576
Design Flow (gpd)	435,000
Peak Hourly Design Flow (gpd)	1,476,960
Filter Type	Upflow, Sand Media
Effluent Copper (Effluent Limit at the Time)	0.009 mg/L
Effluent Lead Limit (Effluent Limit at the Time)	0.003 mg/L
Effluent Zinc Limit (Effluent Limit at the Time)	0.12 mg/L

2.C.2.2. WASTEWATER TREATMENT PLANT – UNIT PROCESSES

Below include detailed descriptions for each unit process at the City of East Helena's Wastewater Treatment Plant (WWTP).

SCREENING

The screening process includes the screening structure that encloses two side-by-side screens that are used to remove large inorganic solids from the influent wastewater. These solids may include rocks, sticks, rags, plastics, or other items potentially harmful to the treatment process. Screening is used to protect the downstream process equipment from structural damage, plugging, premature wear, and loss of efficiency or effectiveness.

Screening Building

Wastewater enters the screening structure via a 12-inch PVC pipe and flows into a channel where it is directed by two manually operated stop gates. One stop gate leads to the mechanical screen and should be opened during normal operation and the other stop gate leads to the manually cleaned screen and should only be opened during maintenance of the mechanical screen.

Screens

Screens

The wastewater passes through a submerged basket and suspended solids are collected on a stainless-steel ¼" perforated screen. The trapped solids on the face of the screen cause the water level in the channel to rise. When the water reaches a preset level, a float will initiate a 1hp 3-phase electric spiral motor. The trapped solids are then conveyed from the screen up the stainless-steel transport tube by a rotating spiral brush. Solids are then compacted and dewatered in the tube. Water squeezed from the screenings is captured and returned to the process flow stream for further treatment. The compacted solids are transported down a vertical tube by a rotating serrated cutter and are deposited into ta dumpster for disposal.

The existing mechanical screen is nearing the end of its useful mechanical life. The screening system was designed for a peak hourly flow of 1,026 gallons per minute and are not sized for the flow rates expected through the planning period (further discussion of the treatment plant's capacity is located in **Section 2.E.**).

Originally, the screening building was designed to operate with the door open except during extreme cold conditions. This design was intended to control odors, prevent the build-up of dangerous gases, and prevent corrosion. However, the system has operated over the past 17 years with the door typically closed, causing significant corrosion in the electrical and HVAC systems. This corrosion is causing failure of some items and needs to be addressed. The current headworks building was does not conform to "Explosion Proof" electrical ratings and needs to be modified for operator safety. It is anticipated that the Screening Building needs to operate with the doors closed (as is typical) to prevent freezing within the structure. Alternatives to provide reliable screening through the planning period need to be considered.

GRIT REMOVAL

Wastewater flows from the screening structure into two identical side-by-side grit chambers, each designed to for a maximum design flow rate of 1026 gpm. These chambers are crude way to remove grit which consists of sand, gravel, cinders, or any other solids having subsiding velocities, or substantial specific gravities. The grit may also consist of large organic particles such as bone, eggshell, coffee grounds, seeds, and chips. The grit is removed to decrease sludge volumes, decrease pump wear, and to increase the treatment plant's efficiency. Grit removal is required by the Montana DEQ for mechanical plants.

Grit Removal System

Horizontal grit chambers are designed to maintain a velocity close to 1 foot per second (fps) which allows the heavier particles to settle as the flow travels along the length of the chambers. Velocity through the chambers is maintained by using a proportional weir at the effluent of the chamber. The proportional weir is simply a vertical slot with a width determined to control the velocity of the wastewater passing through the grit chambers. The chambers were designed so that only one would be in use at a time during normal operation. When the chamber needs cleaning, the flow can be redirected through the other chamber using manually operated fiberglass stop gates.

The existing grit removal system is simplistic at best. Operators must manually shovel the grit from the grit chambers in order to remove the grit. Also, the existing system does not wash and separate the grit as most updated systems do. By washing and separating the grit, the grit would be much cleaner for disposal and the organic matter attached to the grit would be recirculated back into the plant, improving plant operations. Additionally, the existing grit removal system was not sized for flows anticipated during planning period. This system is not realistic to use with the increased flow for the planning period and is a dreaded duty for operations staff. This task requires significant contact with the wastewater and grit as operators need to shovel out the grit chambers. This system needs to be considered for replacement to provide reliable grit removal through the planning period.

FLOW EQUALIZATION BASIN, MANHOLE, AND LIFT STATION

A flow equalization basin was required by the Montana Department of Environmental Quality when the WWTP was upgraded to an activated sludge treatment process to serve as back-up treatment in case the single aeration basin and clarifier needed to be shut down for some reason. The current system utilizes only one (1) treatment train to the system and the flow could be diverted if the system was out of service. A surface aerator is available to utilize in the flow equalization basin if the activated sludge treatment system needed to be out of service for a long period.

Pull gates in the flow equalization manhole are used to divert wastewater into the flow equalization basin, the reaction basin or both. During normal operation, the pull-gate to the flow equalization basin is "in" during high flows. A portion of the incoming wastewater will, by design, flow over the top of the pull gate into the flow equalization basin when flows exceed the peak hourly flow rate for the facility. This was done in part to prevent the Ultraviolet disinfection system from becoming overloaded.

As discussed, incoming wastewater can be diverted to the flow equalization basin by manipulating the pull gates to divert flow to the reaction basin or flow equalization basin. If the reaction basin is abandoned for a period of time, a jet type floating aerator can be installed in the flow equalization basin to provide aeration. In an emergency, the basin provides some detention and aeration for partial wastewater treatment. Nitrification, however, will be reduced using this method of treatment.

Flow Equalization Basin

Under normal operating procedures, the flow equalization lift station located at the bottom southeast corner of the flow equalization basin is used to transfer wastewater from the flow equalization basin to the reaction basin. The flow equalization lift station can transport the partially treated water directly to the UV disinfection building. The flow equalization lift station is a dry-pit type lift station with a 10-inch suction line that penetrates the bottom of the pond vertically at the location of a depression on the bottom of the pond with grating installed on the suction intake to prevent solids from entering.

The flow equalization basin is a lined earthen basin with an approximate volume of 5.7 million gallons. The basin is lined with a Hypalon® liner to prevent untreated wastewater from seeping into the ground and potentially contaminating groundwater. A majority of the flow equalization basin liner was the original Cell 1 lagoon liner that was installed in 1981. This liner and basin were re-purposed to the Flow Equalization Pond during construction of the current extended aeration activated sludge treatment process in 2003. At the time of the original installation, the liner was placed directly on rocks that, over the years, have worn through and punctured the liner, particularly at the past operating level. This liner does have significant holes and the liner is past the end of its useful lift. This liner does not prevent wastewater from seeping into the ground. The existing Hypalon® liner is extremely old and at the end of its useful life. Current operations minimize the amount of water held in this pond to prevent contamination.

EXTENDED AERATION ACTIVATED SLUDGE

The activated sludge process is a suspended growth biological treatment method used to stabilize wastewater. Activated sludge is concentrated particles made of microorganisms which need dissolved oxygen and feed on waste material in the water. These microorganisms are kept in suspension and aerated. As these microorganisms feed and multiply a biomass is formed. This biomass density is balanced to some degree with the incoming food.

The microorganisms are separated from the stabilized (treated) water in a sedimentation tank (clarifier). The organisms settle as sludge while the water flows over the effluent weir. The sludge or "activated sludge" is returned to mix with incoming wastewater and the process is repeated. This flow stream of biomass from the clarifiers to the treatment tanks (where the microorganisms will be in contact with the wastewater) is call return activated sludge (RAS).

The ability of an activated sludge system to treat wastewater depends on the volume of biomass in the system and the health/make-up of the microorganisms in the activated sludge. The sludge volume must be balanced to some degree with the incoming food to promote a healthy biomass and to promote good settling characteristics in the clarifier. The volume of biomass is the system is controlled by discharging (wasting) portions of the biomass to a solids treatment/handling process. The flow stream from the treatment process to the solids treatment process is called waste activated sludge (WAS).

Reaction Basin

The extended aeration activated sludge process includes the reaction basin and the clarifier. This system was designed to remove Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS), and Ammonia (NH_3).

Wastewater enters the process at the west end of the Reaction Basin. Solids from the bottom of the clarifier are lifted by an airlift pump and also flow to the west end of the Reaction Basin. These solids make up the microorganisms utilized for treatment and is referred to as the "activated sludge" or Return Activated Sludge (RAS). The mixture of incoming wastewater and RAS is referred to as mixed liquor. This mixed liquor flows through the aerated basin and allows the bacteria contact time with the waste for oxidation and nitrification. Air is provided to the basin by the Reaction Basin Blowers through fine bubble diffusers. This aeration provides mixing and provides oxygen to the microorganisms. Mixing keeps particles moving to provide contact with waste and prevents settling. Providing the microorganisms with adequate oxygen is paramount for proper treatment. Oxygen is added to the system through the diffusers as air from the Reaction Blowers located in the Blower Building.

The mixed liquor flows from the reaction basin into the clarifier through openings in the bottom of the concrete dividing wall that separate the two. The solids settle to the floor of the clarifier and are removed as RAS or are wasted to the solids handling process as WAS. Water flows over the effluent weir of the clarifier to the UV disinfection building.

The Biolac® System supplied by Parkson Corporation provides the aeration system. It utilizes subsurface fine bubble diffusers evenly spaced throughout the reaction basin. The diffusers are arranged in groups and suspended from header pipes that float on the surface of the Reaction Basin.

Scum is removed from the surface of the clarifier by use of slotted rotary pipes located at each end of the clarifier. Water removed from the surface of the clarifier flows to a septic tank where scum is trapped using baffles. Effluent from the scum septic tank flows by gravity to into the flow equalization basin.

Three blowers located in the blower building provide a constant supply of air for the reaction basin aeration equipment and the clarifier airlift pump. Two blowers are necessary at all times and the SCADA system controls blower rotation at operator chose intervals such that all blowers get equal wear.

Variable frequency drives (VFD's) have been added to the blower so they do not overaerate the system. If the system is overaerated, it will take too long to get the dissolved oxygen (DO) down to the appropriate level. Additionally, operators have experimented with blower run times and speeds in an attempt to denitrify (remove nitrogen) in the reaction basin. These experiments have also included having periods where no blowers operate. The system was not designed for dentrification and experiments have had variable results. One flaw with using this system for dentrification are the utilization of air lift pumps. The RAS (which consumes oxygen) cannot be maintained when the blowers are off as the blowers that provide process air are also utilize for the air lift RAS pump.

Control of the air distribution within the reaction basin could potentially create aerobic and anoxic zones within the basin that may allow for more successful nitrification and denitrification. Having the blowers that supply this air connected to the RAS pumps make this process more difficult as there is not convenient way to control and vary the RAS rate. These two operations would ideally run independently to maintain optimum conditions for nutrient removal and make the treatment plant more efficient.

ULTRAVIOLET DISINFECTION

Effluent from the clarifier flows to the Ultraviolet (UV) building for disinfection. Disinfection is considered to be the primary mechanism for the destruction of pathogenic organisms and viruses contained in domestic wastewater that can caused diseases in humans. The ultraviolet disinfection system consists of a concrete channel with two banks of lamps that produce a band of ultraviolet light oriented parallel to the direction of flow in each channel. The ultraviolet light penetrates an organism's genetic material and destroys its ability to reproduce. As the wastewater passes the lamps, organisms are subjected to a lethal dose of UV energy. The banks are turned on and off according to the flow reported by a magnetic flow meter installed upstream of the concrete channel. Once disinfected, the partially treated wastewater flows from the UV building to the metals building for further treatment. The design criteria for the Ultraviolet disinfection system is shown below in **Table 2.C.7**.

Ultraviolet Disinfection Building

Ultraviolet Disinfection System

Table 2.C.7: Ultraviolet Disinfection System Design Criteria

Manufacturer	Trojan Technologies, Inc.
Model Number	UV3000B ™
Peak Flow	1.08 MGD
Average Flow	0.435 MGD
Minimum Flow	0.1 MGD
Suspended Solids	30 mg/l (based on a 30-day average)
Disinfection	200/100-ml fecal

As shown in **Table 2.C.7** above, the UV system was constructed to handle an average daily flow of 0.435 MGD and a peak flow of 1.8 MGD. This system will not be able to disinfect wastewater properly for flows anticipated during the planning period without some type of flow equalization. According to City Operators, the UV system is functioning well and currently undergoes routine general maintenance.

AERATED SLUDGE HOLDING BASIN

Sludge Holding Basin

Sludge wasted from the clarifier is discharged into the sludge holding pond and settles on a sloped bottom where it is collected into a sludge hopper. This hopper is a manhole located at the center of the basin. Operators remove the sludge from the basin by opening a valve located in the basement of the sludge thickening building.

The sludge holding pond has an aeration system that provides 10 scfm (standard cubic feet per minute) per 1000 cf (cubic feet) for the upper five feet within the basin with two blowers in operation to provide an aerated cap over the sludge to prevent objectionable odors.

SLUDGE THICKENING

Sludge from the sludge holding basin flows by gravity into the lower level of the sludge thickening building through 8-inch piping. There is a plug valve and butterfly valve located on the piping just inside the basement wall of the building used to isolate and control the flow of sludge from the sludge holding basin to the rotary drum sludge thickener located in the building. Polymer injection points are provided at 45, 30, and 15 feet from the thickening unit although typically only one injection point is used at a time. The butterfly valve is used for throttling/controlling the flow to the rotary drum sludge thickener and maintain the desired flow as sludge conditions change.

The sludge thickening process can be altered to achieve varying results and to optimize performance for the target solids concentration such as:

- Adjusting polymer dosage.
- Adjusting the rotational speed of the rotary drum.
- Adjusting the spray header impact angle.
- Adjusting the flocculator speed.
- Adjusting the sludge feed rate.
- Polymer injection location.

Sludge Thickening Building


Sludge Thickener

Dry polymer is batched in either of two 500-gallon fiberglass tanks installed on the main floor of the sludge thickening building. Each tank is provided with a mechanical mixer and ultrasonic level sensor. Only one (1) unit is required for pre-treatment of the sludge upstream of the rotary drum thickener.

It should be noted that, at the time the existing WWTP was constructed, the sludge thickening system was required by the Montana Department of Environmental Quality. However, to date it has not been utilized. Operators have had success diverting the sludge directly to the drying beds. However, as growth occurs this system may need to be resurrected and tested to make sure the solids load associated with the increased flows anticipated during the planning period can be accommodated.

THICKENED SLUDGE LIFT STATION

Sludge from the end of the rotary drum thickener is discharged into an aluminum chute that penetrates the main floor to the two progressive cavity pumps located in the basement. Thickened sludge is pumped from the sludge chute to the drying beds through 6-inch piping by one of the two progressive cavity pumps.

Since operators have not used the rotary drum sludge thickening process, these pumps have not been used and are presumed to be in good condition.

FILTRATE LIFT STATION

Water separated from the solids in the rotary drum thickener passes through the screen and into a 4-inch collection pipe. The 4-inch pipe enters a 6-inch header which penetrates the main floor vertically and then the north basement wall and discharges to an 8'-0" wet well located on the north side of the sludge thickening building. This wet well serves as a sump for two dry pit non-clog pumps inside the sludge thickening building. These pumps pump all of the filtrate from the sludge thickening process, water collected by the Sludge Thickening Building floor drainage systems, and percolate from the drying beds. These pumps are also able to pump water (permeate) from the digester to dewater this pond or as otherwise needed. The Filtrate Lift Station pumps to the reaction basin through 4-inch HDPE piping. These pumps were replaced in 2018 and are functioning adequately.

SLUDGE DRYING BEDS

Sludge from the sludge holding pond (either thickened or not thickened) is placed in the drying beds for dewatering. There are 8 drying beds located near the entrance of the wastewater treatment plant. The drying beds allow the thickened sludge to be exposed to both evaporation and percolation. Water which runs to the bottom of the drying beds drains to a pipe below a sand media. Each percolate pipe is connected to a header which slopes to the Filtrate Lift Station wet well.

Sludge Drying Beds

The drying beds are typically filled in lifts no more than 8 inches in depth. Drying times vary depending on the climatic conditions and desired solids concentration. The dewatered biosolids are removed and hauled away for disposal at least once per year. Each bed is provided with an above grade plug valve operators use to select the bed in which to place the sludge. Only one bed should receive sludge at a time to maintain velocities through the piping. There is a total of 4 buried laterals, each lateral provides flow to two (2) drying beds.

Currently, City Operators utilize 7 of the drying beds and 1 for storage. These drying beds operate correctly and functioning as designed.

2.C.3. METALS FILTRATION PROCESS

The City of East Helena was issued an updated Montana Pollutant Discharged Elimination System (MPDES) permit effective October 1, 2009 that contained new effluent limits for metals. The City's MPDES permit required that metals limitations for copper, lead, and zinc be met by January 1, 2013. These limits necessitated installation of a treatment process to comply with the MPDES permit. Metals limits required by the past MPDES are listed in **Table 2.C.8** below.

Table 2.C.8 – Metals Effluent Limits for 2009 MPDES Permit

Parameter	Units	Average Monthly Limitation	Maximum Daily Limitation
Copper, Total Recoverable	mg/L	0.009	0.014
Lead, Total Recoverable	mg/L	0.003	0.078
Zinc, Total Recoverable	mg/L	0.12	0.12

The effluent metals removal process housed within the structure was designed based on pilot testing results and recommendations from filtration process equipment manufacturers. It should be noted, however, that no manufacturers had any prior experience meeting copper limits as low as that imposed on the City of East Helena. The copper limit in the City's MPDES permit at the time the metals process was constructed was much lower than any industrial application required or any other municipal treatment facility. Keeping copper limits below permitted levels has been a struggle for the City. The current permitted level has been relaxed slightly to 11.7 ug/l. This effectively makes little difference and does not ease the difficulty of copper removal for City operators.

Metals Building

Clarified and disinfected effluent flows by gravity from the UV Building to the effluent metals building clear well where caustic is added to increase the pH for more effective filtration. Ferric chloride is added to the water as a coagulant as it is pumped up to the filter distribution trough.

Pumping occurs by use of (6) vertical turbine pumps mounted above the clearwell. These pumps operate in combination as needed to meet the incoming flow.

Inside Metals Building

The system can operate with a combination of caustic and ferric chloride or with polymer alone. Caustic and ferric chloride were used successfully during pilot testing and during the start-up period. This combination is significantly lower cost than the polymer. The City has never Metals utilized the polymer for operation.

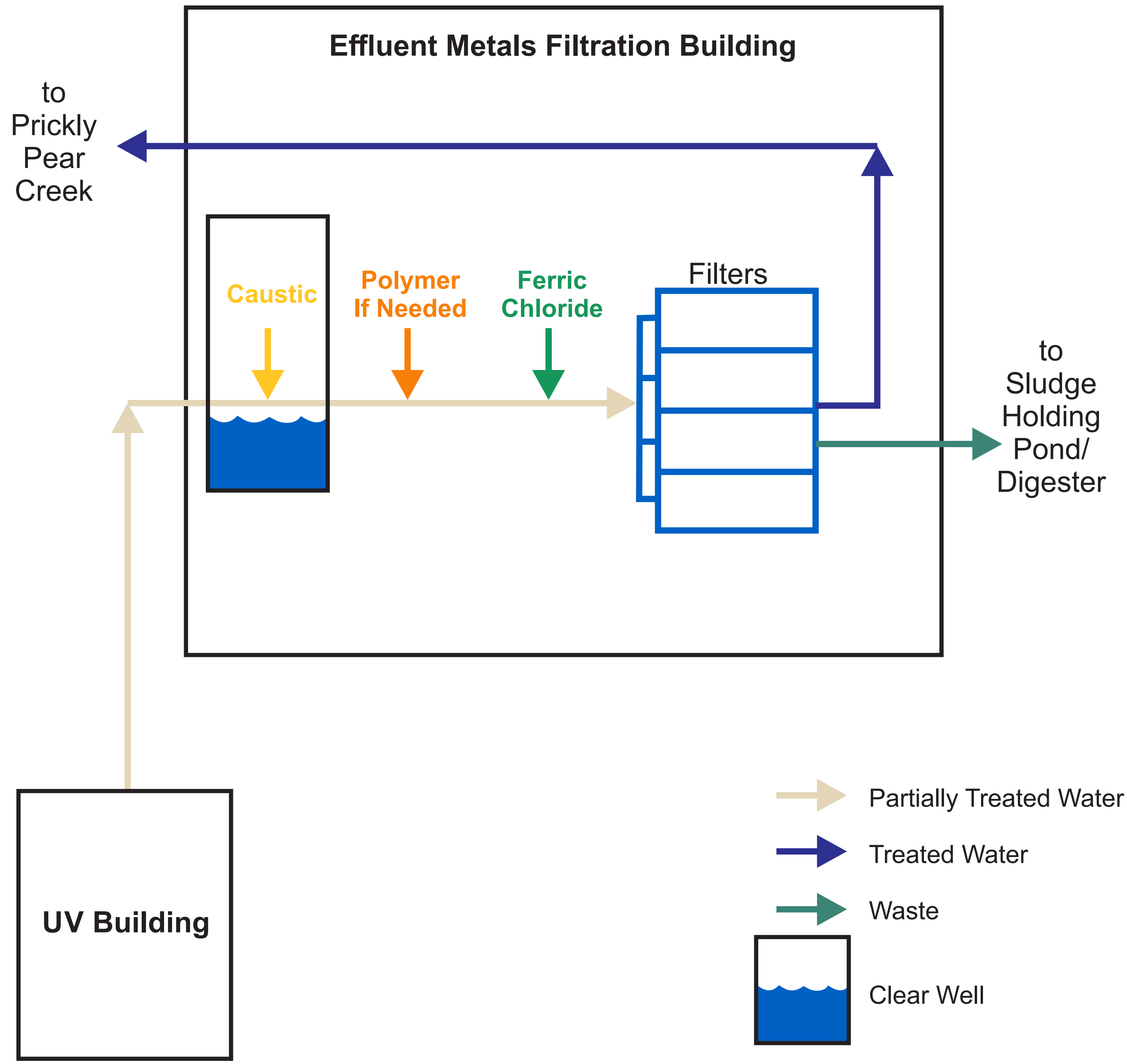
Water flows from the filter distribution trough above into the Blue Water Technologies Blue PRO® upflow sand filter process. Depending on the flow, up to three filters can be utilized to meet the peak hourly design flow. A fourth filter provides a redundant back-up.

Filtered effluent flows to a gravity outfall and into Prickly Pear Creek. Filtered reject material flows to the reject wet well and is pumped back to the sludge holding pond where it is mixed with biological solids and disposed of after drying. **Figure 2.C.10** shows the flow pattern for the metals removal process.

Table 2.C.9 below shows the metals removal treatment Metals Filtration System process design criteria.

Table 2.C.9: Effluent Metals Removal Treatment Process Design Criteria

Target Design Year	2021
Design Population	3576
Design Flow (gpd)	435,000
Peak Hourly Design Flow (gpd)	1,476,960
Filter Type	Upflow, Sand Media
Effluent Copper Limit	0.009 mg/L
Effluent Lead Limit	0.003 mg/L
Effluent Zinc Limit	0.12 mg/L



East Helena Wastewater Master Plan - 2020

Figure 2.C.10
Effluent Metals Filtration Building

Liquid Caustic

Liquid Ferric Chloride

Meeting the copper limit has been a struggle for City Operators. Operators use the caustic and ferric chloride because it is cheaper for the City. Polymer alone has not been used to date. However, pilot testing using polymer has shown great results.

Process control and sampling for copper as required by the City's Montana Pollutant Discharge Elimination System (MPDES) permit has also been difficult for the City. A copper analyzer was installed during construction deisgned to provide real time results to operators. Real-time data is helpful as a means to understand and make adjustments based on current operating parameters. However, the analyzer did not function and has not been used. At the time of construction there was only one company making such an analyzer and it was manufactured in England.

Given that real time data cannot be gained, operators have sent samples to a commercial laboratory for testing. These "low level" sample results for copper sample take a minimum of 3 days to return if a rush fee is paid. By the time the results have been returned, conditions such as pH, temperature, flow rate, and solids concentration have changed several times which has led to difficulty with the process control.

2.C.4. METALS REMOVAL UNIT PROCESSES

METALS PROCESS CLEAR WELL

Partially treated disinfected water flows from the UV building to the clear well inside the metals building. The clear well is 15 ft wide, 55.5 ft long, with baffle walls to prevent short circuiting of the partially treated disinfected water to the pumps. Liquid caustic is pumped into the clear well by peristaltic metering pumps which raises the pH, making the metals in the solution less soluble and the filtration more effective.

The clear well works as a flow equalization tank so that the pumped rate to the filters can be as consistent as possible. Filtering at a more consistent rate provides more reliable results and better process control. The clear well also provides time for the caustic to react and evenly raise the pH which makes the metals in solution less soluble, thus making the filtration more effective.

The metals building cannot be easily bypassed. A means for bypassing this process was not allowed by MDEQ at the time of construction. In the event flow backs up in the clear well, the partially treated disinfected water will however spill over an interior separation wall into the outfall to Prickly Pear Creek.

VERTICAL TURBINE FILTER SUPPLY PUMPS

Six (6) 5 hp vertical turbine pumps lift water from the clear well through piping to the filter distribution trough. The first pump turns on at a clear well depth of 4.5 ft as measured by an ultrasonic level indicator. The clear well level is transmitted to the cascade controller in the variable frequency drive (VFD) for pump one. This controller stops, starts, and rotates all 6 vertical turbine pumps. If the level continues to rise, additional pumps are called into service. With 6 pumps running, a flow slightly above 1,200 gpm is achieved. All turbine pumps turn off at a water depth of 2.5 in the clear well. The system is designed to provide a steady supply of water to the filters that is as constant as possible.

Vertical Turbine Pump Controls

Vertical Turbine Pumps

Polymer and ferric chloride injection points are located in the filter influent piping. The filter influent piping as two (2) parallel piping trains beneath the filter influent channel that include two (2) injection points and two (2) sets of double static mixers per train that maintain effective polymer or ferric chloride mixing. Manual ball valves on the polymer supply lines are provided to direct polymer or ferric chloride to the preferred injection location.

SAND FILTRATION PROCESS

The six (6) vertical turbine pumps lift water from the clear well to the filter distribution trough. Process water flows from the 3.5 ft wide by 35 ft long by 11.5 feet deep filter distribution trough to the sand filters. Gates are used by Operators to utilize the filter desired. Filters are rotated and utilized as necessary to match influent flow. Filter influent flows down the center chamber to the radial distribution arms at the bottom of the sand filter and up through the sand be media. The sand media in the filter moves slowly at 0.3 in/min from top to bottom, then returns to the top of the filter was box via an airlift located in the central assembly. The ferric chloride makes the sand “sticky”, allowing particles to accumulate on the surface of the media. The accumulated particles are then “rubbed” off the media both in the sand bed and in the airlift. The sand is retained in the filter and falls back to the top of the bed. The continuous backwashing of the filters generates a variable reject flow stream containing the removed solids. This waste stream flows over the reject weir and down to the reject well where it is then pumped to the sludge holding pond. There is a 14-inch magnetic flow meter on the effluent piping. The cleaned effluent gravity flows over a fixed weir and the filtered effluent from each filter flows to a common header and is discharged to Prickly Pear Creek.

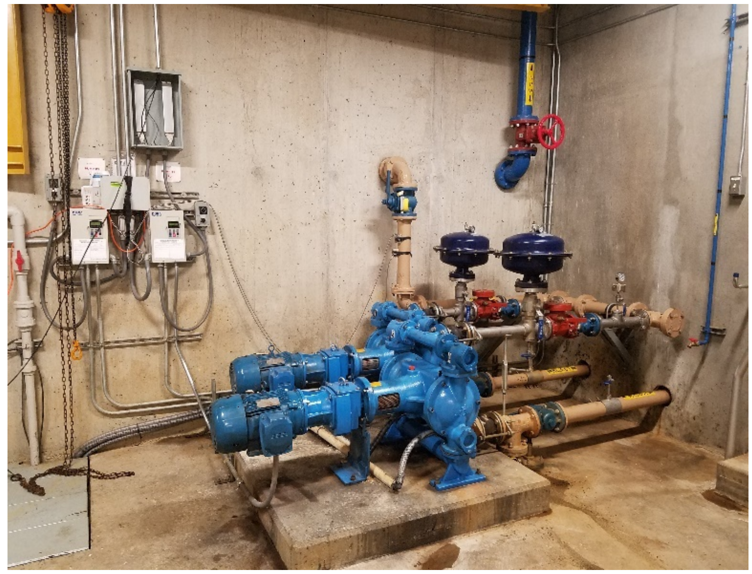


Sand filter Controls

FILTER REJECT PROCESS

The continuous backwashing of the filters generates a constant flow stream of approximately 4 to 6 gpm over the reject weir to the filter reject wet well. Two 7.5 hp electromechanical diaphragm (positive displacement) filter reject pumps with individual variable frequency drives (VFDs) operate in lead/lag fashion from adjustable level setpoints generated by an ultrasonic level controller in the sump and wired as digital inputs to the VFDs. These electromechanical diaphragm pumps pump the filter reject water from the reject well to the sludge holding pond through a buried 2.5-inch PVC pipe.

The diaphragms in these pumps seem to wear out more quickly than anticipated. here are two (2) diaphragms per pump and the diaphragms should last around 2 years according to the manufacturer. Although the City has tried different types of diaphragms, they are having to replace these diaphragms approximately every 60 to 90 days.



Filter Reject Pumps

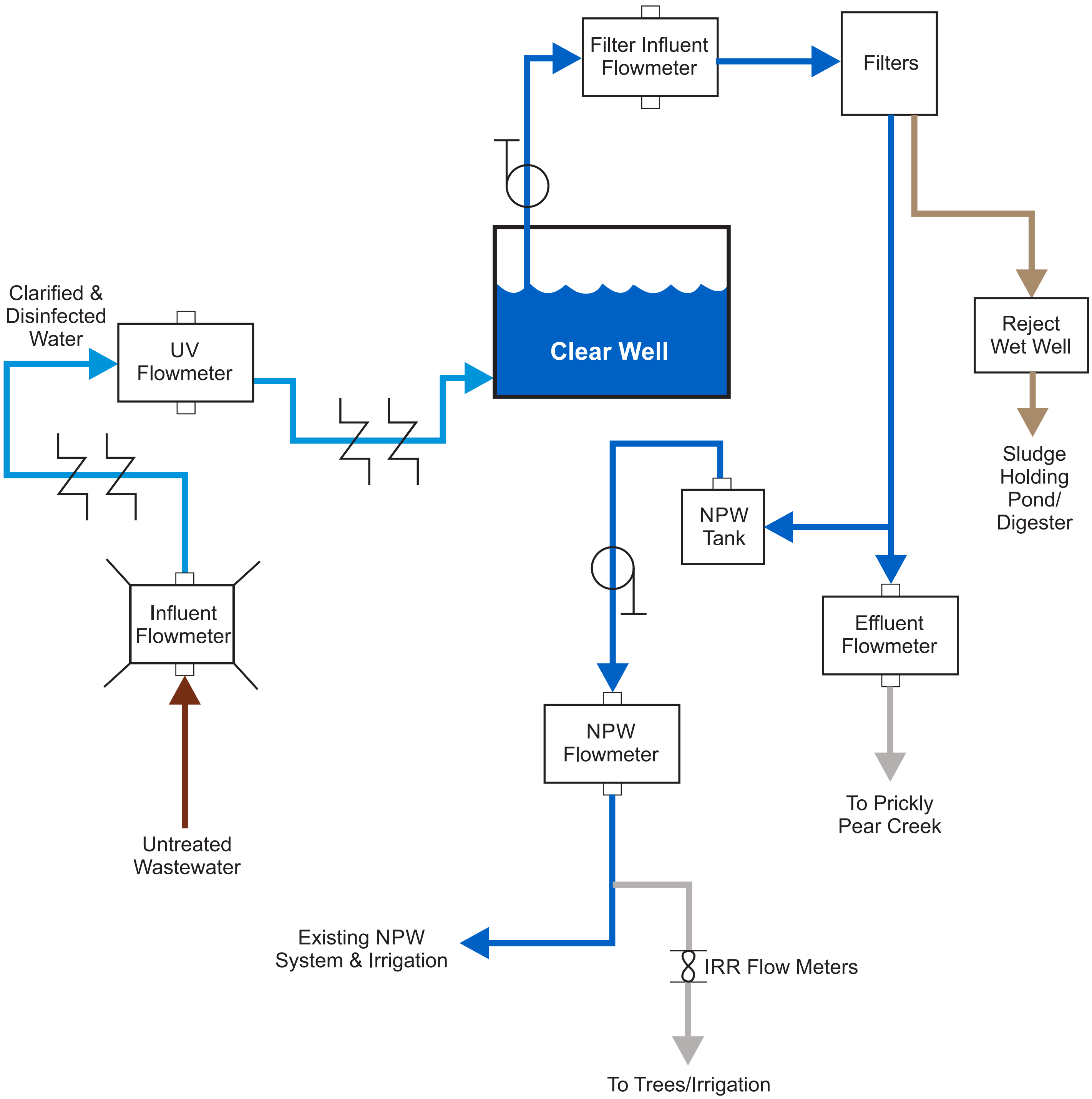
Each diaphragm costs approximately $700 each along with the check-ball system that costs approximately $200 per system. There is also a 6-week lead time for delivery so the City constantly monitoring their inventory. There have been several meetings and inquiries with the manufacturer (Abel Pumps), but there does not seem to be a satisfactory resolution to this issue.

2.C.5. FLOW MEASUREMENTS

Flow meters are provided for filter influent flow, effluent flow, non-potable water, RAS flow rate, WAS flow rate, and irrigation system flow. There is also a flow meter in the UV building for partially treated disinfected water effluent measuring the volume sent to the metals filtration building. **Figure 2.C.11** shows the locations of these flow meters.

Flow Meter Controls

Flow measurements for the influent flow, RAS flow rate, and WAS flow rate utilize a Parshall flume and ultrasonic transducer that continually measures the depth though each of these flumes.



East Helena Wastewater Master Plan - 2020

Figure 2.C.11
East Helena Wastewater Treatment Plant Flow Meters

2.C.6. NON-POTABLE WATER SYSTEM

The non-potable water (NPW) for the treatment plant utilizes filtered effluent generated at the Metals Filtration Building. This effluent flows from the filters into a concrete tank where it is pumped to the NPW system. Three (3) pressure tanks are connected to the NPW system and are located in the UV Building. NPW is used in the screening process, sludge thickening process, for seasonal irrigation, wash down water, and the polymer system.

Vertical Turbine Pumps for Non-Potable Water System

The NPW pumps are a pair of 5-horsepower self-priming pumps with individual variable frequency drives (VFDs). The pumps are redundant and operate from a pressure indicator/controller. The controller maintains a preset (adjustable) discharge line pressure and provides automatic pump alternation. The pressure controller is currently set to start pumps at 40 psi and stop pumping at 60 psi. Both pumps were installed in 2019.

Non-Potable Water System

2.C.7. POTABLE WATER

A potable water well is located to the east of the blower building and provides potable water to the wastewater treatment plant. Potable water is only available in the Blower Building and the Metals Filtration Building. Potable water is used for general plumbing fixtures, safety shower with eye wash, sinks, toilets, shower, washing machine, hot water heater, and some hose bibs.

Potable Water Utilities

2.C.8. IRRIGATION SYSTEM

The landscaping at the wastewater treatment plant is irrigated entirely with plant effluent from the non-potable water system. The site includes approximately 15 zones for a total irrigated area of 200,000 square feet.

2.C.9. EXISTING DISCHARGE LOCATION

The City of East Helena discharges treated effluent into Prickly Pear Creek. The outfall, constructed in the 1980's, is a 21-inch main located approximately 1,640 feet downstream of the crossing at Wylie Drive on the west side of the City. The outfall has an approximate capacity of 2,350 gallons-per-minute (gpm).

2.C.10. EAST HELENA'S MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM (MPDES) PERMIT

A Montana Pollutant Discharge Elimination System (MPDES) permit (MT0022560) was issued to the City of East Helena on August 13, 2009, became effective on October 1, 2009 and expired at midnight on September 30, 2014. The City of East Helena submitted an application to the Montana Department of Environmental Quality (MDEQ) on June 25, 2014 for the renewal of permit MT0022560. After finding the application complete, the MDEQ administratively extended the 2009-issued permit pending the issuance of an updated permit. The updated permit then became effective on December 1, 2019 and expires November 30, 2024. Effluent limits for the new MPDES permit are listed in **Table 2.C.10** below. The permit along with the fact sheet are located in **Appendix D**.

Changes from the 2009 permit are listed below:

- Ammonia limits were removed.
- Total residual chlorine limits were removed.
- The limits for lead and zinc were removed.
- Effluent and instream monitoring for several metals were removed.

- Requirements to monitor dissolved oxygen, temperature, and hardness in the effluent were removed.
- The requirement to conduct whole effluent toxicity (WET) testing was removed.
- The copper limit was lowered slightly.
- Limits on total nitrogen and total phosphorus were revised to reflect nutrient variance regulations and to incorporate the requirement to implement a Pollutant Minimization Plan.

Table 2.C.10 – Effluent Limits for MPDES Permit

Parameter	Units	Average Monthly Limitation (1)	Average Weekly Limitation (1)	Maximum Daily Limitation (1)
5-day Biochemical Oxygen Demand (BODs)	mg/L	30	45	--
	lb/dav	109	163	--
	% removal	85 (2)	--	--
Total Suspended Solids (TSS)	mg/L	30	45	--
	lb/day	109	163	--
	% removal	85 (2)	--	--
pH	S.U.	In the range of 6.0 - 9.0		
E. coli Bacteria, summer (3)	Number of organisms /100 mL	126	252	--
E. coli Bacteria, winter (4)	Number of organisms /100 mL	630	1,260	--
Total Nitrogen Load (5) (6)	lb/day	53.3	--	--
Total Phosphorus as P Load (7)	lb/day	11.2	--	--
Total Phosphorus as P Load (8)	lb/day	5.5	--	--
Copper, Total Recoverable	ug/L	11.7	--	17.5

Footnotes:
(1) See Definition section at end of permit for explanation of terms
(2) Average monthly minimum
(3) This limit applies during the period April I through October 31
(4) This limit applies during the period November I through March 31
(5) Calculated from the sum of Nitrate+ Nitrite as N and Total Kjeldahl Nitrogen (TKN) concentrations.
(6) This limit applies year round
(7) This limit applies October – June
(8) This limit applies July-September

In 2014, MDEQ adopted general nutrient standard variances due to the fact that "*the treatment of wastewater to base numeric nutrient standards in 2011 would have resulted in substantial and widespread economic impacts on a statewide basis (75-5-313(5)(b) M.C.A.)*" This decision allows a permittee who meets the end-of-pipe treatment requirements established by MDEQ to apply for a general nutrient standard variance ("general variance"). On February 26, 2018, the City of East Helena requested a general variance for both nitrogen and phosphorus. A copy of the application is included in **Appendix E.**

The 2009 permit implemented Phase I of the TMDL, which required “no increase” in nutrient concentrations. Phase II requires optimization of the facility infrastructure, and Phase III of the TMDL is to implement the necessary actions to reach the level of treatment to meet the total nitrogen (TN) and total phosphorus (TP) targets for the Prickly Pear Creek. Phase III of the TMDL is intended to implement the water quality-based effluent limits for TP and TN that would apply to the East Helena Wastewater Treatment Plant at the end of the variance term.

The City of East Helena’s wastewater treatment plant was not designed for total nitrogen (TN) and total phosphorus (TP) removal. However, the addition of the metal removal process to the WWTP has improved the removal of TP from the wastewater with the use of ferric chloride. As shown in the DMR results from 2015-2019 in **Appendix F**, the City is currently able to consistently meet their current permit limits for TN (53.3 lbs/day) and TP (11.2/5.5 lbs/day). However, using projected per capita data for nitrogen and phosphorous generation and the Montana Department of Environmental Quality’s standard of 0.033 lbs per capita per day of TN and 0.009 lbs per capita per day of TP, the non-degredation limits for the City will be difficult to meet for the growth rate expected during the planning period. Estimations of TN and TP that will be entering the wastewater treatment plant at the end of the planning period show an estimated 146.7 lbs/day of TN and 40.0 lbs/day of TP. Calculations using the estimated 2040 population projection of 4,446 are shown below:

4,446 x 0.033 lbs/capita/day = 146.7 lbs/day
4,446 x 0.009 lbs/capita/day = 40.0 lbs/day

If the growth within the City is realized as predicted during the planning period, and increased process for further removing nutrients (particularly nitrogen) will be necessary. Future upgrades to the treatment plant will likely be necessary as flow rates increase. Any future upgrades need to evaluate and implement nutrient removal to meet current (non-degradation limit of 53.3 lb/day TN) and future TN (10 mg/l) and TP (1 mg/l) limits that will be implemented once the term of the variance has ended.

2.D. EXISTING INFLUENT FLOW (YEARS 2015-2019)

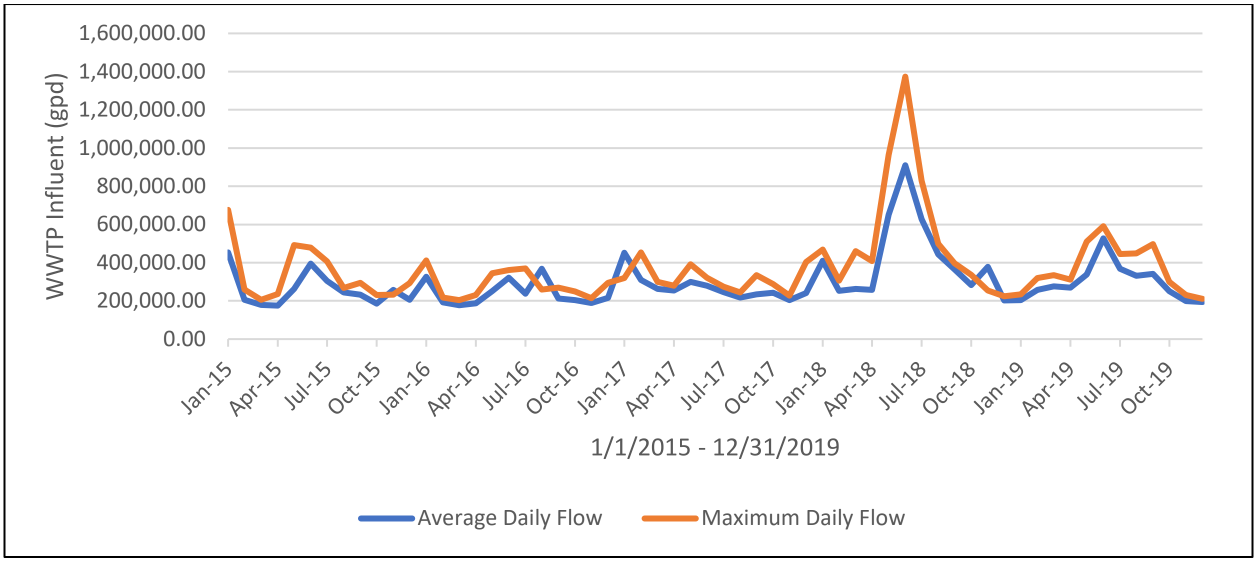
Influent into the Wastewater Treatment Plant (WWTP) is monitored and recorded by a Parshall flume with ultrasonic flow meter. Flow data from this meter for the past five years is located in **Appendix G** has been summarized in **Table 2.D.1** below.

Average daily flow is the average of daily volumes recorded at the WWTP for a 12-month period. **Table 2.D.1** above shows the average daily flow for 2015, 2016, 2017, 2018, and 2019 as well as an average for the 5 years combined. As shown in **Table 2.D.1** above, the average daily flow over the 5-year period is 288,635 gpd.

Table 2.D.1 – Influent Wastewater Treatment Plant Flows

Year	Total Influent Wastewater (gal/yr)	Average Daily Flow (gpd)	Maximum Daily Flow (gpd)
2015	94,536,236	259,003	675,521
2016	83,083,553	204,118	411,751
2017	92,019,821	252,700	453,929
2018	149,033,814	408,312	1,373,663
2019	108,158,977	296,326	590,306
	2015-2019	**288,635**	**1,373,663**

Figure 2.D.1 – Influent Wastewater Treatment Plant Flows



Maximum daily flow is the largest volume recorded at the WWTP during a 24-hour period. **Table 2.D.1** above shows the maximum daily flow for 2015, 2016, 2017, 2018, and 2019 as well as the maximum for the 5 years combined. As shown in **Table 2.D.1** above, the maximum daily flow over the 5-year period is 1,373,663 gpd. **Figure 2.D.1** above shows the monthly variation of the average daily flows and the maximum daily flows at the WWTP for 2015-2019.

The existing users of the City of East Helena's WWTP include the City of East Helena, Pele Park, and East Clark Street Water and Sewer District (locations shown in Figure 2.A.1). Per capita usage is the flow estimated per person using the facility measured in gallons-per-capita-per-day. The estimated persons using the City of East Helena WWTP for 2015 - 2019 include:

- The City of East Helena (2010 Census) – 1,984 people
- Pele Park (85 sewer connections at 2.6 people per connection) – 221 people
- East Clark Street Water and Sewer District (6,750 gpd /100 gpcd) – 68 people

Since the East Clark Street Water and Sewer District did not connect to the East Helena WWTP until 2018, the population for the existing users in 2015, 2016, and 2017 is estimated at 2,205 and 2,273 for 2018 and 2019. **Table 2.D.2** below shows the per capita usage for 2015 - 2019.

Table 2.D.2 – Per Capita Usage for 2015 – 2019

Year	Total Influent Wastewater (gal/yr)	Estimated Population	Per Capita Usage (gpcd)
2015	94,536,236	2,205	117
2016	83,083,553	2,205	103
2017	92,019,821	2,205	114
2018	149,033,814	2,273	180
2019	108,158,977	2,273	130
Total Average for 2019 population	**526,832,401**	**2,273**	**127**

2.E. WASTEWATER TREATMENT PLANT CAPACITY ANALYSIS FOR THE PLANNING PERIOD

2.E.1. EXISTING AGREEMENTS FOR WASTEWATER SERVICE

During the next 20 years, a significant increase in the volume of wastewater annually received by the City is anticipated. This increase is due to growth and contributions from both inside the City Limits and from parties outside the City that have contracts for service.

Through the year 2018 wastewater production was limited to the developed area within the City limits generated by current City residents and businesses with the exception of Pele Park which is located outside the city limits north of the City. This service population remained fairly constant for the period of 2002 through 2017. In 2018, the East Clark Water and Sewer District began contributing.

Plans have been approved and Agreements are in place which will add additional flow to the WWTP and increase the size of the collection system. Additional flow is anticipated in the near term from the East Clark Street Water & Sewer District, Red Fox Meadows Subdivision, East Helena High School, Vigilante Subdivision, Highland Meadows Subdivision, American Chemet Addition, and the Missouri River Brewery. These contributors are identified in **Figure 2.A.1**.

Below discussions summarize the wastewater contributions expected over the next 20 years that may be generated.

2.E.2. PELE PARK TRAILER COURT

The wastewater treatment plant receives wastewater from the Pele Park Trailer Court. This connection was made in 2003. The City does not own or maintain the collection system, lift station, or force main that conveys the wastewater from this trailer court to the East Helena WWTP. The Pele Park Trailer Court is located west of the WWTP outside of the City Limits. The trailer court consists of 85 sewer connections, assuming each connection in the trailer court generates 260 gpd of wastewater, it is estimated the WWTP receives 22,100 gpd of wastewater from the Pele Park Trailer Court.

2.E.2.3. EAST CLARK STREET WATER AND SEWER DISTRICT

As stated above, the City signed an interlocal agreement with the Clark Street Water and Sewer District March 2017 reserving 24,000 gpd of the Wastewater Treatment Plant capacity. Records for 2018 show the East Clark Street Water and Sewer District only averages approximately 6,570 gpd. However, with continued growth and additional connections to the City's collection system there is potential for the Clark Street Water and Sewer District to generate the reserved 24,000 gpd.

2.E.2.4. RED FOX MEADOWS

Red Fox Meadows is a subdivision located northeast of the WWTP that is planned for 110 residential homes, 62 duplexes, as well as a gas station and convenience store. As of April 16, 2020, there are 15 residential connections currently connected at this location. The Red Fox Meadows collection system consists of 8-inch gravity mains, a lift station, and a 6-inch force main that will convey wastewater to the East Helena WWTP. The City does not own or maintain the Red Fox Meadows collection system, lift station, or force main.

As part of an Interlocal Agreement, the Red Fox Meadows County Water and Sewer District will be created. The residential customers of the Red Fox Meadows subdivision will be charged a flat rate per connection based on the East Helena residential sewer rate. Per the Interlocal Agreement, the City has reserved 55,000 gpd (Average Daily Flow) at the Wastewater Treatment Plant for the Red Fox Meadow subdivision.

2.E.2.5. EAST HELENA HIGH SCHOOL

Construction is currently underway for the new East Helena High School with an anticipated attendance of 600 students (scheduled to open in August of 2020). According to DEQ Circular 4, a school with cafeteria, gym, and showers will typically produce 15 to 30 gpd of wastewater per student. For purposes of estimating wastewater volume, we will assume each student will generate 25 gpd of wastewater. Using these values, it is estimated that the new East Helena High School will contribute 15,000 gpd to the Wastewater Treatment Plant.

2.E.2.6. AMERICAN CHEMET ADDITION

The City's wastewater collection system receives no industrial waste. American Chemet, a privately-owned manufacturer of metal-based chemicals, is connected to the City's wastewater collection system for purposes of discharging wastewater from their urinals and toilets. No process wastewater is discharged into the collection system. On October 19, 2018 the City of East Helena received a letter requesting permission to discharge up to 900 gpd of Reverse Osmosis reject water to the City's wastewater system. This wastewater is the result of American Chemet expanding their production capacity at an existing process by utilizing a Reverse Osmosis (RO) water purifying system. This water originates from the City's municipal system and is treated by Reverse Osmosis prior to discharge into the wastewater system. The City deemed the discharge acceptable.

2.E.2.7. HIGHLAND MEADOWS

The Oakland Group has proposed 100-acre housing development located north of Prickly Pear Elementary School consisting of 320 houses, we assume each house will generate 260 gpd of wastewater for a total of 83,200 gpd. Flows were developed/determined by the subdivision's design engineer based on construction type and subsequently approved by the City. This development is pending final review and the lift station is under construction at the time of this writing. This development is anticipated to fully developed in 8 years. The local housing market may impact the rate of development.

2.E.2.8. BREWERY

The Missouri River Brewery is currently being completed that includes a brewery, tap room, and restaurant. The preliminary engineering report (PER)completed in 2019 for the project estimated an additional wastewater flow added to the City of East Helena's wastewater system at 7,640 gallons per day. According to the PER, the brewery equipment for the establishment was sized for two (2) 320-gallon batches (the maximum that can be produced per day). Wastewater production rate of 6 gallons of wastewater for every one gallon of beer produced. Estimated wastewater for the tap room and restaurant are based on the number of vehicles per day assuming 2 people per vehicle. According to the PER completed, the following are wastewater flow rates estimated for the Missouri River Brewery:

Brewery: (320 x 2) gpd x 6 gallons	= 3,840 gpd
Tap Room: 250 vehicles x 2 person per vehicle x 2gpd/person	= 1,000 gpd
Restaurant: 140 vehicles x 2 persons per vehicle x 10 gpd/person	= 2,800 gpd
Total:	= 7,640 gpd

2.E.2.9. HABITAT FOR HUMANITY

Planning is underway for ten (10) single-family Habitat for Humanity homes are expected to contribute an additional 2,500 gpd to the East Helena WWTP.

2.E.1.11 VIGILANTE SUBDIVISION

The Vigilante Subdivision is a housing development located north of the East Helena WWTP consisting of 72 homes. The Engineer for the development provided a flow rate of 17,000 gpd which equates to 236 gpd/lot. Flows were developed/determined by the subdivision's design engineer based on construction type and subsequently approved by the City. This development is well into construction and the water system has been installed at the time of this writing. This development is anticipated to fully developed in 8 years. The local housing market may impact the rate of development.

2.E.3. SUMMARY OF FUTURE WASTEWATER TREATMENT PLANT CAPACITY

Table 2.E.1 below provides a complete list of the current and approved future wastewater users as well as possible future wastewater contributors that will contribute wastewater to the East Helena Treatment Facility during the planning period. Business models from the developers report that new developments will be built out in 8 years. Therefore, estimations for wastewater flow reflect this 8-year time frame. Based on the anticipated growth and current flow rates, the WWTP will exceed capacity before all developments are completed.

Table 2.E.1 – Capacity Summary Projections for 8-Year Planning Period (2020-2028)

Capacity and Flow by User/Group	*Flow (GPD)*	*Contracted Allowable Flow (GPD)*	*Percentage of Capacity*
Capacity of Existing Treatment Facility (Design year for existing facility 2021)	434,400		100%
Current Flow from City Limits (2015-2019)	288,635		66%
Includes:			
Pele Park Trailer Court (85 EDU)			
East Clark Street Water & Sewer District (6,570 gpd in 2018)			
East Clark Street Water & Sewer District (Remaining 24,000 gpd reserved - 6,570 gpd actual)		17,430	70%
Vigilante Subdivision		17,000	74%
Red Fox Meadow (per Interlocal Agreement)		55,000	87%
East Helena High School (600 students x 25 gpd = 15,000 gpd)		15,000	90%
Highland Meadows Subdivision (320 residential homes x 260 gpd = 83,200 gpd)		83,200	110%
Habitat for Humanity (10 residential homes x 260 gpd = 2,600 gpd)		2,600	110%
Missouri River Brewery		7,640	112%
American Chemet		900	112%
Total Flow	**288,635**	**198,770**	**112%**
Utilization with Reserved Flow	**487,405**		**112%**
Remaining Capacity	**-53,005**		**-12%**

Plant capacity was also evaluated based on population and a growth rate of 1.45% for the rest of the planning period after all developments have been completed. An additional population growth of 1.45% is assumed for the 12 years after the planned development is realized. **Table 2.E.2** below estimates the additional population that will be contributing to the WWTP during the entire 20-year planning period. As stated above, the table assumes the developments currently underway are filled evenly over the next 8 years.

In **Table 2.E.2**, population was calculated by assuming 2.6 persons per household and additional flow was calculated assuming 100 gpd for each individual.

Table 2.E.2 – Capacity Summary Projections for 20-Year Planning Period (2020-2040)

Year	Total Population Served	Additional Population	Additional Annual Flow (GPD)	Total Flow Increase (GPD)	Capacity (GPD)	Percent of Capacity
2020	2,273	0	0	0	288,635	66%
2021	2,473	200	20,020	20,020	308,655	71%
2022	2,673	200	20,020	40,040	328,675	76%
2023	2,873	200	20,020	60,060	348,695	80%
2024	3,073	200	20,020	80,080	368,715	85%
2025	3,273	200	20,020	100,100	388,735	89%
2026	3,473	200	20,020	120,120	408,755	94%
2027	3,673	200	20,020	140,140	428,775	99%
2028	3,873	200	20,020	160,160	448,795	103%
2029	3,917	44	4,400	164,560	453,195	104%
2030	3,961	44	4,400	168,960	457,595	105%
2031	4,006	45	4,500	173,460	462,095	106%
2032	4,051	45	4,500	177,960	466,595	107%
2033	4,098	46	4,600	182,560	471,195	108%
2034	4,144	47	4,700	187,260	475,895	109%
2035	4,192	47	4,700	191,960	480,595	110%
2036	4,240	48	4,800	196,760	485,395	112%
2037	4,289	49	4,900	201,660	490,295	113%
2038	4,338	50	5,000	206,660	495,295	114%
2039	4,389	50	5,000	211,660	500,295	115%
2040	4,440	51	5,100	216,760	505,395	116%

Both **Table 2.E.1** and **2.E.2** show the East Helena Wastewater Treatment Plant will exceed capacity within the 8-year development period. Modifications to the treatment plant to increase the capacity as well as to remove additional nutrients will need to occur before capacity is reached. The planning process for such a monumental task is expected to take several years to accomplish. A new Wastewater Facilities Plan that would focus on updating the capacity of the treatment plant as well as nutrient reduction would need to be completed and would expect to begin when the wastewater treatment plant is has reached and approximate capacity of 80%. Based on the above assumptions, this planning would be recommended in the Fall of 2023. It is assumed that a new Facilities Plan would be completed and submitted for funding for construction of the project. Funding applications are typically due in even numbered years and therefore would be submitted for this project in the Spring of 2024. Grant awards would occur in the Spring of 2025 and, at that point, design can begin on the project. With this schedule, construction would be expected to begin in the Spring of 2026 when the plant is approximately 94% of capacity.

2.E.4. PLANT CAPACITY - REDUCTION OF INFLOW AND INFILTRATION

As stated above, the City of East Helena is expecting additional users over the next 20 years which constitutes a significant increase in wastewater flow. A large amount of the anticipated growth is forecast to occur over the next 8 years as discussed above. With a design capacity of 434,400 gpd, and with no reduction to inflow and infiltration (I & I), it is estimated that the existing WWTP will reach capacity during the year 2027. One strategy for extending the useful life of the wastewater treatment plant is to reduce the amount of I & I that enters the facility. This allows the City to provide service to additional customers and a method for receiving revenue from new users prior to the plant upgrades which could be put to future plant upgrades.

Based on estimates of inflow and infiltration as discussed in **Section 2.C.2.2,** approximately 23% of the influent currently received at the City's treatment plant is clean water entering as I & I. Therefore, approximately 66,386 gpd of the 288,635 gpd is clean water. To be conservative, it is reasonable to assume that if I&I abatement in the areas shown in **Figure 2.C.5** were undertaken, only an approximate reduction of 50% of the I&I would be realized. Based on this assumption, the WWTP average daily flow could be reduced to approximately **255,400 gpd**.

Table 2.E.3 below shows the capacity for future flows with the reduction of I & I.

Table 2.E.3 – Capacity Summary Projections with 50% I & I Reduction for 8-Year Planning Period (2020-2028)

Capacity and Flow by User/Group	*Flow (GPD)*	*Contracted Allowable Flow (GPD)*	*Percentage of Capacity*
Capacity of Existing Treatment Facility (Design year for existing facility 2021)	434,400		100%
Current Flow from City Limits (2015-2019) with 50% reduction in I & I	255,400		59%
Includes:			
Pele Park Trailer Court (85 EDU)			
East Clark Street Water & Sewer District (6,570 gpd in 2018)			
East Clark Street Water & Sewer District (Remaining 24,000 gpd reserved - 6,570 gpd actual)		17,430	63%
Vigilante Subdivision		17,000	67%
Red Fox Meadow (per Interlocal Agreement)		55,000	79%
East Helena High School (600 students x 25 gpd = 15,000 gpd)		15,000	83%
Highland Meadows Subdivision (320 residential homes x 260 gpd = 83,200 gpd)		83,200	102%
Habitat for Humanity (10 residential homes x 260 gpd = 2,600 gpd)		2,600	103%
Missouri River Brewery		7,640	104%
American Chemet		900	
Total Flow	**255,400**	**197,870**	**104%**
Utilization with Reserved Flow	**453,270**		**104%**
Remaining Capacity	**-18,870**		**-4%**

Plant capacity was also evaluated based on population and a growth rate of 1.45% for the rest of the planning period after all developments have been completed. An additional population growth of 1.45% is assumed for the 12 years after the planned development is realized. **Table 2.E.4** below estimates the additional population that will be contributing to the WWTP during the entire 20-year planning period. As stated above, the table assumes the developments currently underway are filled evenly over the next 8 years.

Table 2.E.4 – Capacity Summary Projections with 50% I & I Reduction for 20-Year Planning Period (2020-2040)

Year	Total Population Served	Additional Population	Additional Annual Flow (GPD)	Total Flow Increase (GPD)	Capacity (GPD)	Percent of Capacity
2020	2,273	0	0	0	255,400	59%
2021	2,473	200	20,020	20,020	275,420	63%
2022	2,673	200	20,020	40,040	295,440	68%
2023	2,873	200	20,020	60,060	315,460	73%
2024	3,073	200	20,020	80,080	335,480	77%
2025	3,273	200	20,020	100,100	355,500	82%
2026	3,473	200	20,020	120,120	375,520	86%
2027	3,673	200	20,020	140,140	395,540	91%
2028	3,873	200	20,020	160,160	415,560	96%
2029	3,917	44	4,400	164,560	421,160	97%
2030	3,961	44	4,417	168,977	426,860	98%
2031	4,006	45	4,482	173,459	432,660	99%
2032	4,051	45	4,547	178,006	438,560	101%
2033	4,098	46	4,612	182,618	444,560	102%
2034	4,144	47	4,679	187,297	450,560	104%
2035	4,192	47	4,747	192,045	456,660	105%
2036	4,240	48	4,816	196,861	462,860	106%
2037	4,289	49	4,886	201,746	469,160	108%
2038	4,338	50	4,957	206,703	475,560	109%
2039	4,389	50	5,029	211,732	482,060	111%
2040	4,440	51	5,101	216,833	488,560	112%

In **Table 2.E.4** above, population was calculated by assuming 2.6 persons per household and additional flow was calculated assuming 100 gpd for each individual.

A reduction in the I&I will not prevent the WWTP from exceeding capacity during the planning period. However, reducing the I & I will postpone the needed improvements to the treatment plant. If an I & I reduction of 50% can be realized, a new Wastewater Facilities Plan could be delayed until Fall of 2027 (approximately 4 years). This would “free up” some hydraulic capacity at the treatment plant and allow additional users to be served. This may allow the City to accumulate more funds to put toward a future project, provide a more clear picture of what reductions in I&I can be realized, and ultimately keep user rates lower.

It is assumed that a Wastewater Facilities Plan would be prepared and submitted as part of funding applications that would be submitted for the project. Funding applications are typically due in even numbered years and therefore would be submitted for this project in the Spring of 2028. Grant awards would occur in the Spring of 2029 and, at that point, design can begin on the project. With this schedule, construction would be expected to begin in the Spring of 2030 when the plant would be at 98% of capacity.

2.F. FINANCIAL STATUS OF THE EXISTING FACILITY

Operation of the East Helena Wastewater System is funded through the City's wastewater enterprise fund, with revenue generated primarily through wastewater rates charged to users. As an enterprise fund, sewer revenues must be exclusively used for the municipal sewer utility. Revenues are used to fund the annual sewer budget, which includes both the collection system and the treatment plant operations, along with City administrative and management expenses directly related to the sewer system.

Currently, there are 799 sewer service connections for the City of East Helena. Each residential service is charged a flat rate of $66.40 and the commercial services are charged a flat rate of $66.40 times a billing factor. The billing factor used for commercial services is based on the average daily metered water usage (in gallons) for the commercial customer over the consecutive months of December, January, and February divided by 200 which is the average daily metered water usage (in gallons) for a single residence. The existing sewer rate has not changed since 2013 as stated in the City Ordinance Number 251 located in **Appendix H**.

Growth areas listed above are also charged a flat fee of $66.40 per each user with the exception of the East Clark Street District. The East Clark Street District is charged $12.10 per every 1,000 gallons used. District usage is metered at the East Clark Street Lift Station. As of April 16, 2020, there are 15 connections in the Red Fox Subdivision that are charged a flat rate of $66.40 per connection.

2.G. WATER / ENERGY / WASTE AUDITS

The purpose of a wastewater audit is to establish the performance of the existing wastewater collection and treatment facilities and identify necessary improvements. This report has been developed to help identify areas of the wastewater treatment plant that are in need of improvement.

The East Helena Water System Master Plan-2018 document was prepared in 2018 to help identify the City's non-revenue water and identify ways minimize the amount of water that cannot be accounted for.

There has not been an energy audit completed for the City of East Helena's wastewater system.

CHAPTER 3: NEED FOR PROJECT

3.A. HEALTH, SANITATION AND SECURITY

According to the inflow and infiltration study that was conducted in June of 2019 as part of this Master Plan, there is a large amount of inflow and infiltration (I&I) that is entering the collection system during high precipitation or runoff events. Approximately 6,630 feet of the collection system should be replaced or rehabilitated in order to prevent continued I&I. If I&I can enter the collection system it stands to reason that raw wastewater can flow out of the damaged piping, thus contaminating the surrounding soils and groundwater in the area.

There is also a potential risk of contaminated groundwater from the leaking sewer mains entering the water distribution system. There is a potential for cross contamination of the water distribution system from the leaking sewer collection system should a significant watermain failure or a negative pressure event occur.

The groundwater infiltration is also overloading the existing treatment plant, reducing the treatment efficiency of the system and causing the facility to reach capacity much sooner than anticipated. A reduction in the treatment efficiency can cause inadequately treated wastewater to be discharged into Prickly Pear Creek. Inadequately treated wastewater can contain pathogens that pose a significant health risk to fisherman and recreational users of the Creek.

Without adequate screening, the amount of non-organic material in the treatment process would increase causing plugging and increase the likelihood of operators maintaining the system to come into direct contact with wastewater downstream. Non-organic material removed upstream is easier and typically cheaper to deal with than in the downstream processes. A large amount of the organic material would be washed back into the main process stream. This would provide a decreased odor problem in the headworks building, decreasing pathogens and vector attractants, while providing a healthier work environment for the operators. There would also be less organic material in the landfill and these organics would be returned to the main flow stream where they can be more adequately treated prior to discharge in the Prickly Pear Creek. The solids would be compacted following washing, contributing to a smaller volume required for disposal. Also, the current headworks building was does not conform to Division 1 Class 1 rating for safety. Originally, the screening building was constructed to leave the door open in order to control odors and prevent corrosion. However, it is typically closed, causing corrosion and is unsafe to City Operators.

The installation of an adequate grit removal system with a grit washer would significantly decrease the amount of organic material currently being removed with the grit. A large amount of the organic material would be washed back into the main process stream. This would also decrease odors and there would be less organic material in the landfill. These organics would be returned to the main flow stream where they can be more adequately treated prior to discharge in the Prickly Pear Creek. The existing grit removal system requires the City Operators to remove the grit by hand with a shovel which requires a lot of manual labor and puts the operators in direct contact with wastewater.

3.B. AGING INFRASTRUCTURE

The significant I&I in the collection system mains identified in **Chapter 2 Section 2.C.2.3** are likely due to the significant age of these pipes. While some of the City's collection system has been upgraded to PVC over the years, a majority of the City's collection system consists of clay pipe that is well over 50 years old. Clay pipe has a propensity to lose its structural integrity over time and is often damaged by root intrusion. The clay pipe in the City's collection system either have no gasketed fittings or the gasketted fittings have deteriorated. These factors lead the clay lines to be a major source of inflow and infiltration and obstruction of the gravity sewer collection system. Replacement or rehabilitation of these mains will ensure these collection mains are operational for another 50 years.

As stated in **Chapter 2**, the existing screening system and the grit removal system at the wastewater treatment plant is approximately 20 years old and are not sized for the additional growth the City is anticipating.

The existing screw pumps are aging and in need of maintenance. Currently, grease is not reaching the grease pumps that transports the lubricant to the bearings. If the repairs are not made at this time, the results could be a sudden, unexpected failure of one or more of the pumps.

3.C. REASONABLE GROWTH

The existing wastewater treatment plant was originally designed to treat an average daily flow of 434,400 gpd. The current average daily flow using flow meter records at the wastewater treatment plant from 2015-2019 is 288,635. However, this includes a considerable amount of I&I.

As shown in **Chapter 2**, reduction of the I & I will increase the capacity of the treatment facility and extend its useful life. If the I & I is reduced, the existing treatment system will have the capacity to handle the projected growth through 2033. If the I & I is not reduced, the system will reach capacity by 2027 and the City would need to upgrade their wastewater treatment system.

The infiltration that is entering the collection system and ultimately the treatment system is increasing the operations and maintenance of a wastewater treatment plant since all water entering the wastewater treatment plant must be treated as wastewater. Treating unnecessary amounts of I & I increases the cost of operating the wastewater treatment plant. Reducing the amount of I & I in the collection system would reduce the treatment system energy costs and reduce the operations and maintenance of the wastewater facility.

Reduction of I & I will preserve the groundwater as well as improve the treatment of the effluent that is being discharged into Prickly Pear Creek.

If the I & I is reduced, the City of East Helena Wastewater Treatment Plant will still need to go through major modifications due to the anticipated growth that is expected to occur during the planning period. Future growth anticipated for the City of East Helena would be taken into account in replacement of the aging headworks facility. New screens and grit removal system would be usable with any modifications that would need to be made to the overall treatment facility in order to increase the system's capacity. These would be anticipated to be sized for growth though the planning period and beyond.

An 8" collection main that crosses Montana Highway 12 southwest of the City currently serves few residences. This 8-inch collection line is an old steel main that has corroded over time. This corrosion has inhibited the City Operators to inspect and clean the main. Flows for the pipe are adequate now. However, if there is any additional growth in this area, this main would not be able to handle the extra flow. Any additional growth in the area would require this main to be upgraded.

Future modifications to the treatment plant would need to be re-evaluated in a future Preliminary Engineering Report (PER). Based on assumptions discussed in the capacity analysis in **Chapter 2**, a new PER focusing on modifications to the current treatment would need to begin by the year 2027 If I & I is reduced. If the I & I is not reduced with this project, this process would need to begin by the year 2023.

CHAPTER 4: ALTERNATIVES CONSIDERED

4.A. COLLECTION SYSTEM ALTERNATIVES

4.A.1. COLLECTION SYSTEM ALTERNATIVE 1 – NO-ACTION

4.A.1.1. DESCRIPTION

As stated in **Chapter 2**, the infiltration study that was completed as part of this report shows a significant amount of inflow and infiltration (I & I) into the City of East Helena's wastewater collection system. Not only does excessive I & I increase the operations and maintenance of the wastewater system but it also reduces the capacity of the treatment facility. The No-Action Alternative would not reduce the amount of I & I entering in the collection system. Therefore, the No-Action Alternative is <u>eliminated from further discussion</u>.

4.A.2. COLLECTION SYSTEM ALTERNATIVE 2 – OPEN-DIG REPLACEMENT

4.A.2.1. DESCRIPTION

Under this alternative, the portion of the collection system that was identified during the I&I study detailed in **Chapter 2** and determined to be contributing a majority of the I & I would be replaced by conventional trenching. The identified collection mains would be excavated and replaced with new PVC SDR 35 pipe and new watertight service saddles will be installed on the mains. Manholes identified during the I & I study to be leaking or damaged would be replaced with new 48" concrete manholes as well (Manholes 208 and 541). The remaining manholes could be re-used if in adequate condition.

4.A.2.2. DESIGN CRITERIA

The requirements of the Montana Department of Environmental Quality *Circular DEQ-2 Design Standards for Public Sewage Systems* would be followed during the design and construction of this alternative.

The following design criteria are proposed for this alternative:

Table 4.A.1 – Summary of Proposed Design Criteria for Collection System Alternative 2 – Open-Dig Replacement

System Design Criteria		
Pipe Material		SDR 35 PVC
Minimum Slopes:	8-inch diameter	0.0040 ft/ft
	12-inch diameter	0.0022 ft/ft
	18-inch diameter	0.0012 ft/ft
	24-inch diameter	0.0008 ft/ft
Manholes		Standard 48-inch Precast Concrete - Watertight

4.A.2.3. MAP

Figure 4.A.1 shows the existing collection system and the collection mains that will be replaced as part of this alternative.

4.A.2.4. ENVIRONMENTAL IMPACTS

Short-term environmental impacts would occur during construction such as dust, noise, and emissions from construction equipment. However, these impacts would only be temporary and the contractor would be required to mitigate these impacts when possible by using appropriate construction practices. No significant long-term environmental impacts will occur as a result of this alternative.

This alternative should have a beneficial impact on the environment by reducing the potential for raw sewage to leak from the collection system and reduce the amount of clean groundwater entering the wastewater system preserving this resource.

A Joint Application for Proposed Work in Montana's Streams, Wetlands, Floodplains, and Other Water Bodies would need to be submitted to obtain a SPA 124 Permit from Montana Fish, Wildlife and Parks and a 404 permit from the Army Corps of Engineers as well as a Floodplain Development Permit from the City of East Helena's Floodplain Administrator.

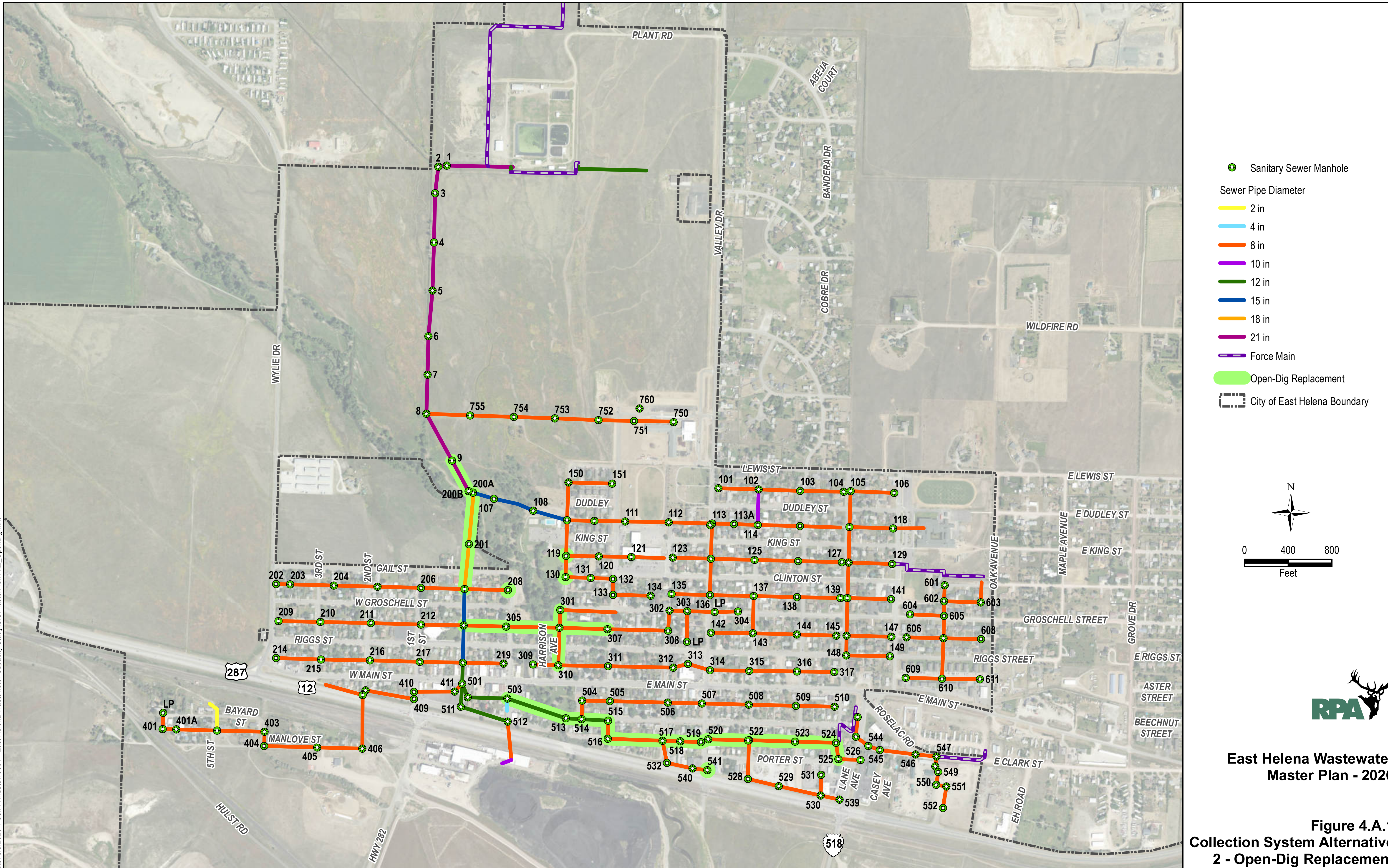
4.A.2.5. LAND REQUIREMENTS

All of the work will occur within existing right-of-way, easements, and City property. Therefore, there should not be a need for additional land acquisition.

4.A.2.6. POTENTIAL CONSTRUCTION PROBLEMS

This alternative will require that the collection mains be removed replaced by open trenching. Pavement will have to be cut on existing paved streets. Some of the existing collection system is located in alleys where there is limited room for construction equipment to operate. The overhead power lines and existing utilities located in the alley could also cause a significant construction issue. Trenches will have to be shored, as there will not be sufficient room to slope the sides of the trenches to meet OSHA requirements. Dewatering may be required depending on the time of year. Damage to adjacent structures is more likely to occur in the alleys due to the tight constraints. Access to homes and garages may be hindered during construction.

While there are no other construction problems anticipated for this alternative, construction projects can generate unforeseen difficulties that cannot be predicted prior to construction. All construction related problems that arise in the field will be promptly addressed and remedied.



East Helena Wastewater Master Plan - 2020

Figure 4.A.1
Collection System Alternative 2 - Open-Dig Replacement

4.A.2.7. SUSTAINABILITY CONSIDERATIONS

WATER AND ENERGY EFFICIENCY

Energy would be consumed during the construction process in the form of fuel and electricity for equipment. However, the long-term operation and maintenance requirements for the collection system should decrease, reducing the energy needed for system maintenance. Reduced flows to the treatment system would reduce the treatment system energy costs. The infiltration that is entering the collection system and ultimately the treatment system is increasing the operations and maintenance of a wastewater treatment facility since all water entering the wastewater treatment facility must be treated as wastewater. Treating unnecessary amounts of I & I increases the cost of operating the wastewater treatment facility.

GREEN INFRASTRUCTURE

The new PVC main would have a life expectancy well over 50 years.

OTHER

If this alternative is undertaken, collection system operational requirements should decrease. The new PVC collection mains would require less effort to clean and maintain and would be significantly less prone to groundwater infiltration. Manpower requirements for collection system maintenance should decrease.

4.A.2.8. COST

Table 4.A.2 below summarize the cost estimates for this alternative. Detailed cost estimates for this alternative are presented in **Appendix I**.

Table 4.A.2: Cost Summary for Collection System Alternative 2 – Open-Dig Replacement

Total Project Cost	$2,321,000.00
Total Annual Operation and Maintenance Cost	$0.00

Included in this cost estimate are construction contingency of 10%, engineering costs of 18%, and administrative/financial costs of 5%. Also included in the cost estimate is an inflation factor of 4.25% for the additional time between funding application submittals and actual construction of the project. This inflation is due to the historic volatility of the construction market.

4.A.3. COLLECTION SYSTEM ALTERNATIVE 3 – CURED IN-PLACE PIPE (CIPP)

4.A.3.1. DESCRIPTION

Under this alternative, the portion of the collection system that was investigated during the I&I study detailed in **Chapter 2** and determined to be contributing a majority of the I & I would be rehabilitated. The mains would be lined with Cured In-Place Pipe (CIPP). Generally, it is more economical to rehabilitate 8-inch and larger sewers with CIPP if the sewers are in paved streets with utilities or in alleys with tight quarters as long as there are no sags or major damage to the pipe. If it is determined that the sewer main has a sag, misaligned joints, or other major damage, that main will need to be replaced instead of rehabilitated. It is assumed that there would be some open-dig required in localized areas as part of this alternative. During dry periods, the City T.V.'d the mains identified in **Chapter 2** that are in need of rehabilitation. These videos were used for this alternative to identify where open-dig may be necessary used to estimate the open-dig quantities.

CIPP usually consists of a resin impregnated liner which is pulled through the sewer main to be lined. Steam is forced through the liner which expands the liner, activates the resins in the line, and binds it to the original pipe. The liner is designed so that it can withstand all soil and vehicular loading even if the original pipe completely decomposes. Services are reconnected with a robot that is driven through the sewer main and cuts out the liner at each service.

Leaking manholes that were identified during the I&I study will be replaced with new standard 48-inch precast concrete. This includes Manhole 208 and Manhole 541 and is relatively minor.

4.A.3.2. DESIGN CRITERIA

The requirements of the Montana Department of Environmental Quality *Circular DEQ-2 Design Standards for Public Sewage Systems* would be followed during the design and construction of this alternative.

4.A.3.3. MAP

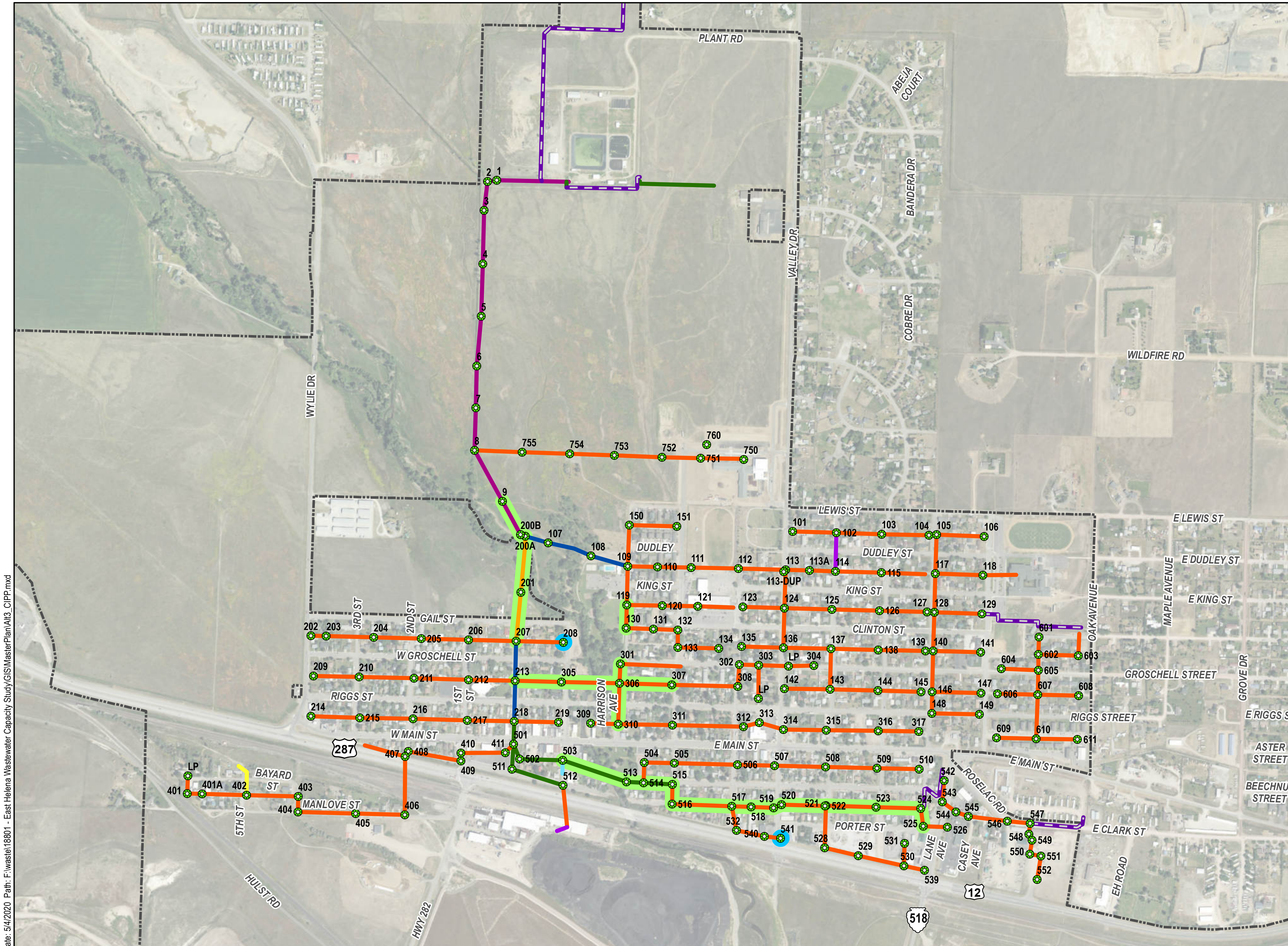
Figure 4.A.2 shows the existing collection system and the collection mains that will be replaced as part of this alternative.

4.A.3.4. ENVIRONMENTAL IMPACTS

Short-term environmental impacts will occur during construction such as dust, noise, and emissions from construction equipment. However, these impacts would only be temporary and the contractor would be required to mitigate these impacts when possible by using appropriate construction practices. No significant long-term environmental impacts will occur as a result of this alternative.

This alternative should have a beneficial impact on the environment by reducing the potential for raw sewage to leak from the collection system and reduce the amount of effluent being discharged from the treatment facility to Prickly Pear Creek.

This alternative will also minimize surface disturbance of the construction area.



Sanitary Sewer Manhole

Sewer Pipe Diameter

- 2 in
- 4 in
- 8 in
- 10 in
- 12 in
- 15 in
- 18 in
- 21 in
- Force Main
- CIPP
- Manhole Replacement
- City of East Helena Boundary

N

0 400 800

Feet

RPA

East Helena Wastewater Master Plan - 2020

Figure 4.A.2
Collection System Alternative 3 -Cured In-Place Pipe (CIPP)

Assuming the sewer mains can be lined, no stream permits will be required. However, if it is determined that the mains that runs through Prickly Pear Creek will need to be fully replaced, a Joint Application for Proposed Work in Montana's Streams, Wetlands, Floodplains, and Other Water Bodies would need to be submitted to obtain a SPA 124 Permit from Montana Fish, Wildlife and Parks and a 404 permit from the Army Corps of Engineers as well as a Floodplain Development Permit from the City of East Helena's Floodplain Administrator.

4.A.3.5. LAND REQUIREMENTS

All of the work will occur within existing right-of-way, easements, and City property. Therefore, there should not be a need for additional land acquisition.

4.A.3.6. POTENTIAL CONSTRUCTION PROBLEMS

This alternative will require that the collection mains be rehabilitated by CIPP lining. By-pass pumping of sewer flows would be required for segments of pipe that are being rehabilitated. Dewatering may be required depending on the time of year for installation of the new manholes. Damage to adjacent structures is less likely to occur in the alleys due to the tight constraints because lining does not disturb existing ground above the pipe. Access to homes and garages may be hindered during construction but would be less likely with lining. Areas where the pipe is severely damaged or has a sag or low spot would have to be dug and a spot repair performed on that particular section of pipe.

While there are no other construction problems anticipated for this alternative, construction projects can generate unforeseen difficulties that cannot be predicted prior to construction. All construction related problems that arise in the field will be promptly addressed and remedied.

4.A.3.7. SUSTAINABILITY CONSIDERATIONS

WATER AND ENERGY EFFICIENCY

Energy would be consumed during the construction process in the form of fuel and electricity for equipment. However, the long-term operation and maintenance requirements for the collection system should decrease, reducing the energy needed for system maintenance. The infiltration that is entering the collection system and ultimately the treatment system is increasing the operations and maintenance of a wastewater treatment facility since all water entering the wastewater treatment facility must be treated as wastewater. Treating unnecessary amounts of I & I increases the cost of operating the wastewater treatment facility.

GREEN INFRASTRUCTURE

The new CIPP lined mains have a life expectancy well over 50 years.

OTHER

If this alternative is undertaken, collection system operational requirements should decrease. The rehabilitated collection mains would require less effort to clean and maintain and would be significantly less prone to groundwater infiltration. Manpower requirements for collection system maintenance should decrease.

Collection systems can be damaged when forced to handle more flow than they were designed for. In extreme cases, excessive I & I can lead to structural failure and collapse of the sewer pipe due to soil erosion underneath the pipe, possibly causing paved roads and alleyways to buckle and sag.

4.A.3.8. COST

Table 4.A.3 below summarize the cost estimates for this alternative. Detailed cost estimates for this alternative are presented in **Appendix I**.

Table 4.A.3: Cost Summary for Collection System Alternative 3 – CIPP

Total Project Cost	$717,200.00
Total Annual Operation and Maintenance Cost	$0.00

Included in this cost estimate are construction contingency of 10%, engineering costs of 18%, and administrative/financial costs of 5%. Also included in the cost estimate is an inflation factor of 4.25% for the additional time between funding application submittals and actual construction of the project. This inflation is due to the historic volatility of the construction market.

4.B. MONTANA AVENUE LIFT STATION

4.B.1. MONTANA AVENUE LIFT STATION ALTERNATIVE 1 – NO-ACTION

4.B.1.1. DESCRIPTION

As stated in **Chapter 2**, the Montana Avenue lift station is currently located in the middle of Montana Avenue/Valley Drive. With the addition of the East Helena High School and the anticipated growth north of the City, traffic on Montana Avenue/Valley Drive has and will continue to increase dramatically over the next several years. New developments including the new East Helena High School, Vigilante Subdivision, and the Highland Meadows Subdivision are expected to increase the number of daily trips on Montana Avenue/Valley Drive. The new East Helena High School is expected to generate 1,015 new daily trips on Montana Avenue/Valley Drive, the Vigilante Subdivision is expected to generate an additional 680 daily trips, and the Highland Meadows Subdivision is expected to generate 3,021 daily trips for a total of 4,716 additional daily trips. Also, according to City Operators, the Montana Avenue lift station is prone to plugging which requires the pumps to be removed. The location of this lift station requires the operators work in the middle of Montana Avenue/Valley Drive, often times during busy peak driving periods. This makes it difficult and unsafe for operators to access and maintain this lift station.

With the Montana Avenue lift station being located in the roadway, controls for the lift station are located on a rack in the road right-of-way and the system does not have a permanent generator. Instead, the Montana Avenue lift station shares a portable generator with the Wylie pumps during a power outage. The City of East Helena recently published design standards that includes all lift station be located in a building and have a permanent generator. The Montana Avenue lift station does not adhere to these regulations. The No-Action Alternative would not eliminate the unsafe conditions this lift station poses to the operators or adhere to City regulations. Therefore, the No-Action Alternative is <u>eliminated from further discussion</u>.

4.B.2. MONTANA AVENUE LIFT STATION ALTERNATIVE 2 – W. DUDLEY STREET

4.B.2.1. DESCRIPTION

This alternative explores the option of replacing the existing lift station that is currently located in the middle of Montana Avenue to W. Dudley Street as shown in **Figure 4.B.1**. W. Dudley Street is used as one of two accesses to a residential 4-plex located off Montana Avenue. Moving the lift station to this location would provide the City Operators with much better access to the facility.

There are approximately 202 services that are served by the Montana Avenue lift station and the average daily flow as discussed in **Chapter 2** for the Montana Avenue lift station is approximately 45,500 gpd.

This alternative would provide a new submersible pump type lift station below ground similar to the current Montana Avenue lift station. However, this lift station would be in a relatively safe location for operators to access when needed. This alternative would continue to rely on the portable generator for use as backup power.

The abandonment of the existing Montana Avenue lift station is also included with this alternative.

This alternative would require portions of the collection system to be re-routed to get the wastewater to the new lift station location with the addition/replacement of new manholes and modifications of existing manholes. A forcemain would also be required to move the wastewater back to the existing collection system.

While this alternative would move the Montana Avenue lift station to a location that would not have the amount of traffic as the existing lift station, this alternative does not have the area for a building for controls and a permanent generator. Also, this alternative does not follow the City of East Helena engineering design standards that have been published.

4.B.2.2. DESIGN CRITERIA

The requirements of the Montana Department of Environmental Quality *Circular DEQ-2 Design Standards for Public Sewage Systems* would be followed during the design and construction of this alternative.

This alterative proposes to install a new wet well and two new submersible pumps that are capable of pumping 500 gpm. This is the pumping rate required to meet the peak hourly flow individually.

The following design criteria are proposed for this alternative:

Table 4.B.1 – Summary of Proposed Design Criteria for Montana Avenue Lift Station Alterative 2 – W. Dudley Street

System Design Criteria		
Average Design Flow Rate (influent)		32 gpm
Peak Hour Flow Rate (influent)		500 gpm
Minimum Flushing Velocity		2.0 fps
Design Flushing Velocity		2.4 fps
Maximum Wet Well Fill Time		30 minutes
Wet Well		Concrete vault (10' diameter or 12' x 12' vault, TBD during design)
Pipe Material		SDR 35 PVC
Minimum Slopes:	8-inch diameter	0.0040 ft/ft
	12-inch diameter	0.0022 ft/ft
Manholes		Standard 48-inch Precast Concrete - Watertight

4.B.2.3. MAP

Figure 4.B.1 shows the location of the new Montana Avenue lift station and **Figure 4.B.2** shows a schematic of the Montana Avenue lift station alternative at W. Dudley Street.

4.B.2.4. ENVIRONMENTAL IMPACTS

The new lift station may require dewatering to install the new wet well. If needed, the contractor would likely have to utilize dewatering wells in order to draw down the water table temporarily during construction.

Short-term environmental impacts will occur during construction such as dust, noise, and emissions from construction equipment. However, these impacts would only be temporary and the contractor would be required to mitigate these impacts when possible by using appropriate construction practices. No significant long-term environmental impacts will occur as a result of this alternative.

Existing Montana Avenue Lift Station

New Montana Avenue Lift Station

N

0 50 100

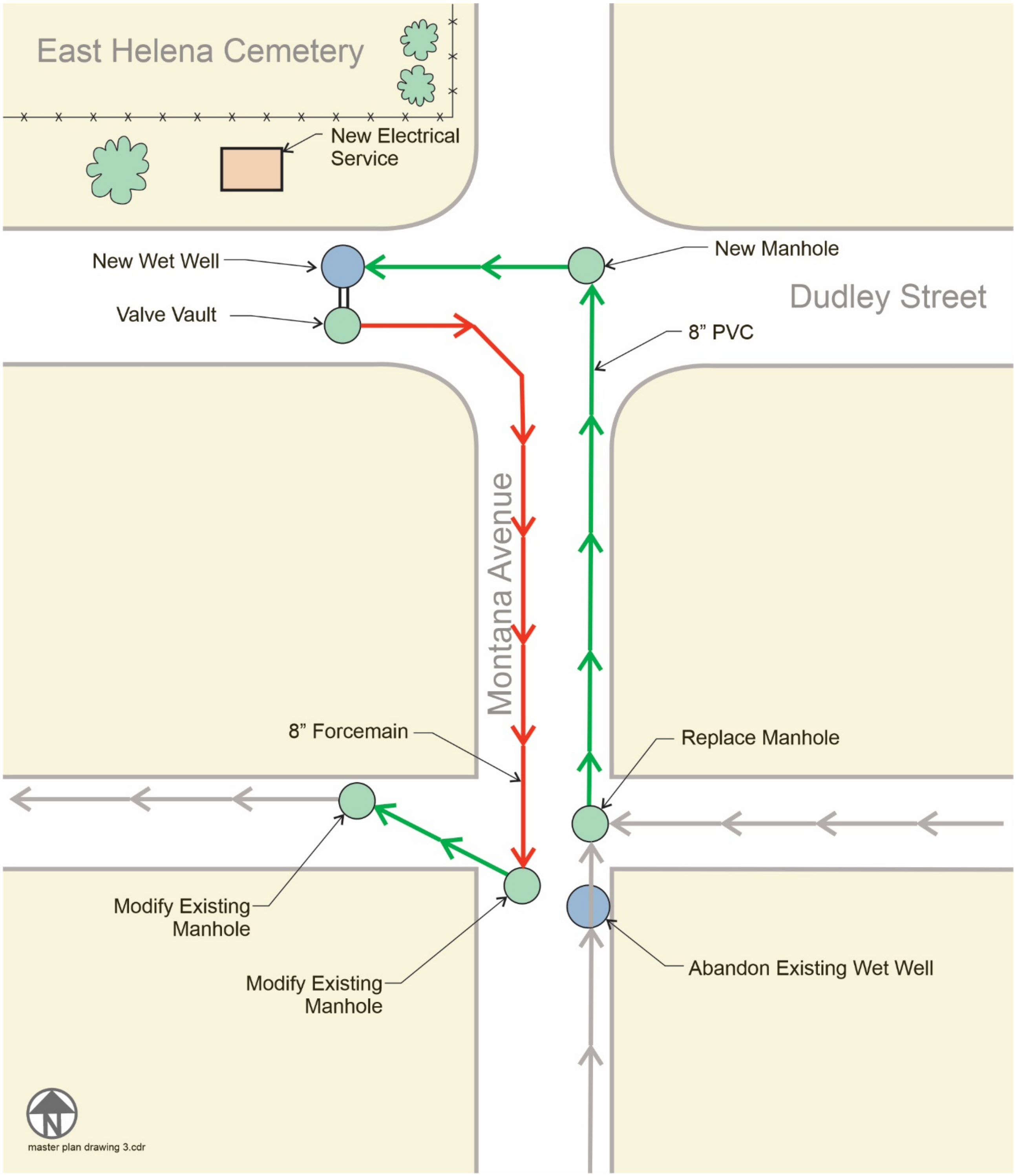
Feet

East Helena Wastewater Master Plan - 2020

Figure 4.B.1.
Montana Avenue Lift Station Replacement Alternative 2 - W. Dudley St. Location

Date: 5/4/2020 Path: F:\waste\18801 - East Helena Wastewater Capacity Study\GIS\MasterPlanAlt2_LSReplacement.mxd

Figure 4.B.2: Montana Avenue Lift Station Alternative 2 – Schematic of the W. Dudley Street Lift Station



4.B.2.5. LAND REQUIREMENTS

All of the work will occur within the City of East Helena property. Not additional land would be required for this alternative.

4.B.2.6. POTENTIAL CONSTRUCTION PROBLEMS

While there are no construction problems anticipated for this alternative, construction projects can generate unforeseen difficulties that cannot be predicted prior to construction. All construction related problems that arise in the field will be promptly addressed and remedied.

Maintaining service during construction of the new lift station will be challenging. The wastewater system will need to stay operational during construction. Therefore, bypass pumping, construction sequencing, and a solid bypass plan will be important components to having this new lift station installation go smoothly.

Construction sequencing of the Montana Avenue/Valley Drive reconstruction project will need to be taken into account for this alternative.

Construction of this alternative will occur on the route to the East Helena High School and two (2) elementary schools in the area. Therefore, work may need to occur when these schools are out of session during the summer months.

4.B.2.7. SUSTAINABILITY CONSIDERATIONS

WATER AND ENERGY EFFICIENCY
The new lift station pumps will be energy efficient and equipped with variable frequency drives (VFD’s) in order to allow the most efficient operation of these pumps while conserving energy.

GREEN INFRASTRUCTURE
To the extent possible, recyclable materials like fly ash can be used in the construction.

4.B.2.8. COST

Table 4.B.2 below summarize the cost estimates for this alternative. Detailed cost estimates for this alternative are presented in **Appendix I**.

Table 4.B.2: Cost Summary for Montana Avenue Lift Station Alternative 2 – W. Dudley Street

Total Project Cost	$855,900.00
Total Annual Operation and Maintenance Cost	$0.00

Included in this cost estimate are construction contingency of 10%, engineering costs of 18%, and administrative/financial costs of 5%. Also included in the cost estimate is an inflation factor of 4.25% for the additional time between funding application submittals and actual construction of the project. This inflation is due to the historic volatility of the construction market.

4.B.3. MONTANA AVENUE LIFT STATION ALTERNATIVE 3 – KING STREET ALLEY

4.B.3.1. DESCRIPTION

This alternative explores the option of replacing the existing lift station currently located in the middle of Montana Avenue to a piece of property that is located adjacent to the King Street alley as shown in **Figure 4.B.3**. Moving the lift station to this location would provide the City Operators with much better access to the facility.

There are approximately 202 services that are served by the Montana Avenue lift station and the average daily flow as discussed in **Chapter 2** for the Montana Avenue lift station is approximately 45,500 gpd.

This alternative would provide a new submersible pump type lift station. The new lift station would be located south east of the existing lift station and all pump controls would be housed in in a 20' x 20' building that would allow the operators to access and maintain the lift station easily to access the controls and a permanent generator which meets the City of East Helena's design standards. A fence would be installed around the new lift station to secure the property. This alternative would also include a 60kW generator for use as backup power.

This alternative includes the abandonment of the existing Montana Avenue lift station.

This alternative would require portions of the collection system to be re-routed and regraded to get the wastewater to the new lift station location with the addition/replacement of new manholes and modifications of existing manholes. A forcemain would also be required to move the wastewater back to the existing collection system.

4.B.3.2. DESIGN CRITERIA

The requirements of the Montana Department of Environmental Quality *Circular DEQ-2 Design Standards for Public Sewage Systems* and the *City of East Helena Engineering Design Standards* would be followed during the design and construction of this alternative.

This alterative proposes to install a new wet well and two new submersible pumps that are capable of pumping 500 gpm. This is the pumping rate required to meet the peak hourly flow individually.

The following design criteria are proposed for this alternative:

Table 4.B.3 – Summary of Proposed Design Criteria for Montana Avenue Lift Station Alternative 3 – King Street Alley

System Design Criteria		
Average Design Flow Rate (influent)		32 gpm
Peak Hour Flow Rate (influent)		500 gpm
Minimum Flushing Velocity		2.0 fps
Design Flushing Velocity		2.4 fps
Maximum Wet Well Fill Time		30 minutes
Wet Well		Concrete vault (10’ diameter or 12’ x 12’ vault, TBD during design)
Pipe Material		SDR 35 PVC
Minimum Slopes:	8-inch diameter	0.0040 ft/ft
	12-inch diameter	0.0022 ft/ft
Manholes		Standard 48-inch Precast Concrete - Watertight

4.B.3.3. MAP

Figure 4.B.3 shows the location of the new Montana Avenue lift station and **Figure 4.B.4** shows a schematic of the Montana Avenue lift station alternative at the King Street Alley.

4.B.3.4. ENVIRONMENTAL IMPACTS

The new lift station may require dewatering to install the new wet well. The contractor may have to utilize dewatering wells in order to draw down the water table temporarily during construction.

Short-term environmental impacts will occur during construction such as dust, noise, and emissions from construction equipment. However, these impacts would only be temporary and the contractor would be required to mitigate these impacts when possible by using appropriate construction practices. No significant long-term environmental impacts will occur as a result of this alternative.

4.B.3.5. LAND REQUIREMENTS

A parcel of land located adjacent to the King Street alley would need to be acquired as part of this alternative. The City and landowner have no firm commitment for the sale of this parcel for this alternative and will need to be explored further with the landowner.

Existing Montana Avenue Lift Station
New Montana Avenue Lift Station

N

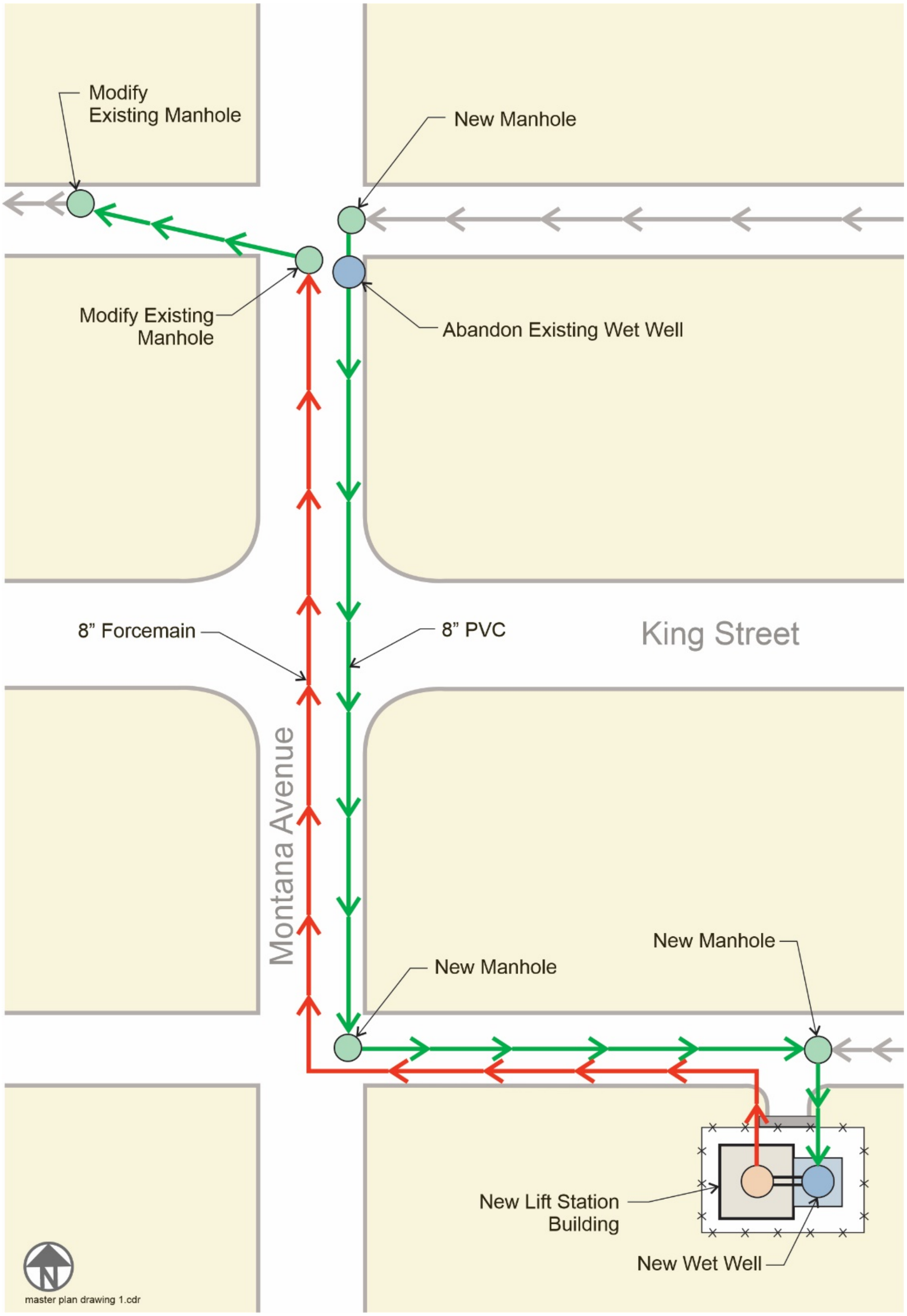
0 50 100
Feet

East Helena Wastewater Master Plan - 2020

Figure 4.B.3.
Montana Avenue Lift Station Replacement
Alternative 3 - King St. Alley Location

Date: 5/4/2020 Path: F:\waste\18801 - East Helena Wastewater Capacity Study\GIS\MasterPlan\Alt3_LSReplacement.mxd

Figure 4.B.4: Montana Avenue Lift Station Alternative 3 – Schematic of the King Street Alley Lift Station



4.B.3.6. POTENTIAL CONSTRUCTION PROBLEMS

While there are no construction problems anticipated for this alternative, construction projects can generate unforeseen difficulties that cannot be predicted prior to construction. All construction related problems that arise in the field will be promptly addressed and remedied.

Maintaining service during construction of the new lift station will be challenging. The wastewater system will need to stay operational during construction. Therefore, bypass pumping, construction sequencing, and a solid bypass plan will be important components to having this new lift station installation go smoothly.

Construction sequencing of the Montana Avenue/Valley Drive reconstruction project will need to be taken into account for this alternative.

Construction of this alternative will occur on the route to the East Helena High School and two (2) elementary schools in the area. Therefore, work may need to occur when these schools are out of session during the summer months.

4.B.3.7. SUSTAINABILITY CONSIDERATIONS

WATER AND ENERGY EFFICIENCY
The new lift station pumps will be energy efficient and equipped with variable frequency drives (VFD's) in order to allow the most efficient operation of these pumps while conserving energy. Use of high efficiency lighting in the lift station building as well as LED lighting outside will be considered for this alternative.

GREEN INFRASTRUCTURE
To the extent possible, recyclable materials like fly ash can be used in the construction.

4.B.3.8. COST

Table 4.B.4 below summarize the cost estimates for this alternative. Detailed cost estimates for this alternative are presented in **Appendix I**.

Table 4.B.4: Cost Summary for Montana Avenue Lift Station Alternative 3 – King Street Alley

Total Project Cost	$1,454,800.00
Total Annual Operation and Maintenance Cost	$0.00

Included in this cost estimate are construction contingency of 10%, engineering costs of 18%, and administrative/financial costs of 5%. Also included in the cost estimate is an inflation factor of

4.25% for the additional time between funding application submittals and actual construction of the project.

4.B.4. MONTANA AVENUE LIFT STATION ALTERNATIVE 4 – EAST HELENA CEMETERY

4.B.4.1. DESCRIPTION

This alternative explores the option of moving the existing lift station that is currently located in the middle of Montana Avenue to the northeast corner of the East Helena Cemetery as shown in **Figure 4.B.5**. Moving the lift station to this location would provide the City Operators with much better access to the facility.

There are approximately 202 services that are served by the Montana Avenue lift station and the average daily flow as discussed in **Chapter 2** for the Montana Avenue lift station is approximately 45,500 gpd.

This alternative would provide a new submersible pump type lift station. The new lift station would be located north west of the existing lift station and all pump controls would be housed in in a 16' x 16' building that would allow the operators to access and maintain the lift station easily to access the controls and a permanent generator which meets the City of East Helena's design standards A fence would be installed around the new lift station to secure the property. This alternative would include a 60kW generator for use as backup power.

This alternative includes the abandonment of the existing Montana Avenue lift station.

4.B.4.2. DESIGN CRITERIA

The requirements of the Montana Department of Environmental Quality *Circular DEQ-2 Design Standards for Public Sewage Systems* and the *City of East Helena Engineering Design Standards* would be followed during the design and construction of this alternative.

This alterative proposes to install a new wet well and two new submersible pumps that are capable of pumping 500 gpm. This is the pumping rate required to meet the peak hourly flow individually.

The following design criteria are proposed for this alternative:

Table 4.B.5 – Summary of Proposed Design Criteria for Montana Avenue Lift Station Alternative 4 – East Helena Cemetery

System Design Criteria		
Average Design Flow Rate (influent)		50 gpm
Peaking Factor		3.9
Peak Hour Flow Rate (influent)		500 gpm
Minimum Flushing Velocity		2.0 fps
Design Flushing Velocity		2.4 fps
Maximum Wet Well Fill Time		30 minutes
Wet Well		Concrete vault (10’ diameter or 12’ x 12’ vault, TBD during design)
Pipe Material		SDR 35 PVC
Minimum Slopes:	8-inch diameter	0.0040 ft/ft
	12-inch diameter	0.0022 ft/ft
Manholes		Standard 48-inch Precast Concrete - Watertight

4.B.4.3. MAP

Figure 4.B.5 shows the location of the new Montana Avenue lift station and **Figure 4.B.6** shows a schematic of the Montana Avenue lift station alternative at the East Helena Cemetery.

4.B.4.4. ENVIRONMENTAL IMPACTS

The new lift station may require dewatering to install the new wet well. The contractor would may have to utilize dewatering wells in order to draw down the water table temporarily during construction. The water table is high in this area and this temporary lowering should not create issues or negatively impact the environment.

Short-term environmental impacts will occur during construction such as dust, noise, and emissions from construction equipment. However, these impacts would only be temporary and the contractor would be required to mitigate these impacts when possible by using appropriate construction practices. No significant long-term environmental impacts will occur as a result of this alternative.

4.B.4.5. LAND REQUIREMENTS

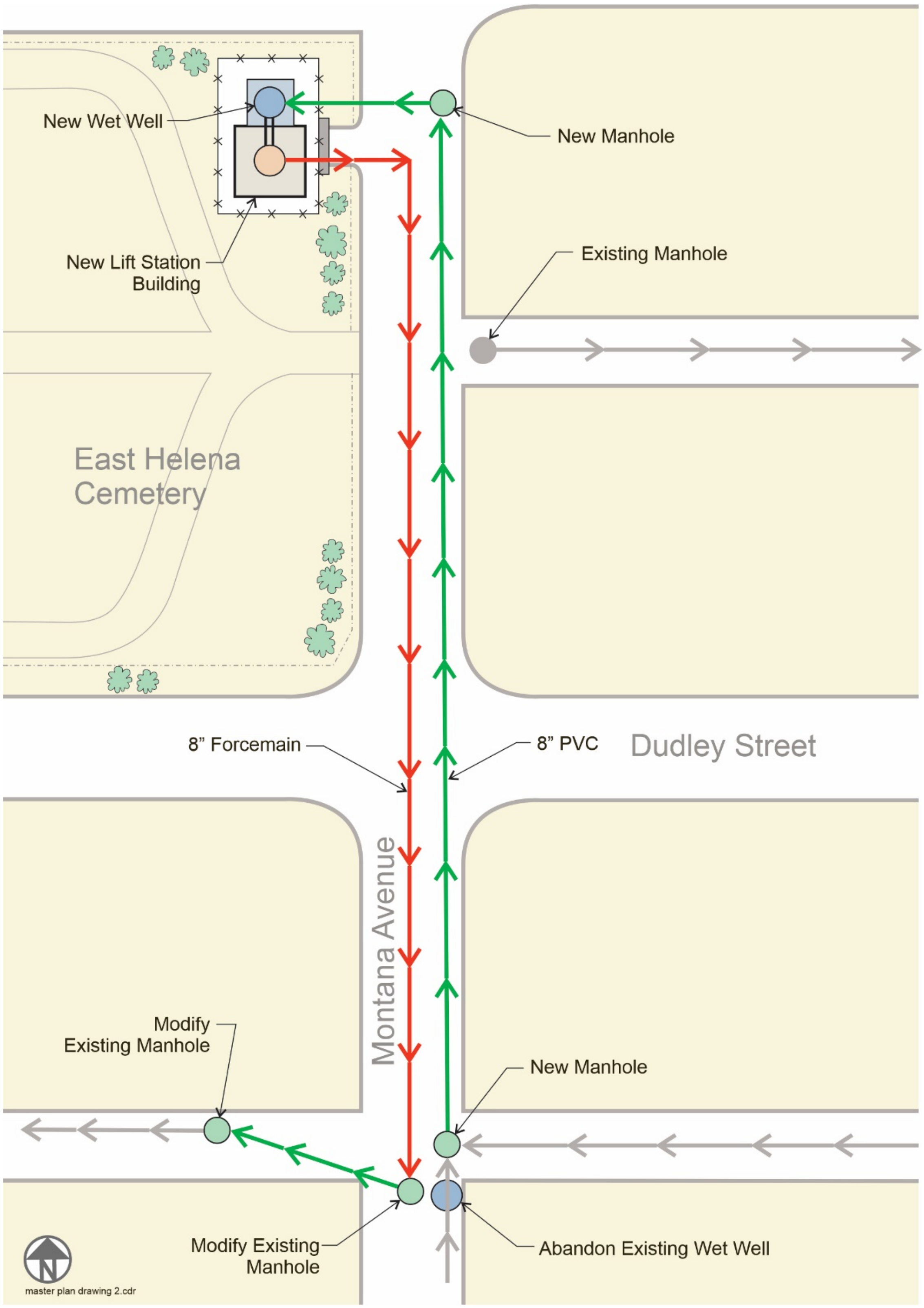
Land would need to be acquired as part of this alternative. Some of the land required for this Alternative may be acquired as part of the City’s proposed project to improve Montana Avenue/Valley Drive.

East Helena Wastewater Master Plan - 2020

Figure 4.B.5.
Montana Avenue Lift Station Replacement
Alternative 4 - East Helena Cemetery Location

Date: 5/4/2020 Path: F:\waste\18801 - East Helena Wastewater Capacity Study\GIS\MasterPlanAlt4_LSReplacement.mxd

Figure 4.B.6: Montana Avenue Lift Station Replacement Alternative 4 – Schematic of the East Helena Cemetery Lift Station



4.B.4.6. POTENTIAL CONSTRUCTION PROBLEMS

While there are no construction problems anticipated for this alternative, construction projects can generate unforeseen difficulties that cannot be predicted prior to construction. All construction related problems that arise in the field will be promptly addressed and remedied.

Maintaining service during construction of the new lift station will be challenging. The wastewater system will need to stay operational during construction. Therefore, bypass pumping, construction sequencing, and a solid bypass plan will be important components to having this new lift station installation go smoothly.

Construction sequencing of the Montana Avenue/Valley Drive reconstruction project will need to be taken into account for this alternative.

Construction of this alternative will occur on the route to the East Helena High School and two (2) elementary schools in the area. Therefore, work may need to occur when these schools are out of session during the summer months.

4.B.4.7. SUSTAINABILITY CONSIDERATIONS

WATER AND ENERGY EFFICIENCY
The new lift station pumps will be energy efficient and equipped with variable frequency drives (VFD's) in order to allow the most efficient operation of these pumps while conserving energy.

GREEN INFRASTRUCTURE
To the extent possible, recyclable materials like fly ash can be used in the construction.

4.B.4.8. COST

Table 4.B.6 below summarize the cost estimates for this alternative. Detailed cost estimates for this alternative are presented in **Appendix I**.

Table 4.B.6: Cost Summary for Montana Avenue Lift Station Alternative 4 – East Helena Cemetery

Total Project Cost	$1,467,300.00
Total Annual Operation and Maintenance Cost	$0.00

Included in this cost estimate are construction contingency of 10%, engineering costs of 18%, and administrative/financial costs of 5%. Also included in the cost estimate is an inflation factor of 4.25% for the additional time between funding application submittals and actual construction of the project. This inflation is due to the historic volatility of the construction market.

4.C. TREATMENT SYSTEM ALTERNATIVES

As stated in **Chapter 2**, the city of East Helena's existing wastewater treatment facility is aging and it is anticipated to reach capacity during the planning period. It has been noted that the existing treatment system will need to be re-evaluated in the near future, taking into account the anticipated growth the system will be required to accept. However, improvements to some of the existing treatment facilities components should be considered at this time to maintain reliable treatment in anticipation for future growth.

At this time, the following components are being evaluated as part of this report and the options listed will be evaluated in further detail in this section:

Flow Equalization Basin Liner
1. No action.

Screening
1. No action.
2. Install new mechanical bar screen with washer/compactor.
3. Install new drum screen with screw compactor.

Grit Removal
1. No action.
2. Install new Vortex grit removal system with grit washer.
3. install new Headcell® grit removal system with grit washer.

Screw Pumps
1. No action.
2. Rehabilitate Existing Screw Pumps.
3. Replace Existing Screw Pumps.

RAS Pumps
1. No action.

4.C.1. FLOW EQUALIZATION BASIN LINER ALTERNATIVE 1 – NO-ACTION

4.C.1.1. DESCRIPTION

As stated in **Chapter 2**, the existing flow equalization basin liner is failing which has the potential to contaminate groundwater in the area. This No-Action Alternative would not prevent possible groundwater contamination. However, the existing treatment facility is nearing capacity and will require significant upgrades. It is expected that an evaluation of the treatment facility may need to begin as early as 2023 and constructed by 2027. As a result, it would not be prudent at this time for the City to spend money on a new flow equalization basin liner when a new treatment alternative may be considered and the flow equalization may not be utilized/needed depending on future treatment facility upgrades. Future upgrades or modifications to the flow equalization basin should be included with overall wastewater treatment plant evaluation that will be completed as early as 2023. Therefore, the No-Action Alternative is the only alternative prudent at this time.

4.C.2. SCREENING ALTERNATIVE 1 – NO-ACTION

4.C.2.1. DESCRIPTION

As stated in **Chapter 2**, the existing screening system at the wastewater treatment facility is approximately 20 years old and some components are nearing the end of its useful life and need to be replaced. Also, the current headworks building is not rated Division 1 Class 1 for safety. This No-Action Alternative would not allow the City's screening system to handle the additional wastewater that is anticipated over the next several years. Therefore, the No-Action Alternative is eliminated from further discussion.

4.C.3. SCREENING ALTERNATIVE 2 – INSTALL NEW MECHANICAL BAR SCREEN WITH WASHER/COMPACTOR

4.C.3.1. DESCRIPTION

This alternative includes the installation of a new mechanical bar screen to replace the existing screen utilizing the existing screening channels. This alternative also includes the installation of a new washer/compactor for the removed screenings. The mechanical bar screen and washer/compactor would be housed in the existing screening building. A new building or small addition to the existing building would be constructed to house the electrical controls for the screening equipment. Sewer gases, including hydrogen sulfide, ammonia, methane, carbon monoxide, sulfur dioxide and nitrogen oxides can be present in various concentrations in the raw wastewater entering the headworks building. Because of these gases, all electrical components would be required to be Class 1 Division 1 (C1D1) rated explosion proof. Housing the controls for the screening would allow the City to continue to utilize the existing headworks building and avoid the high cost of explosion proof control panels.

Although the controls for the system will be housed in a separate building, the lighting and other electrical components located in the screening room would be upgraded to the C1D1 rating. The ventilation in the existing building will also be upgraded as part of this alternative.

The openings to the screen would be ¼-inch. Screening smaller inorganic solids removes them from the process and prevents build-up and clogging in the downstream processes.

The new screen would be placed in the existing bypass concrete channel below the floor of the screening room. As material builds up on the face of the screen, the water level upstream of the screen would rise due to the increased hydraulic losses. A level control system would monitor the water level upstream of the screen and activate the screens mechanical cleaning operation at a pre-set water level. Once the level is realized, screenings would be mechanically transported up the screen to a washer where the material would be washed and compacted. The washed screenings would be compacted and the water "squeezed" from the material. The wash water would be returned to the channel and treatment process.

Screenings are typically pressure washed and compacted before ultimate disposal with the majority of the organic material being returned to process for treatment. The washing/compacting process can be either provided integral to the screen or provided as a separate unit. For the purposes of this alternative, it has been assumed the washer/compactor is supplied and installed as a separate unit. The primary reason for this assumption is that many of the screens that have the washer/compactor integrated into the unit are longer and require more space than what is available.

A manual screen would be installed in the existing screen channel. This screen would be used in case of emergencies and during maintenance events on the mechanical screen.

The interior siding in the existing building will be replaced as part of this alternative as well.

Appendix J contains the manufacturer's information on this system.

4.C.3.2. DESIGN CRITERIA

The requirements of the Montana Department of Environmental Quality *Circular DEQ-2 Design Standards for Public Sewage Systems* would be followed during the design and construction of this alternative.

The screening system included with this alternative would be designed for the future growth anticipated for the wastewater treatment facility. A peak flow of 2,880,000 gpd would allow the screening system to be upgraded now and not during the wastewater treatment facility upgrade.

4.C.3.3. MAP

Figure 4.C.1 shows the location of the screen at the wastewater treatment facility.

4.C.3.4. ENVIRONMENTAL IMPACTS

This alternative would allow the City to continue removal of non-organic material in the treatment process. Non-organic material removed upstream is easier and typically cheaper to deal with than in the downstream processes. A large amount of the organic material would be washed back into the main process stream. This would provide a decreased odor problem in the Headworks Building, decreasing pathogens and vector attractants, while providing a healthier work environment for the operators. There would also be less organic material in the landfill and these organics would be returned to the main flow stream where they can be more adequately treated prior to discharge in the Prickly Pear Creek. The solids would be compacted following washing, contributing to a smaller volume required for disposal.

Headworks Building - Screening

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East Helena Wastewater
Master Plan - 2020

N

0 50 100
Feet

RPA

Figure 4.C.1.
Screening Alternative 2 - Install New Mechanical Bar Screen with Washer/Compactor

4.C.3.5. LAND REQUIREMENTS

Installation of the new mechanical bar screen with a separate washer/compactor would occur in the existing Headworks Building at the City of East Helena's wastewater treatment facility (WWTF). All other improvements with this alternative would be located at the WWTF. No additional land would be required.

4.C.3.6. POTENTIAL CONSTRUCTION PROBLEMS

While there are no construction problems anticipated for this alternative, construction projects can generate unforeseen difficulties that cannot be predicted prior to construction. All construction related problems that arise in the field will be promptly addressed and remedied.

Maintaining flow and screening operations during the installation of the new screen and control room may prove difficult. It is expected that the existing auxiliary screen would be used during the installation of the new mechanical bar screen to allow for the continued preliminary treatment of the wastewater influent.

4.C.3.7. SUSTAINABILITY CONSIDERATIONS

WATER AND ENERGY EFFICIENCY
Use of high efficiency lighting in the Headworks Building as well as LED lighting outside will be considered for this alternative.

GREEN INFRASTRUCTURE
The continued removal of the trash and debris prior to treatment will ensure optimization of the treatment process and ensure that the water discharged to Prickly Pear Creek is optimally treated.

The new building could be constructed from recyclable material, regional CMU blocks and regional wood products. Fly ash used in concrete is another example of recyclable materials that can be used and can be specified in the contract documents.

4.C.3.8. COST

Table 4.C.1 below summarize the cost estimates for this alternative. Detailed cost estimates for this alternative are presented in **Appendix I**.

Table 4.C.1: Screening Alternative 2 – Install New Mechanical Bar Screen with Washer/Compactor

Total Project Cost	$727,100.00
Total Annual Operation and Maintenance Cost	$0.00

Included in this cost estimate are construction contingency of 10%, engineering costs of 18%, and administrative/financial costs of 5%. Also included in the cost estimate is an inflation factor of 4.25% for the additional time between funding application submittals and actual construction of the project. This inflation is due to the historic volatility of the construction market.

4.C.4. SCREENING ALTERNATIVE 3 – INSTALL NEW DRUM SCREEN INCLUDING SCREW COMPACTOR

4.C.4.1. DESCRIPTION

This alternative includes the installation of an Ovivo® Ozzy Cup Screen, a 6-foot diameter drum structure, with a ¼" screen opening placed in the existing screening channel. Water flows from the inside of the drum to the outside through ¼" meshed panels arranged around the drums periphery. The mesh panels are then cleaned by spray wash nozzles mounted on the outer side of the drum screen. A screening hopper collects the screenings and conveyed to the screw compactor through a sluice trough.

The screening structure would be housed in the existing screening building and a new building or addition to the existing building would be constructed to house the electrical controls for the screening equipment. Sewer gases, including hydrogen sulfide, ammonia, methane, carbon monoxide, sulfur dioxide and nitrogen oxides can be present in various concentrations in the raw wastewater entering the headworks building. Because of these gases, all electrical components would be required to be Class 1 Division 1 (C1D1) rated explosion proof. Housing the controls for the screening would allow the City to continue to utilize the existing headworks building and avoid the high cost of explosion proof control panels.

Although the controls for the system will be housed in a separate building, the lighting and other electrical components located in the screening room would be upgraded to the C1D1 rating. The ventilation in the existing building will also be upgraded as part of this alternative.

The openings to the screen would be ¼-inch. Screening smaller inorganic solids removes them from the process and prevents build-up and clogging in the downstream processes.

A manual screen would be installed in the existing bypass screen channel. This screen would be used in case of emergencies and during maintenance events on the mechanical screen.

Appendix J contains the manufacturer's information on this system.

4.C.4.2. DESIGN CRITERIA

The requirements of the Montana Department of Environmental Quality *Circular DEQ-2 Design Standards for Public Sewage Systems* would be followed during the design and construction of this alternative.

The screening system included with this alternative would be designed for the future growth anticipated for the wastewater treatment facility. A peak flow of 2,880,000 gpd would allow the screening system to be upgraded now and not during the wastewater treatment facility upgrade.

4.C.4.3. MAP

Figure 4.C.2 shows the location of the screen at the wastewater treatment facility.

4.C.4.4. ENVIRONMENTAL IMPACTS

This alternative would allow the City to continue removal of non-organic material in the treatment process. Non-organic material removed upstream is easier and typically cheaper to deal with than in the downstream processes. A large amount of the organic material would be washed back into the main process stream. This would provide a decreased odor problem in the Headworks Building, decreasing pathogens and vector attractants, while providing a healthier work environment for the operators. There would also be less organic material in the landfill and these organics would be returned to the main flow stream where they can be more adequately treated prior to discharge in the Prickly Pear Creek. The solids would be compacted following washing, contributing to a smaller volume required for disposal.

4.C.4.5. LAND REQUIREMENTS

Installation of the new mechanical bar screen with a separate washer/compactor would occur in the existing headworks building at the City of East Helena's wastewater treatment facility. All other improvements with this alternative would be located at the WWTF. No additional land would be required.

4.C.4.6. POTENTIAL CONSTRUCTION PROBLEMS

While there are no construction problems anticipated for this alternative, construction projects can generate unforeseen difficulties that cannot be predicted prior to construction. All construction related problems that arise in the field will be promptly addressed and remedied.

Maintaining flow and screening operations during the installation of the new screen and control room may prove difficult. It is expected that the new screen would be installed in the bypass channel which the existing screen remains in service during construction.

4.C.4.7. SUSTAINABILITY CONSIDERATIONS

<u>WATER AND ENERGY EFFICIENCY</u>
Use of high efficiency lighting in the headworks building as well as LED lighting outside will be considered for this alternative.

Headworks Building - Screening

N

0 50 100
Feet

East Helena Wastewater
Master Plan - 2020

Figure 4.C.2.
Screening Alternative 3 - Install New Drum Screen with Washer/Compactor

RPA

Date: 5/4/2020 Path: F:\waste\18801 - East Helena Wastewater Capacity Study\GIS\MasterPlan\Alt3_Screening.mxd

GREEN INFRASTRUCTURE

The continued removal of the trash and debris prior to treatment will ensure optimization of the treatment process and ensure that the water discharged to Prickly Pear Creek is optimally treated.

The new building improvements could be constructed from recyclable material, regional CMU blocks and regional wood products. Fly ash used in concrete is another example of recyclable materials that can be used and can be specified in the contract documents.

4.C.4.8. COST

Table 4.C.2 below summarize the cost estimates for this alternative. Detailed cost estimates for this alternative are presented in **Appendix I**.

Table 4.C.2: Screening Alternative 3 – Install New Cup Screen Including Screw Compactor

Total Project Cost	$910,600.00
Total Annual Operation and Maintenance Cost	$0.00

Included in this cost estimate are construction contingency of 10%, engineering costs of 18%, and administrative/financial costs of 5%. Also included in the cost estimate is an inflation factor of 4.25% for the additional time between funding application submittals and actual construction of the project. This inflation is due to the historic volatility of the construction market.

4.C.5. GRIT REMOVAL ALTERNATIVE 1 – NO-ACTION

4.C.5.1. DESCRIPTION

As stated in **Chapter 2**, the existing grit removal system at the wastewater treatment facility is approximately 20 years old extremely labor intensive. The existing grit removal system is not adequately sized for the additional growth the City is anticipating and provides a low performance level of grit removal. This No-Action Alternative would not allow the City's grit removal system to adequately perform with the additional wastewater that is anticipated over the next several years. Therefore, the No-Action Alternative is <u>eliminated from further discussion</u>.

4.C.6. GRIT REMOVAL ALTERNATIVE 2 – INSTALL NEW VORTEX GRIT REMOVAL SYSTEM WITH A GRIT WASHER

4.C.6.1. DESCRIPTION

Grit consists of a variety of particles including sand, gravel, and other heavy inorganic materials that can be found in wastewater that are too small to be removed by screening upstream.

Removal of grit from the wastewater flow helps prevent accumulation in downstream processes, primarily the aeration basin.

This alternative includes the installation of a vortex grit removal system from WTP Equipment Corporation which utilizes a rotating agitator which maintains a vortex action, keeping the organics in suspension, and allowing the grit to settle. The grit chamber sloped at the bottom of the system allows for continuous grit settling even during power failures. Separated grit is removed from the storage chamber by a grit pump and pumping to a grit washer. The grit pump provides 240 gpm grit slurry pumping capacity with an estimated 30 ft TDH.

The controls for the grit removal system would be housed in a 12' x 12' building away from the grit removal system that would be housed in a 39' x 35' building. The controls building would meet Class 1, Division 1 provisions of the National Electric Code.

A grit washer will be installed behind the grit removal process as part of this alternative and would be installed in a Class 1 Division 1 rated building. The grit removal system will feed the grit washer prior to temporary storage/disposal into a dumpster. This alternative includes a TeaCup® Grit Washing Unit manufactured by Hydro International. Washing the grit prior to temporary storage. Grit would emit fewer odors as more of the organic material would be returned to the main flow stream. Grit equipment would require a source of water and a drain system to return the wash water back into the treatment system.

Appendix J contains the manufacturer's information on this system.

Use of a bagger would help control odors. The grit would be required to pass the paint filter test in order for the material to be hauled to a local landfill. The dewatering portion of the grit removal system is designed to remove the sufficient amount of moisture to pass this test.

Providing adequate screening at the wastewater treatment facility would significantly reduce plugging and operators would have less direct contact with wastewater.

4.C.6.2. DESIGN CRITERIA

The requirements of the Montana Department of Environmental Quality *Circular DEQ-2 Design Standards for Public Sewage Systems* would be followed during the design and construction of this alternative.

The grit removal system included with this alternative would be designed for the future growth anticipated for the wastewater treatment facility. A peak flow of 2,880,000 gpd would allow the grit removal system to be upgraded now and not during the wastewater treatment facility upgrade. This grit removal system is expected to remove 65% to 95% of grit particles depending on particle size from the wastewater.

4.C.6.3. MAP

Figure 4.C.3 shows the location of the grit removal facility at the wastewater treatment facility. **Figure 4.C.4** is a schematic of the new grit removal system.

4.C.6.4. ENVIRONMENTAL IMPACTS

The installation of an adequate grit removal system with a grit washer would significantly decrease the amount of organic material currently being removed with the grit. A large amount of the organic material would be washed back into the main process stream. This would also decrease odors and there would be less organic material in the landfill. These organics would be returned to the main flow stream where they can be more adequately treated prior to discharge in the Prickly Pear Creek.

4.C.6.5. LAND REQUIREMENTS

Installation of the grit removal system and grit washer at the City of East Helena's wastewater treatment facility. No additional land would be required.

4.C.6.6. POTENTIAL CONSTRUCTION PROBLEMS

While there are no construction problems anticipated for this alternative, construction projects can generate unforeseen difficulties that cannot be predicted prior to construction. All construction related problems that arise in the field will be promptly addressed and remedied.

Maintaining flow and grit removal operations during the installation of the new grit removal system may prove difficult. It is expected that the existing grit removal system will remain operational while the new grit removal system is being constructed. Once the new grit removal system is installed and operations are transferred to the new system, the existing grit removal system will be removed.

4.C.6.7. SUSTAINABILITY CONSIDERATIONS

WATER AND ENERGY EFFICIENCY

Energy would be consumed during the construction process in the form of fuel and electricity for equipment.

Washing the grit prior to temporary storage and allowing more of the organic material to be returned to the main flow stream increases the process efficiency of the wastewater treatment facility.

Washing the grit prior to temporary storage. Grit would emit fewer odors as more of the organic material would be returned to the main flow stream.

Headworks Building - Grit Removal

East Helena Wastewater
Master Plan - 2020

N

0 50 100
Feet

Figure 4.C.3.
Grit Removal Alternative 2 - Install New
Vortex Grit Removal System with Grit Washer

RPA

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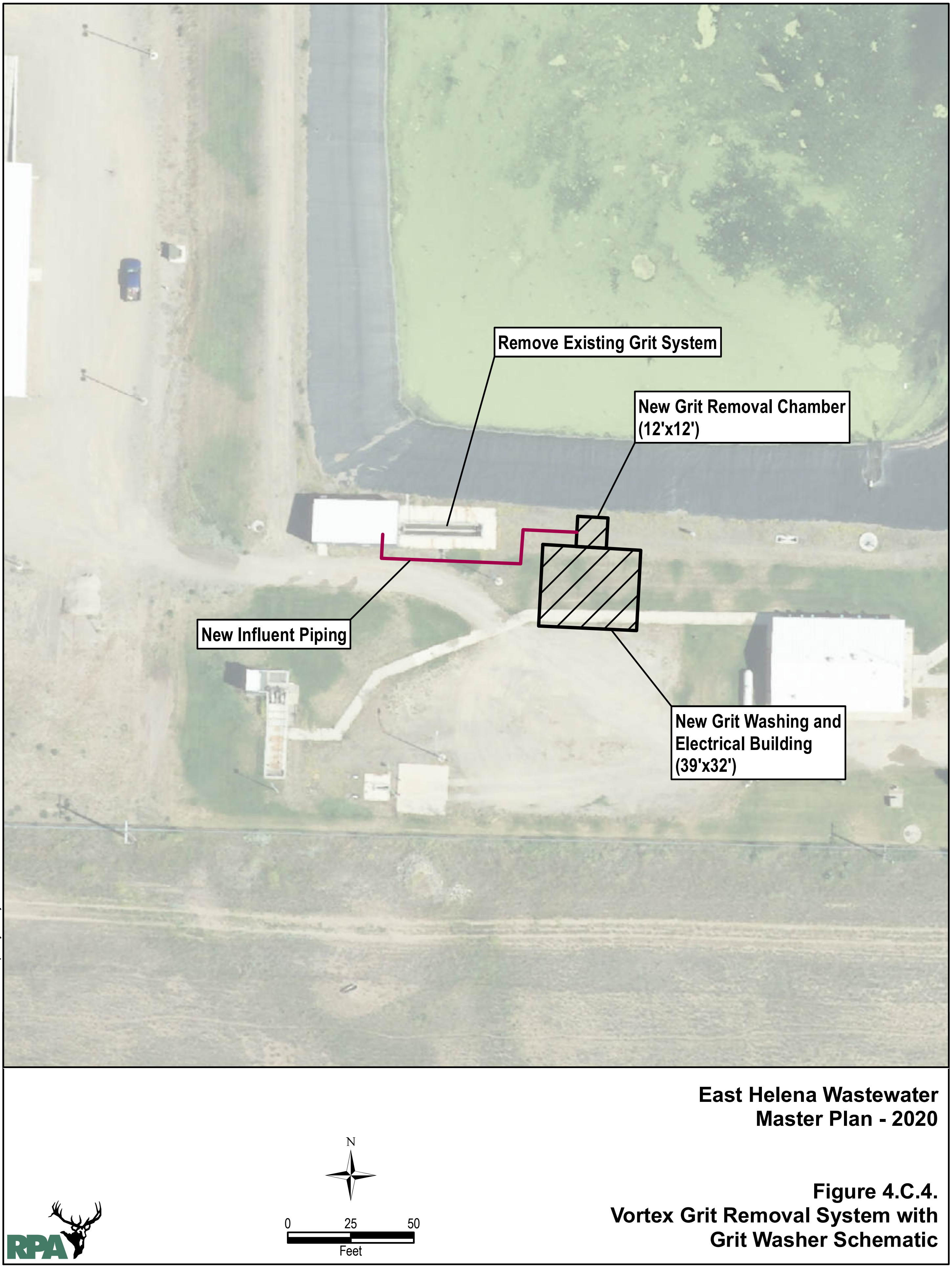

East Helena Wastewater
Master Plan - 2020

Figure 4.C.4.
Vortex Grit Removal System with
Grit Washer Schematic

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GREEN INFRASTRUCTURE

The new building could be constructed from recyclable material, regional CMU blocks and regional wood products. Fly ash used in concrete is another example of recyclable materials that can be used and can be specified in the contract documents.

4.C.6.8. COST

Table 4.C.3 below summarize the cost estimates for this alternative. Detailed cost estimates for this alternative are presented in **Appendix I**.

Table 4.C.3: Grit Removal Alternative 2 – Install New Vortex Grit Removal System with a Grit Washer

Total Project Cost	$1,505,200.00
Total Annual Operation and Maintenance Cost	$12,185.00

Included in this cost estimate are construction contingency of 10%, engineering costs of 18%, and administrative/financial costs of 5%. Also included in the cost estimate is an inflation factor of 4.25% for the additional time between funding application submittals and actual construction of the project. This inflation is due to the historic volatility of the construction market.

4.C.7. GRIT REMOVAL ALTERNATIVE 3 – INSTALL NEW HEADCELL® GRIT REMOVAL SYSTEM WITH A GRIT WASHER

4.C.7.1. DESCRIPTION

Grit consists of a variety of particles including sand, gravel, and other heavy inorganic materials that can be found in wastewater that are too small to be removed by screening upstream. Removal of grit from the wastewater flow helps prevent accumulation in downstream processes, primarily the aeration basin.

This alternative includes the installation of the HeadCell® grit removal system manufactured by Hydro International. This system utilizes a circular flow pattern similar to the vortex grit chamber but the design consists of a series of stacked trays, providing a shorter settling distance and increased surface area through the application of plate settling principals. The flow is split between the stacked trays and exists over an effluent weir. Grit is trapped on the trays and falls into a collection bin at the bottom of the chamber. Under this alternative, the grit would then be pumped to a grit washer. This system requires no mechanical equipment to operate prior to being pumped to the grit washer.

The controls for the grit removal system would be housed in a 12 x 12 building away from the grit removal system housed in a 39’ x 35’ building. The controls building would meet Class 1, Division 1 provisions of the National Electric Code. The grit removal system will feed the grit washer prior to temporary storage/disposal into a dumpster. This alternative includes a TeaCup® Grit Washing Unit manufactured by Hydro International. Washing the grit prior to temporary storage would emit fewer odors and would remove more of the organic material which would be returned to the main flow stream. Grit equipment would require a source of water and a drain system to return the wash water back into the treatment system.

Appendix J contains the manufacturer's information on this system.

Use of a bagger would help control odors. The grit would be required to pass the paint filter test in order for the material to be hauled to a local landfill. The dewatering portion of the grit removal system is designed to remove the sufficient amount of moisture to pass this test.

Providing adequate screening at the wastewater treatment facility would significantly reduce plugging and operators would have less direct contact with wastewater.

4.C.7.2. DESIGN CRITERIA

The requirements of the Montana Department of Environmental Quality *Circular DEQ-2 Design Standards for Public Sewage Systems* would be followed during the design and construction of this alternative.

The grit removal system included with this alternative would be designed for the future growth anticipated for the wastewater treatment facility. A peak flow of 2,880,000 gpd would allow the grit removal system to be upgraded now and not during the wastewater treatment facility upgrade. This grit removal system is expected to remove 95% of grit particles that are greater than 106 microns during peak flow from the wastewater.

4.C.7.3. MAP

Figure 4.C.5 shows the location of the grit removal facility at the wastewater treatment facility. **Figure 4.C.6** is a schematic of the new grit removal system.

4.C.7.4. ENVIRONMENTAL IMPACTS

The installation of an adequate grit removal system with a grit washer would significantly decrease the amount of organic material currently being removed with the grit. A large amount of the organic material would be washed back into the main process stream. This would also decrease odors and there would be less organic material in the landfill. These organics would be returned to the main flow stream where they can be more adequately treated prior to discharge in the Prickly Pear Creek.

East Helena Wastewater
Master Plan - 2020

Figure 4.C.5.
Grit Removal Alternative 3 - Install New Headcell Grit Removal System with Grit Washer

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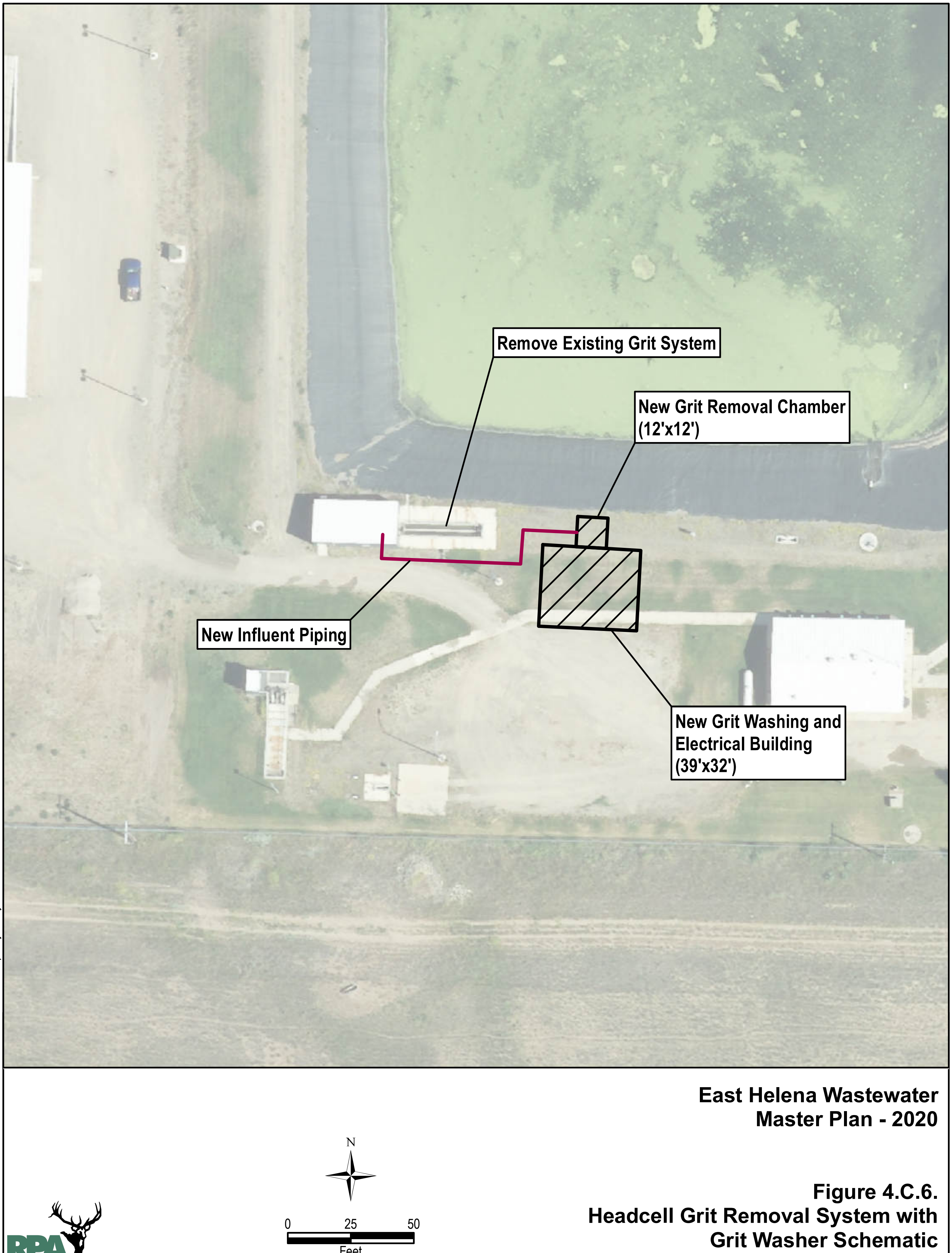

East Helena Wastewater
Master Plan - 2020

Figure 4.C.6.
Headcell Grit Removal System with
Grit Washer Schematic

Date: 5/4/2020 Path: F:\waste\18801 - East Helena Wastewater Capacity Study\GIS\MasterPlan\HeadcellGritRemovalSchematic.mxd

4.C.7.5. LAND REQUIREMENTS

Installation of the grit removal system and grit washer at the City of East Helena's wastewater treatment facility. No additional land would be required.

4.C.7.6. POTENTIAL CONSTRUCTION PROBLEMS

While there are no construction problems anticipated for this alternative, construction projects can generate unforeseen difficulties that cannot be predicted prior to construction. All construction related problems that arise in the field will be promptly addressed and remedied.

Maintaining flow and grit removal operations during the installation of the new grit removal system may prove difficult. It is expected that the existing grit removal system will remain operational while the new grit removal system is being constructed. Once the new grit removal system is installed and operations are transferred to the new system, the existing grit removal system will be removed.

4.C.7.7. SUSTAINABILITY CONSIDERATIONS

WATER AND ENERGY EFFICIENCY

Energy would be consumed during the construction process in the form of fuel and electricity for equipment.

Washing the grit prior to temporary storage and allowing more of the organic material to be returned to the main flow stream increases the process efficiency of the wastewater treatment facility.

The HeadCell® grit removal system is an all-hydraulic design with no moving parts, minimizing the energy required for the grit removal system.

GREEN INFRASTRUCTURE

The new building could be constructed from recyclable material, regional CMU blocks and regional wood products. Fly ash used in concrete is another example of recyclable materials that can be used and can be specified in the contract documents.

4.C.7.8. COST

Table 4.C.4 below summarize the cost estimates for this alternative. Detailed cost estimates for this alternative are presented in **Appendix I**.

Table 4.C.4: Grit Removal Alternative 3 – Install New Headcell Grit Removal System with a Grit Washer

Total Project Cost	$1,599,100.00
Total Annual Operation and Maintenance Cost	$5,330.00

Included in this cost estimate are construction contingency of 10%, engineering costs of 18%, and administrative/financial costs of 5%. Also included in the cost estimate is an inflation factor of 4.25% for the additional time between funding application submittals and actual construction of the project. This inflation is due to the historic volatility of the construction market.

4.C.8. SCREW PUMP ALTERNATIVE 1 – NO-ACTION

4.C.8.1. DESCRIPTION

The existing screw pumps are aging and in need of maintenance. The concrete troughs of the screw pumps have worn over time which has increased the gap between the outer edge of the screw pump flight and the trough. This allows more water to pass the flight rather than travel up the trough which decreases the efficiency of the screw pumps by increasing the amount of energy that is required to transport the same volume of water. The bearing assemblies are also in need of repair. Also, the bearing assemblies are at the end of their useful life and need replacement. If the bearings were to fail, the system would cease to work. Over the years, the corrosive nature of the wastewater has worn at the carbon steel augers and need to be repainted for protection. This is a simple maintenance issue that would reflect poorly on the City if not completed. If the repairs are not made at this time, the results could be a sudden, unexpected failure of one or more of the pumps. The No-Action Alternative would allow the existing screw pumps to continue to degrade and the pumps will eventually fail. Therefore, the No-Action Alternative is <u>eliminated from further discussion</u>.

4.C.9. SCREW PUMP ALTERNATIVE 2 – REHABILITATE EXISTING SCREW PUMPS

4.C.9.1. DESCRIPTION

As stated above, the existing screw pumps were last rehabilitated in 2002 and are in need of maintenance. This Alternative includes the general rehabilitation of the screw pumps in order to extend the operation life of the pumps. The rehabilitation includes replacement of the upper and lower bearing assembly, re-grouting the screw pump troughs, and cleaning and repainting the screws.

The upper and lower bearing assemblies are required in order to reduce friction on the pump. If the bearings fail, the pump will cease to operate. The bearings associated with the existing screw pumps are at the end of their useful life and need replacing.

The concrete troughs of the screw pumps have worn over time which has increased the gap between the outer edge of the screw pump flight and the trough. This allows more water to pass the flight rather than travel up the trough which decreases the efficiency of the screw pumps by increasing the amount of energy that is required to transport the same volume of water. Re-grouting the screw pump troughs will decrease the gap between the trough and screw pump flights and increase the efficiency of the screw pump system.

The screws will be cleaned and repainted in order to protect the integrity of the carbon steel screw due to the corrosive nature of the wastewater.

4.C.9.2. DESIGN CRITERIA

Requirements from the manufacturer of the existing screw pumps would need to be followed for this alternative.

4.C.9.3. MAP

Figure 4.C.7 shows the location of the screw pumps at the wastewater treatment facility and **Figure 4.C.8** is a plan view of the existing screw pumps and the wastewater treatment facility.

4.C.9.4. ENVIRONMENTAL IMPACTS

The screw pumps are a critical piece of the City's wastewater treatment system. These pumps propel wastewater from the collection system to the wastewater treatment facility for treatment and ultimately discharge into Prickly Pear Creek. This alternative allows for continues reliability and efficiency of the screw pumps. If the screw pumps were to fail, the wet well could possibly overflow, resulting in the discharge of raw wastewater to the ground surface.

4.C.9.5. LAND REQUIREMENTS

The rehabilitation of the existing screw pumps would occur at the City of East Helena's wastewater treatment facility. No additional land would be required.

4.C.9.6. POTENTIAL CONSTRUCTION PROBLEMS

While there are no construction problems anticipated for this alternative, construction projects can generate unforeseen difficulties that cannot be predicted prior to construction. All construction related problems that arise in the field will be promptly addressed and remedied.

Typically grouting of the screw pumps would occur at the same time. However, in order to maintain flow into the wastewater treatment facility, one screw pump would be rehabilitated at a time in order to keep the wastewater treatment facility operational.

Screw Pumps

N

0 50 100
Feet

East Helena Wastewater
Master Plan - 2020

Figure 4.C.7
Screw Pump Alternative 2
Rehabilitate Existing Screw Pumps

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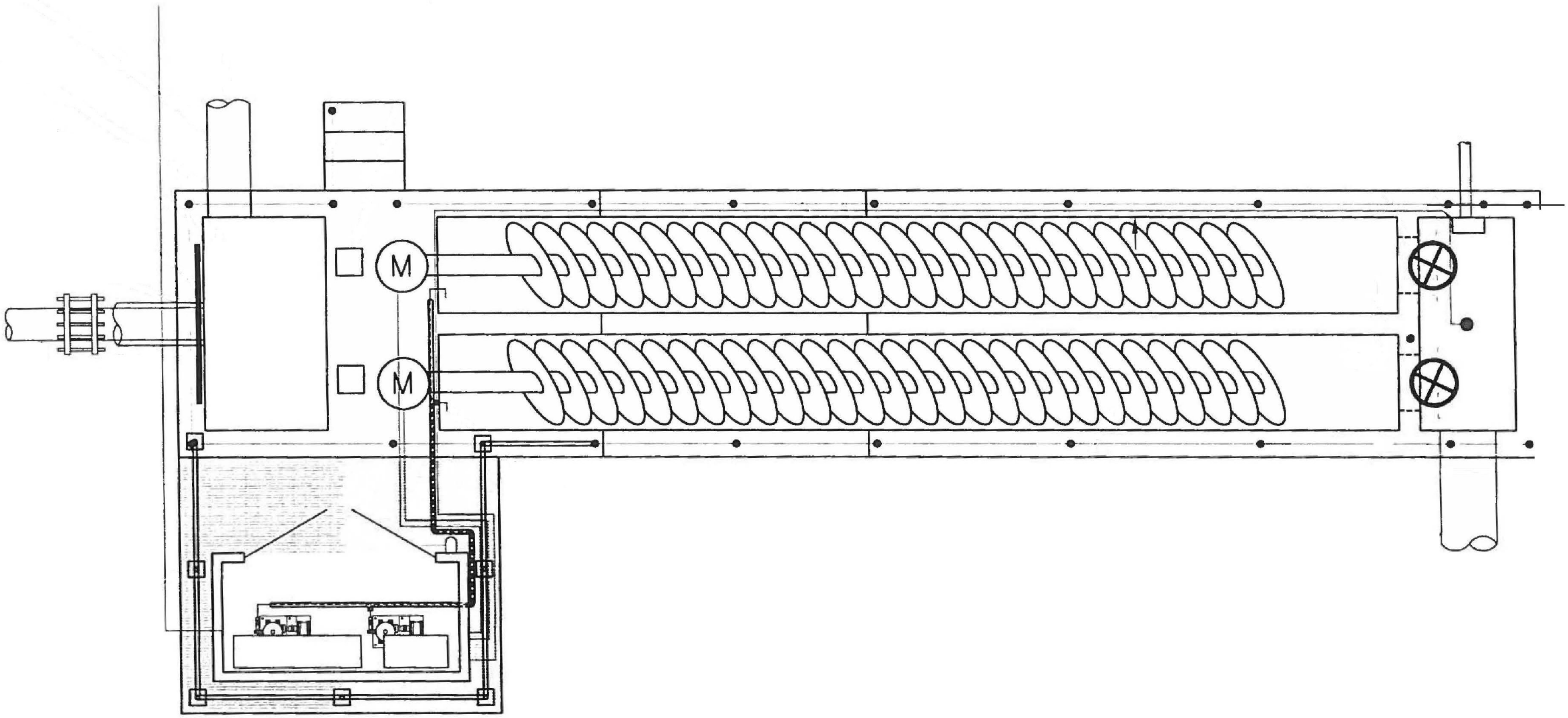

East Helena Wastewater
Master Plan - 2020

Figure 4.C.8
Screw Pump Alternative 2 -
Rehabilitate Existing Screw Pumps

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4.C.9.7. SUSTAINABILITY CONSIDERATIONS

WATER AND ENERGY EFFICIENCY

Energy would be consumed during the construction process in the form of fuel and electricity for equipment.

Re-grouting the concrete troughs of the screw pumps decreases the gap that has been worn into the concrete over time. This decreases the amount of water that will pass the flight and increase the efficiency of the screw pump by decreasing the amount of energy that is required to transport the wastewater.

GREEN INFRASTRUCTURE

Rehabilitating the existing screw pumps maintain the existing equipment so no new equipment is required.

4.C.9.8. COST

Table 4.C.5 below summarize the cost estimates for this alternative. Detailed cost estimates for this alternative are presented in **Appendix I**.

Table 4.C.5: Screw Pump Alternative 2 – Rehabilitate Existing Screw Pumps

Total Project Cost	$173,000.00
Total Annual Operation and Maintenance Cost	$0.00

Included in this cost estimate are construction contingency of 10%, engineering costs of 18%, and administrative/financial costs of 5%. Also included in the cost estimate is an inflation factor of 4.25% for the additional time between funding application submittals and actual construction of the project. This inflation is due to the historic volatility of the construction market.

4.C.10. SCREW PUMP ALTERNATIVE 1 – REPLACE EXISTING SCREW PUMPS

4.C.10.1. DESCRIPTION

As stated above, the existing screw pumps are aging and in need of maintenance. The concrete troughs of the screw pumps have worn over time which has increased the gap between the outer edge of the screw pump flight and the trough. This allows more water to pass the flight rather than travel up the trough which decreases the efficiency of the screw pumps by increasing the amount of energy that is required to transport the same volume of water. The bearing assemblies are also in need of repair. Also, the bearing assemblies are at the end of their useful life and need replacement. If the bearings were to fail, the system would cease to work. Over the years, the corrosive nature of the wastewater has worn at the carbon steel augers and need to be repainted for protection. This is a simple maintenance issue that would reflect poorly on the City if not completed. If the repairs are not made at this time, the results could be a sudden, unexpected failure of one or more of the pumps. All these issues can be completed with simple maintenance of the existing screw pump for approximately 50% of the cost of full replacement. Therefore, the Replacement of the Screw Pumps Alternative is <u>eliminated from further discussion</u>.

4.C.11. RAS PUMP ALTERNATIVE 1 – NO-ACTION

4.C.11.1. DESCRIPTION

As stated in **Chapter 2**, the airlift pump that pumps activated sludge from the clarifier back to the reaction basin is connected to the blowers that supply air to the reaction basin. Control of the air distribution in the reaction basin creates zones of anerobic and anoxic areas within the basin that allow for nitrification and denitrification as well as phosphorous removal. Having the blowers that supply this air connected to the RAS pump is difficult to maintain the operations of these two systems since the aeration to the reaction basin cannot be turned off without turning off the RAS pump. While these two operations should run independently to maintain optimum conditions for nutrient removal and make the treatment plant more efficient, the existing treatment facility is nearing capacity and will require significant upgrades in the near future. It is expected that an evaluation of the treatment facility may need to begin as early as 2023 and constructed by 2027. As a result, it would not be prudent at this time for the City to spend money on separating the two operations when a new treatment alternative may be considered. Therefore, the <u>No-Action Alternative is the only alternative prudent at this time</u>.

CHAPTER 5: SELECTION OF AN ALTERNATIVE

In this chapter, the alternatives selected as potentially feasible and cost-effective through the alternatives discussion in **Chapter 4** are compared in further detail. This chapter focuses on the alternative analysis for the East Helena Wastewater System. Please refer to **Chapter 4** for a more detailed discussion of the alternatives presented in this chapter.

5.A. LIFE CYCLE COST ANALYSIS

Table 5.A.1 below shows the life cycle cost analysis for the Alternatives detailed in **Chapter 4**.

Table 5.A.1 – Alternative Life Cycle Cost Analysis

Alternative	Total Project Cost	O&M	Salvage Value (est.)	Total Net Present Worth (0.3% for 20 years)
Collection System Alternatives				
Open-Dig Replacement	$2,321,000.00	$0.00	$543,180.00	$1,809,410.00
Cured In-Place Pipe (CIPP)	$717,200.00	$0.00	$213,462.00	$516,150.00
Montana Avenue Lift Station Alternatives				
W. Dudley Street	$855,900.00	$0.00	$71,560.00	$788,500.00
King Street Alley	$1,454,800.00	$0.00	$99,497.00	$1,361,090.00
East Helena Cemetery	$1,467,300.00	$0.00	$108,947.00	$1,364,690.00
Treatment System Alternatives				
Install New Mechanical Bar Screen with Washer/Compactor	$727,100.00	$0.00	$35,200.00	$693,950.00
Install New Drum Screen with Washer/Compactor	$910,600.00	$0.00	$32,000.00	$880,460.00
Install New Vortex Grit Removal System with Grit Washer	$1,505,200.00	$12,185.00	$75,580.00	$1,670,200.00
Install New Headcell Grit Removal System with Grit Washer	$1,599,100.00	$5,330.00	$79,840.00	$1,627,220.00
Rehabilitate Existing Screw Pumps	$173,000.00	$0.00	$0.00	$173,000.00

5.A.1. TOTAL CAPITAL COST

Refer to **Appendix I** for detailed cost estimates for each alternative. Included in these estimates are a construction contingency cost of 10%, engineering costs of 18%, and administrative/financial costs of 5%.

5.A.2. INFLATION

An inflation factor of 4.25% annually was included in the cost estimate due to the historic volatility of the construction market and the time between funding application submittals and the actual construction of the project. Construction is expected to occur in 2022, therefore, a 4.5% inflation rate over 2 years was used.

5.A.3. PRESENT WORTH ANALYSIS

A present worth analysis has been completed for each of the alternatives and is shown in the detailed cost estimates in **Appendix I**. The present worth analysis includes the capital cost, annual O&M cost for each alternative, and a 20-year salvage value. The result is the amount that would have to be invested (in 2022 dollars) at an interest rate of 0.3% to pay for the capital cost and the annual O&M costs, less the salvage value in 20 years.

5.B. NON-MONETARY FACTORS

5.B.1. SUMMARY AND SELECTION OF THE PREFERRED ALTERNATIVE

5.B.1.1. COLLECTION SYSTEM

Table 5.B.1 below ranks each collection system alternative in several categories. Each alternative is ranked from 1 through 5 in each of the categories, with ranking of 1 being the lowest ranking and a 5 being the highest ranking. The ranking is then multiplied by the weight assigned to each criterion by a value between 1 and 3, with 3 having the highest weight and hence, the most importance. The highest score possible for any category would be 15. The ranking table includes both monetary and non-monetary criteria to provide an overall ranking of the alternatives.

The No-Action collection system alternative was eliminated from the screening process. The No-Action alternative does not address the inflow and infiltration problem that is plaguing the City’s collection system and reduces the capacity of the treatment facility. The public health risks associated with this issue would not be addressed with this alternative.

The following collection system alternatives were included in the screening process detailed above:

- Collection System Alternative 2 – Open-Dig Replacement
- Collection System Alternative 3 – Cured In-Place Pipe (CIPP)

Table 5.B.1: Comparison of Collection System Alternatives

Criteria	Criteria Weight	Collection System Alternative 2 - Open-Dig Replacement		Collection System Alternative 3 - Cured In-Place Pipe (CIPP)	
		Scale of 1 to 5	Total	Scale of 1 to 5	Total
Technical Feasibility	2	5	10	5	10
Longevity/Reliability	1	5	5	5	5
Water Quality	2	5	10	5	10
Regulatory Compliance	2	5	10	5	10
Constructability	1	4	4	5	5
Environmental Impacts	1	4	4	5	5
Financial Feasibility	2	2	4	5	10
Operation and Maintenance	2	5	10	5	10
Public Health and Safety	3	4	12	4	12
Land Impact/Availability	1	3	3	4	4
Total			**73**		**81**

As shown in **Table 5.B.1**, Collection System Alternative 3 – Cast-In-Place Pipe (CIPP) scores the most favorably than Alternative 2 – Open-Dig Replacement. The open-dig method has a higher capital cost and will impact more land during construction than using CIPP to rehabilitate the sewer mains.

5.B.2. LIFT STATION ALTERNATIVES

Table 5.B.2 below ranks each water supply alternative in several categories. Each alternative is ranked from 1 through 5 in each of the categories, with ranking of 1 being the lowest ranking and a 5 being the highest ranking. The ranking is then multiplied by the weight assigned to each criterion by a value between 1 and 3, with 3 having the highest weight and hence, the most importance. The highest score possible for any category would be 15. The ranking table includes both monetary and non-monetary criteria to provide an overall ranking of the alternatives.

The No-Action lift station alternative was eliminated from the screening process. The existing Montana Avenue lift station is currently in the middle of Montana Avenue. With the addition of the East Helena High School and the anticipated growth north of the City, traffic on Montana Avenue/Valley Drive has and will continue to increase dramatically over the next several years. New developments including the new East Helena High School, Vigilante Subdivision, and the Highland Meadows Subdivision are expected to increase the number of daily trips on Montana Avenue/Valley Drive. The new East Helena High School is expected to generate 1,015 new daily trips on Montana Avenue/Valley Drive, the Vigilante Subdivision is expected to generate an additional 680 daily trips, and the Highland Meadows Subdivision is expected to generate 3,021 daily trips for a total of 4,716 additional daily trips. Leaving the lift station in the roadway would continue to make it difficult and extremely unsafe for the City operators to access and maintain this structure. The No-Action Alternative would not eliminate the unsafe conditions this lift station poses to the operators.

The following Montana Avenue lift station alternatives were included in the screening process detailed above:

- Montana Avenue Lift Station Alternative 2 – W. Dudley Street
- Montana Avenue Lift Station Alternative 3 – King Street Alley
- Montana Avenue Lift Station Alternative 4 – East Helena Cemetery

As shown in **Table 5.B.2**, the Dudley Street alternative is the lowest cost than the other alternatives, the operations and maintenance associated with this alternative would still require the operators to access the lift station in the roadway. This alternative would also include a portable generator as does the existing lift station and does not meet the City of East Helena engineering design standards. The availability of land for the King Street alternative may be easier for the City to acquire than land from the East Helena Cemetery Association.

Table 5.B.2: Comparison of Montana Avenue Lift Station Alternatives

Criteria	Criteria Weight	Montana Avenue Lift Station Alternative 2 - W. Dudley Street		Montana Avenue Lift Station Alternative 3 – King Street Alley		Montana Avenue Lift Station Alternative 4 – East Helena Cemetary	
		Scale of 1 to 5	Total	Scale of 1 to 5	Total	Scale of 1 to 5	Total
Technical Feasibility	2	4	8	5	10	5	10
Longevity/Reliability	1	4	4	5	5	5	5
Water Quality	2	5	10	5	10	5	10
Regulatory Compliance	2	3	6	5	10	5	10
Constructability	1	4	4	5	5	5	4
Environmental Impacts	1	5	5	5	5	5	5
Financial Feasibility	2	4	8	3	6	3	6
Operation and Maintenance	2	2	4	5	10	5	10
Public Health and Safety	3	3	9	5	15	5	15
Land Impact/Availability	1	5	5	4	4	3	3
Total			**67**		**80**		**78**

5.B.3. TREATMENT SYSTEM ALTERNATIVES

Table 5.B.3 below ranks each wastewater treatment system alternative in several categories. Each alternative is ranked from 1 through 5 in each of the categories, with ranking of 1 being the lowest ranking and a 5 being the highest ranking. The ranking is then multiplied by the weight assigned to each criterion by a value between 1 and 3, with 3 having the highest weight and hence, the most importance. The highest score possible for any category would be 15. The ranking table includes both monetary and non-monetary criteria to provide an overall ranking of the alternatives.

The No-Action alternatives for the screening and grit removal systems were eliminated from the screening process. These No-Action alternatives would not allow the City's screening and grit removal systems to handle the additional wastewater that is anticipated in the near future and upgrades to these systems would be sized to allow for the increased flows independent of any upgraded treatment system the City would undertake in the future.

The No-Action alternative and replacement the existing screw pumps was also eliminated from the screening process. If the repairs are not made at this time, the results could be a sudden, unexpected failure of one or more of the pumps. The No-Action Alternative would allow the existing screw pumps to continue to degrade and the pumps eventually fail. Replacement of the existing screw pumps would require replacement of parts that can simply be rehabilitated in order for the City to continue using the existing screw pumps for another 20 years. Therefore, the only additional alternative is to rehabilitate the existing screw pumps.

The No-Action alternative for the Flow Equalization Basin Liner and the Installation of New RAS pumps are the only prudent alternative to be considered at this time. The existing treatment facility is nearing capacity and will require significant upgrades in the near future. As a result, spending money on improvements to the flow equalization basin and the RAS system would not be financial practical at this time. Any upgrades to these systems should be done when the City looks at upgrading the entire treatment system which could begin as early as 2023.

The following treatment system alternatives were included in the screening process detailed below:

- Screening Alternative 2 – Install New Mechanical Bar Screen with Washer/Compactor
- Screening Alternative 3 – Install New Cup Screen with Washer/Compactor
- Grit Removal Alternative 2 – Install New Vortex Grit Removal System with Grit Washer
- Grit Removal Alternative 3 – Install New Headcell Grit Removal System with Grit Washer

As shown in **Table 5.B.3**, both screening alternatives are good options for the City. However, the drum screen is more expensive and requires slightly more operation and maintenance costs than the bar screen.

Also shown in **Table 5.B.3**, the grit removal alternatives differ slightly. The Headcell grit removal system is slightly more expensive than the vortex system although there are less mechanical parts associated with the Headcell system.

Table 5.B.3 – Comparison of Treatment System Alternatives - Headworks

Criteria	Criteria Weight	Install New Mechanical Bar Screen with Washer/ Compactor		Install New Drum Screen with Washer/ Compactor		Install New Vortex Grit Removal System with Grit Washer		Install New Headcell Grit Removal System with Grit Washer	
		Scale of 1 to 5	Total	Scale of 1 to 5	Total	Scale of 1 to 5	Total	Scale of 1 to 5	Total
Technical Feasibility	**2**	5	10	5	10	5	10	5	10
Longevity/ Reliability	**1**	5	5	5	5	5	5	5	5
Water Quality	**2**	5	10	5	10	5	10	5	10
Regulatory Compliance	**2**	5	10	5	10	5	10	5	10
Constructability	**1**	5	5	4	4	5	5	4	4
Environmental Impacts	**1**	5	5	5	5	5	5	5	5
Financial Feasibility	**2**	5	10	3	6	5	10	4	8
Operation and Maintenance	**2**	5	10	5	10	4	8	5	10
Public Health and Safety	**3**	5	15	5	15	5	15	5	15
Land Impact/ Availability	**1**	5	5	5	5	5	5	5	5
Total			**85**		**80**		**83**		**82**

CHAPTER 6: PROPOSED RECOMMENDATIONS

6.A. PRELIMINARY PROJECT DESIGN

The preferred alternatives for this project include:

- Collection System Alternative 3 – Cured In-Place Pipe (CIPP)
- Montana Avenue Lift Station Alternative 3 – King Street Alley
- Screening Alternative 2 – Install New Mechanical Bar Screen with Washer/Compactor
- Grit Removal Alternative 2 – Install New Vortex Grit Removal System with Grit Washer
- Screw Pump Alternative 2 – Rehabilitate Existing Screw Pumps

Due to the cost of the needed improvements for the City's wastewater system, the proposed work will be divided into phases, with the most critical portions considered the top priorities. The ability to fund these improvements, along with the availability of potential funding sources, will also be taken into consideration. The Phased approach to the improvements is summarized below.

Phase 1

- Collection System Alternative 3 – Cured In-Place Pipe (CIPP)
- Screening Alternative 2 – Install New Mechanical Bar Screen with Washer/Compactor
- Grit Removal Alternative 2 – Install New Vortex Grit Removal System with Grit Washer
- Screw Pump Alternative 2 – Rehabilitate Existing Screw Pumps
- Acquire/Purchase land for Montana Avenue Lift Station

Phase 2

- Montana Avenue Lift Station Alternative 3 – King Street Alley

The remainder of this Preliminary Engineering Report will discuss the implementation of **Phase 1** improvements only.

The implementation of Phase 2 of the Wastewater System Improvements will be dependent on future street improvements that are proposed for Montana Avenue/Valley Drive. Improvements to the Montana Avenue Lift Station should be completed simultaneously with the Montana Avenue/Valley Drive street improvements.

6.A.1. PHASE 1 IMPROVEMENTS

6.A.1.1. REHABILITATE SEWER MAINS USING CURED IN-PLACE PIPE (CIPP)

The preferred alternative for the collection system includes the rehabilitation of the portions of the collection system that were determined to be contributing a majority of the inflow and infiltration (I & I). Existing sewer mains would be lined with Cured In-Place Pipe (CIPP).

Generally, it is more economical to rehabilitate 8-inch and larger sewers with CIPP if the sewers are in paved streets with utilities or in alleys with tight quarters as long as there are no sags or major damage to the pipe. If it is determined that areas of existing sewer main have sags or are damaged, that main will need to be replaced by conventional excavation rather than with CIPP pipe.

6.A.1.2. NEW MECHANICAL BAR SCREEN WITH WASHER/COMPACTOR

This alternative includes the installation of a new mechanical bar screen to replace of the existing screen utilizing the existing screening channels. This alternative also includes the installation of a new washer/compactor for the removed screenings. The screening structure would be housed in the existing screening building and a new building or addition would be constructed to house the electrical controls for the screening equipment.

6.A.1.3. NEW VORTEX GRIT REMOVAL SYSTEM WITH GRIT WASHER

This alternative includes the installation of a vortex grit removal system which utilizes a rotating agitator which maintains a vortex action, keeping the organics in suspension, and allowing the grit to settle. The grit chamber sloped at the bottom of the system allows for continuous grit settling even during power failures. Separated grit is removed from the storage chamber by a grit pump and is fed to a grit washer which would be installed behind the grit removal process prior to temporary storage/disposal into a dumpster.

The unit process would not be enclosed in a structure. However, the grit washer would be enclosed in a classified environmental meeting Class 1, Division 1 provisions of the National Electric Code.

6.A.1.4. REHABILIATE EXISTING SCREW PUMPS

This Alternative includes the general rehabilitation of the screw pumps in order to extend the operational life of the pumps. The rehabilitation includes replacement of the upper and lower bearing assembly, re-grouting the screw pump troughs, and cleaning and repainting the screws.

6.B. PROJECT SCHEDULE

See **Table 6.B.1** below for the proposed project improvements schedule.

Table 6.B.1: Implementation Schedule for the Recommended Alternatives

TASK	2020				2021				2022			
	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Adopt Wastewater Master Plan		x										
Apply TSEP Grant and RRGL Grants		x										
Grant Awards						x						
Apply SRF Loan						x						
Submit Project Start-Up Conditions and Establish Project files						x						
Execute Grant Contracts						x	x					
PROJECT START-UP												
Preliminary Design							x					
Final Design								x				
MDEQ Plan Review and Approval									x			
PROJECT BIDDING AND AWARD												
Public Bid Advertisement									x			
Open Bids & Examine Proposals									x			
Request Contr. Debarment Review									x			
Select Contractor & Award Bid										x		
Conduct Pre-Const. Meeting										x		
Issue Contractor Notice to Proceed										x		
PROJECT CONSTRUCTION												
Submit Compliance Documents										x		
Begin Construction										x		
Monitor Engineer & Contractor										x	x	
Submit Drawdowns & Progress Reports										x	x	
Hold Const. Progress Meetings										x	x	
Final Inspection											x	
Project Close-Out												
Submit Final Drawdown											x	
Project Completion Report											x	
Submit Condition Certification												x
Submit Final Certification												x
Local Government Audit												x
Warranty Inspection – to be completed Q3 of 2023												

6.C. PERMIT REQUIREMENTS

The following permits will be required for the East Helena Wastewater System Improvements:

- DEQ certified checklist and plans approval. The improvements will specifically comply with Circular DEQ-2.
- Joint Application for Proposed Work in Montana's Streams, Wetlands, Floodplains, and Other Water Bodies.
- Stormwater Permit submitted by the Contractor.
- Floodplain Permits for work in floodplain.

6.D. SUSTAINABILITY CONSIDERATIONS

6.D.1. WATER AND ENERGY EFFICIENCY

Energy would be consumed during the construction process in the form of fuel and electricity for equipment. However, the long-term operation and maintenance requirements for the collection system should decrease, reducing the energy needed for system maintenance. The infiltration that is entering the collection system and ultimately the treatment system is increasing the operations and maintenance of a wastewater treatment facility since all water entering the wastewater treatment facility must be treated as wastewater. Treating unnecessary amounts of clean water increases the cost of operating the wastewater treatment facility.

Use of high efficiency lighting in the screening and grit removal buildings as well as LED lighting outside will be considered for this alternative.

Rehabilitating the screw pumps would allow the pumps to operate more efficiently, possibly improving the amount of energy required for the system.

6.D.2. GREEN INFRASTRUCTURE

The new CIPP lined mains with the collection system alternative will have a life expectancy well over 50 years.

The continued removal of the trash and debris with new screening and grit removal systems prior to treatment will ensure optimization of the treatment process and ensure that the water discharged to Prickly Pear Creek is optimally treated.

The new buildings needed for the screening and grit removal systems could be constructed from recyclable material, regional CMU blocks and regional wood products. Fly ash used in concrete is another example of recyclable materials that can be used and can be specified in the contract documents.

6.D.3. OTHER

If the collection system alternative to rehabilitate the sewer mains with CIPP lining is undertaken, collection system operational requirements should decrease. The rehabilitated collection mains would require less effort to clean and maintain and would be significantly less prone to groundwater infiltration. Manpower requirements for collection system maintenance should decrease.

6.E. TOTAL PROJECT COST ESTIMATE

The total project cost for the wastewater system improvements are summarized in **Table 6.E.1**. Detailed cost estimates are located in **Appendix I**.

Table 6.E.1: Cost Summary for Wastewater System Improvements

Total Project Cost	$3,172,500.00
Total Annual Operation and Maintenance Cost	$12,185.00

6.F. ANNUAL OPERATING BUDGET

6.F.1. INCOME

The City of East Helena operates its wastewater utility on approximately $900,000 in rate revenues. This fully and adequately funds the including an annual payment of $394,743 on a $4.08 million in current wastewater enterprise fund debt.

6.F.2. ANNUAL O&M COSTS

For FY2020, the wastewater enterprise fund expenditure budget includes $636,415 budgeted for operations and maintenance of the system.

6.F.3. DEBT REPAYMENT

The current water system debt repayment includes an annual payment of $394,743 on approximately $7.4 million in loans. The current loans also require 10% excess coverage.

6.F.4. RESERVES

Any surplus of annual rate revenue beyond the fiscal year expenditures is contributed to the wastewater enterprise fund reserves for equipment repair and replacement.

CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS

7.A. PREFERRED ALTERNATIVE

As discussed in **Chapter 6**, the preferred alternatives for the East Helena Wastewater System Improvements are listed below.

- Collection System Alternative 3 – Cured In-Place Pipe (CIPP)
- Montana Avenue Lift Station Alternative 3 – King Street Alley
- Screening Alternative 2 – Install New Mechanical Bar Screen with Washer/Compactor
- Grit Removal Alternative 2 – Install New Vortex Grit Removal System with Grit Washer
- Screw Pump Alternative 2 – Rehabilitate Existing Screw Pumps

Due to the cost of the needed improvements for the City's wastewater system, the proposed work will be divided into phases, with the most critical portions considered the top priorities. The ability to fund these improvements, along with the availability of potential funding sources, will also be taken into consideration. The Phased approach to the improvements is summarized below.

Phase 1 improvements include:

- Collection System Alternative 3 – Cured In-Place Pipe (CIPP)
- Screening Alternative 2 – Install New Mechanical Bar Screen with Washer/Compactor
- Grit Removal Alternative 2 – Install New Vortex Grit Removal System with Grit Washer
- Screw Pump Alternative 2 – Rehabilitate Existing Screw Pumps
- Acquire/Purchase land for Montana Avenue Lift Station

7.B. FUNDING OPTIONS AND RECOMMENDATIONS

7.B.1. FUNDING OBJECTIVES

A well-founded funding strategy will be pivotal for implementation of the proposed wastewater improvements. The final funding strategy will require further dialogue with the City and prospective funding agencies. The funding strategy presented in this document focuses on the best viable approach for the City.

7.B.2. PROSPECTIVE FUNDING PROGRAMS

Public facilities assistance programs are typically restricted to specific project types. This is partly due to the specific focus (and legislative mandate) of the respective programs and also to the enterprise fund origin of local monies typically used to match assistance dollars. Programs that have potential application for the East Helena Wastewater Improvements include the following:

Water Pollution Control State Revolving Fund Program (WPCSRF)

This loan program is administered by the Montana Department of Environmental Quality (MDEQ) for public wastewater system improvements. Prior to initiating the formal loan process, projects must be listed on the program's Project Priority Listing (PPL). The PPL ranks priority projects on a "first come, first served" basis. Loans are made for a 20-year term at a current interest rate of 2.50 percent.

There is no cap on SRF loan amounts and the application cycle is open, subject to availability of funds. SRF loans must be secured by issuance of a bond, which sewer user rate or tax-based revenues are pledged to repay. Excess coverage of 10 percent is required from user rates established to repay the bond unless property tax revenues are pledged. A reserve equal to one-half an annual payment must be borrowed or locally provided at the time loan funds are advanced.

There are currently no loan fees for SRF assistance. Cities and counties are eligible for WPCSRF loans.

Montana Treasure State Endowment Program (TSEP)

The Treasure State Endowment Program (TSEP) is a state grant program authorized by the Montana Legislature, and funded by coal severance tax interest earnings. It is designed to assist cities, towns, counties, consolidated governments, tribal governments, and county or multi-county water, sewer or solid waste districts. Eligible projects include drinking water systems, wastewater systems, sanitary or storm sewers, solid waste disposal and separation facilities, and bridges. The award cycle is biannual, with applications due in even-numbered years. Applications are subject to legislative approval, with awards typically announced the summer following legislative sessions. Applications are competitive, and typically about half of the applicants are successful. TSEP applications are due in June of 2020 for this funding cycle.

Administered by the Montana Department of Commerce (MDOC), funding availability varies each biennium and is derived from the interest on the state coal tax trust. TSEP grant awards are limited to 50 percent of project cost, and grants are provided up to $750,000 per recipient.

Criteria for TSEP grant awards include urgent threats to health and safety, regulatory compliance, economic development, and financial need. Funding may be used for qualifying project administration expense, engineering, and construction. A minimum of one public meeting or hearing is required before submitting a TSEP application.

TSEP grants are typically leveraged with other grant and loan sources, and an MDOC "target (user) rate" analysis is considered in evaluation of applicants for water and sewer projects. Target rate is a statewide average for user rates for water and sewer systems – currently 1.4 percent of median household income for water, 0.9 percent for sewer, and 2.3 percent combined. This threshold must normally be surpassed for a project to be ranked competitively with the TSEP program.

Applicant's user rates based on the projected monthly rates with TSEP assistance must be at least 150% of the communities MDOC "target rate" after project completion to be eligible for $750,000 in grant funds. If the user rates are projected to be between 125% and 150%, applicants are eligible to apply for no more than $625,000 and if the user rates are between 125% and 100%, the maximum grant amount is limited to $500,000.

Tentative target rate analysis indicates that the City of East Helena should meet the eligibility criterion for TSEP grant consideration. Based on TSEP requirements, the City's user rates upon completion of the proposed project after TSEP assistance is over 125% of the "target rate" and therefore is eligible to apply for $625,000 in assistance.

Community Development Block Grant (CDBG) Public Facilities

Also administered by the MDOC, the Community Development Block Grant (CDBG) program is federally funded by the U.S. Department of Housing and Urban Development. Qualifying projects in the "public facilities" category include water, wastewater, and solid waste improvements.

Application cycles are annual, due in June of 2018 for this funding cycle unless funds remain, then the cycle will remain open until all funds are exhausted, with approximately $2.5 million available yearly. Applications are ranked competitively, with typically one-third of applicants being successful in a given cycle. Utility projects compete with other institutional projects such as hospitals, rest homes, and educational facilities within the "public facilities" category. Eligible CDBG applicants include municipalities and counties.

The CDBG program can award up to a maximum of $450,000 per project, but grants are limited to $20,000 per benefitted "Low-and-Moderate-Income" (LMI) household. CDBG grants require 25% local match of CDBG funds unless granted a waiver. Grants are competitive, and the presence of potential health threats helps a community's ranking. A minimum threshold of 51% percent LMI households must be directly benefitted by the project, as determined from census data or a local Income Survey. An even higher LMI percentage garners additional ranking points. The CDBG program also utilizes Target Rate analysis, requiring applicants for to exceed that threshold to be eligible for consideration.

An optional CDBG technique known as "targeting" is also available. Targeting requires that project financing be paid through assessments rather than user rates (see Creation of Special Districts discussion, following). In targeting, CDBG funds are used to pay all assessments for construction cost for only those qualifying LMI residents in an area. Households exceeding LMI criteria and businesses would receive no subsidy. Annual wastewater system O&M costs would still be paid through wastewater rates (i.e., Wastewater Enterprise Fund), which both LMI and non-LMI users would pay.

The targeting technique applies CDBG funds directly to only LMI households, and consequently achieves "100 percent LMI benefit." Targeting would likely require formation of an SID, and property assessments or hook-up fees could be paid directly with CDBG funds for LMI residents.

Creation of an improvement district and application of the targeting approach would require assistance from a qualified legal counsel, as well as further consultation with MDOC prior to grant application. Eligibility for households under a targeting approach would require that interested residents come forward and provide copies of their federal tax return for verification. If the assessments for interested eligible households exceed CDBG grant funds (i.e., $450,000), the City would still be obligated to pay all such assessments even if additional local funds were required. Execution of individual assistance contracts with each eligible homeowner, renter, or landlord is also required. This process plus the legal services for SID creation entail additional costs.

Application to the CDBG Public Facilities grant program was considered but eliminated. According to the MDOC's Montana Community Target Rate Calculator, the City of East Helena has a 46.85% low-and-moderate household income (2015 Estimate). This does not exceed the 51% threshold for CDBG eligibility. Therefore, the City does not qualify for a CDBG grant.

DNRC Renewable Resource Grant and Loan (RRGL) Program

The Renewable Resource Grant and Loan Program (RRGL) is administered by the Montana Department of Natural Resources and Conservation (DNRC) and is funded through interest accrued on the State Resource Indemnity Trust Fund.

RRGL grants are limited to $125,000. Loan amounts are not limited and are issued for 20 years. Eligible projects must "promote conservation of the water resource," although proposals involving fish/wildlife benefits, flood prevention, or mitigation of threats to water resources are also eligible. Any governmental entity is eligible to apply.

Applications are competitive, and funding is available on a biannual basis, subject to legislative approval. Applications are typically due in May of even-numbered years. Unique to the RRGL program is that local match is not mandatory for Construction Project grants but a match is required for Project Planning Grants. Grants or loans can be obtained for capital construction, including engineering and administration.

An application by the City for $125,000 to use towards this project is feasible, subject to competitive ranking and award. The next application deadline for RRGL grant applications is May 15, 2020.

USDA Rural Development (RD) Water and Environmental Loan and Grant Program

The USDA through its Rural Development (RD) program offers funding packages for qualifying public water, wastewater, and solid waste projects. This program typically combines grant and loan offerings to municipalities, counties, tribes, and districts. Grant eligibility and loan rates are summarized as follows but remain discretionary with the agency and subject to change. RD uses an alternate income index known as "Non-Metropolitan Median Household Income," and grant shares shown are typically the maximums allowed and can be substantially less. RD funding thresholds are currently as follows:

- Loan funds only for MHIs above $47,757 (loans at market interest rate – currently 2.375%).
- Grant share up to 45% for MHIs between $38,206 and $47,757 (loans share at 1.875%).
- Grant share up to 75% for MHIs below $38,206 and documented health or sanitation problems (loans share at 1.375%).

Grant share percentages are calculated based on an RD funding package after deducting other grants (rather than the overall project cost) and are discretionary with the agency. Predicted user rates also heavily influence RD's final determination of grant share, based on achieving comparability with user rates in other similar systems.

Grant/loan funds are typically released at the end of construction so interim financing is required with RD assistance and is available through the SRF or INTERCAP programs. Applications are considered on an open cycle and can be submitted at any time. Applications are not competitive but are subject to agency approval and availability of funds. RD requires water metering as a condition of funding either water or sewer projects, except where individual private wells are used.

RD typically provides loans for up to a 40-year term and requires 10% excess coverage in rate revenues. RD allows a loan reserve (typically one annual payment) to be accumulated from excess coverage revenues over the first few years of the loan. RD also requires a Short-Lived Assets (SLA) set aside in projected rates to fund replacement of system mechanical components.

Montana Board of Investments INTERCAP Loan Program

The Montana Board of Investments offers up to 15-year loans to communities, counties, and districts. These INTERCAP loans are not limited to water and sewer improvements and may be used for other capital needs such as vehicles, road paving, building improvements, as well as interim financing. Applications are not competitive but are subject to availability of funds.

Loans up to $5 million can be issued with staff or INTERCAP Loan Committee approval; larger amounts require Board of Investments approval. Current interest rates are variable at 3.37% and change February 16 of each year. The average rate over the last 10 years is 1.897%. INTERCAP loans are often used for "interim financing" for infrastructure improvements to allow project initiation, prior to loan or grant funds availability from other sources. Applications for INTERCAP loans are on an open cycle.

INTERCAP borrowing does not fit well with the wastewater improvements since repayment within 15 years would cause undue rate escalation. Longer term borrowing is more appropriate for these improvements.

Funding Application Procedures and Supporting Plans

With the exception of the INTERCAP program, the preceding programs require submission of the Montana Uniform Application for Public Facilities Projects, in some cases with supplemental information required by individual funding agencies. A current Preliminary Engineering Report is also required.

Particularly for the MDOC funding programs, a local Needs Assessment Survey (or County Growth Policy) needs to indicate the proposed project as a high local priority.

Applications to the TSEP, CDBG, or DNRC grant programs will require public meeting(s) and/or hearing, once a full PER is available and funding applications are being prepared. Requirements are specific to each program, and the respective agencies should be consulted for exact stipulations on type and number of meetings or hearings, as well as advertising requirements.

7.B.3. FUNDING RECOMMENDATIONS

The financial strategy recommended for the East Helena Wastewater Improvements Project includes pursuing TSEP, RRGL grants and borrowing through the SRF program.

Table 7.B.1 below provides difference funding scenarios if some or all of the prospective grant funds are not successful. The City would be eligible for a $625,000 grant from TSEP post-project user rates would be over 125% of the Target Rate as shown in **Table 7.B.1** below.

7.C. PUBLIC PARTICIPATION

Public participation for the proposed project was a key element in the development of this PER and subsequent funding applications. In addition to regular City Council meetings open to the public, two formal public meetings were held regarding the proposed project. These meeting were used to solicit citizen input on the wastewater improvement project, any environmental concerns associated with the project, and information on the funding applications to be submitted. Documentation on the public meetings including meeting presentation materials, copy of the meeting advertisements, attendee sign-in sheets, and meeting minutes are located in **Appendix B**.

7.C.4. FIRST PUBLIC MEETING ON NEEDS, P.E.R., PROCESS AND FUNDING STRATEGY

The first public meeting was held on March 5, 2020. The meeting was advertised twice in the Independent Record as well as on the City's website to give the citizens adequate notice. The meeting was intended to update the public on the proposed project, discuss possible alternatives, and inform citizens of possible funding options available for the project.

Table 7.B.1: Estimated User Rates with SRF, TSEP and RRGL Funding

Item	SRF Loan Only	SRF Loan, DNRC Grant	SRF Loan, DNRC Grant, TSEP Grant
Estimated Total Project Cost:	$3,172,500	$3,172,500	$3,172,500
RRGL Grant		$125,000	$125,000
TSEP Grant			$625,000
Subtotal Non-grant Share:	$3,172,500	$3,047,500	$2,422,500
Bond Reserve (1/2 annual Pmt, assumed Borrowed)	$104,600	$100,500	$79,900
Total Loan Amount:	**$3,277,100**	**$3,148,000**	**$2,502,400**
Assumed Loan Term (year)	20	20	20
Interest Rate	2.50%	2.50%	2.50%
Annual Debt Service	**$209,220**	**$200,980**	**$159,760**
plus Excess Coverage (110%)	$20,922	$20,098	$15,976
Total Annual Debt Service:	**$230,142**	**$221,078**	**$175,736**
Short-Lived Assets	$0	$0	$0
Estimated System O&M Cost	$12,185	$12,185	$12,185
Total Annual Water Cost (projected):	**$242,327**	**$233,263**	**$187,921**
Avg. Monthly Cost per Wastewater Connection	$18.93	$18.22	$14.68
Sewer EDU's	1,067	1,067	1,067
Existing Sewer Rate	$66.40	$66.40	$66.40
Total Rate (Existing + Project)	**$85.33**	**$84.62**	**$81.08**
Existing Water Rate	$33.85	$33.85	$33.85
Expected Water Rate increase	$5.10	$5.10	$5.10
Current Combined Water and Sewer Rate	$105.35	$105.35	$105.35
Projected Combined Water and Sewer Rate	**$124.28**	**$123.57**	**$120.03**
DOC Targe Rate	**$85.92**	**$85.92**	**$85.92**
Percent Target Rate	145%	144%	140%

7.C.5. SECOND PUBLIC MEETING ON DRAFT MASTER PLAN, FUNDING APPLICATIONS, AND ENVIRONMENTAL ASSESSMENT

The City had intended to hold a second public meeting on the project prior to the submittal of any funding applications. However, due to COVID-19 restrictions imposed by Governor Bullock, the City was unable to hold any further public meetings. While restrictions on public meeting are expected to be lifted, the second public meeting could not be held prior to the Preliminary Engineering Report being submitted to the funding agencies. However, once the second public meeting is held on the project, all new public involvement materials will be submitted to the funding agencies as requested.

APPENDIX A

ENVIRONMENTAL

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Montana State Plane Zone (FIPS zone 2500). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from NAIP Orthophotography produced with a one meter ground resolution from photography dated 2005.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

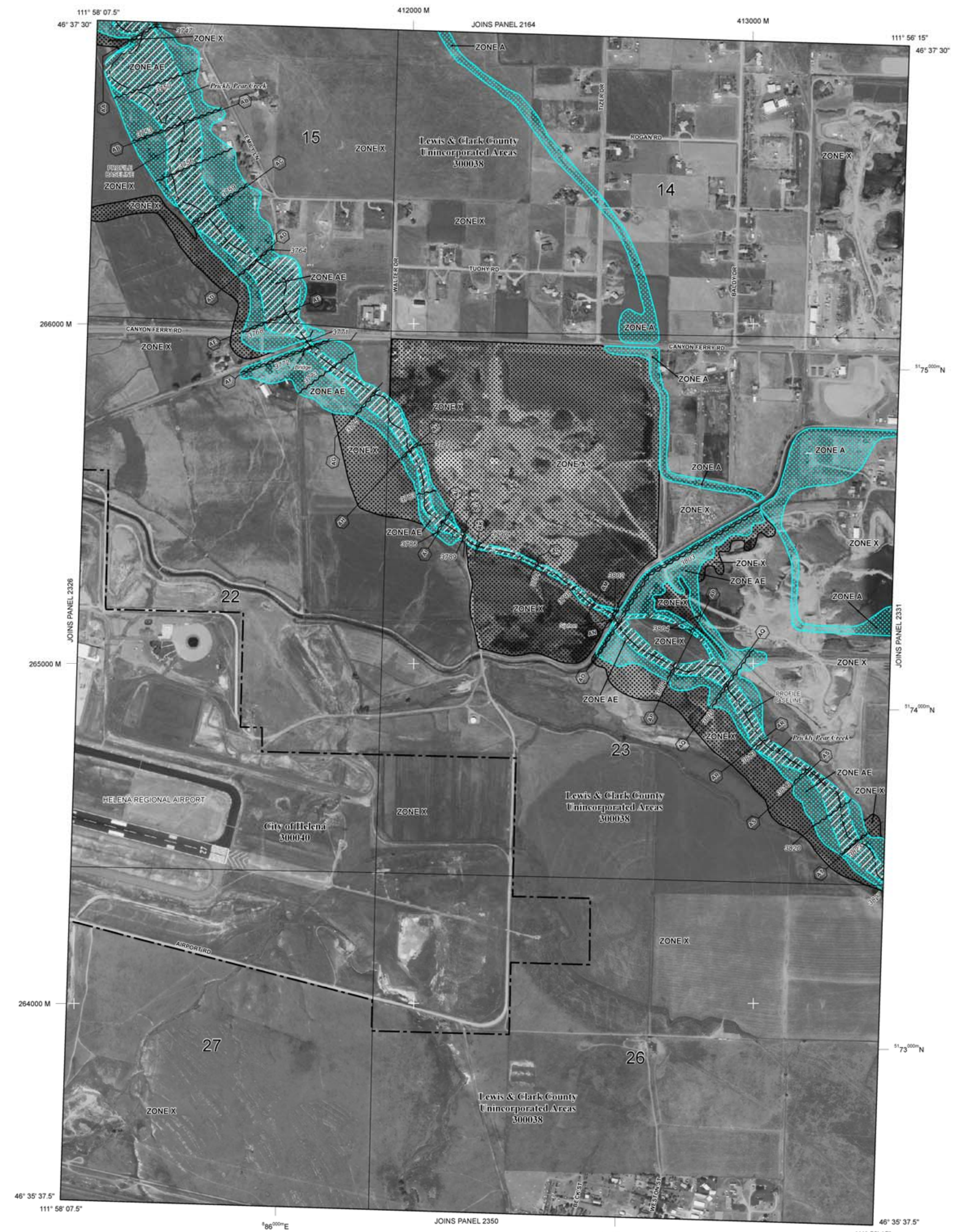
For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map,** how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

Lewis & Clark County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)	Flooding Source	Vertical Datum Offset (ft)
Blackfoot River	3.7	Orofino Gulch	3.5
East Overflow of Prickly Pear Creek	3.4	Prickly Pear Creek	3.4
Elk Creek	3.3	Silver Creek	3.3
Grizzly Gulch	3.5	South Braid of Prickly Pear Creek	3.4
Last Chance Gulch	3.4	Ten Mile Creek	3.4
North Overflow of Prickly Pear Creek	3.4		

Example: To convert Blackfoot River elevations to NAVD 88, 3.7 feet were added to the NGVD 29 elevations.



MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 10 NORTH, RANGE 3 WEST.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.

~~513~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

(A)——(A)	Cross section line
(23)- - - - -(23)	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
4989000 M	1000-meter ticks: Montana State Plane Zone (FIPS Zone 2500), Lambert Conformal Conic projection
$^{49}89^{000m}$ N	1000-meter Universal Transverse Mercator grid values, zone 11
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 19, 2012

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

N

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2327E

FIRM
FLOOD INSURANCE RATE MAP
LEWIS AND CLARK COUNTY, MONTANA AND INCORPORATED AREAS

PANEL 2327 OF 2450
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HELENA, CITY OF	300040	2327	E
LEWIS & CLARK COUNTY, UNINCORPORATED AREAS	300038	2327	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
30049C2327E

EFFECTIVE DATE
SEPTEMBER 19, 2012

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Montana State Plane Zone (FIPS zone 2500). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from NAIP Orthophotography produced with a one meter ground resolution from photography dated 2005.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

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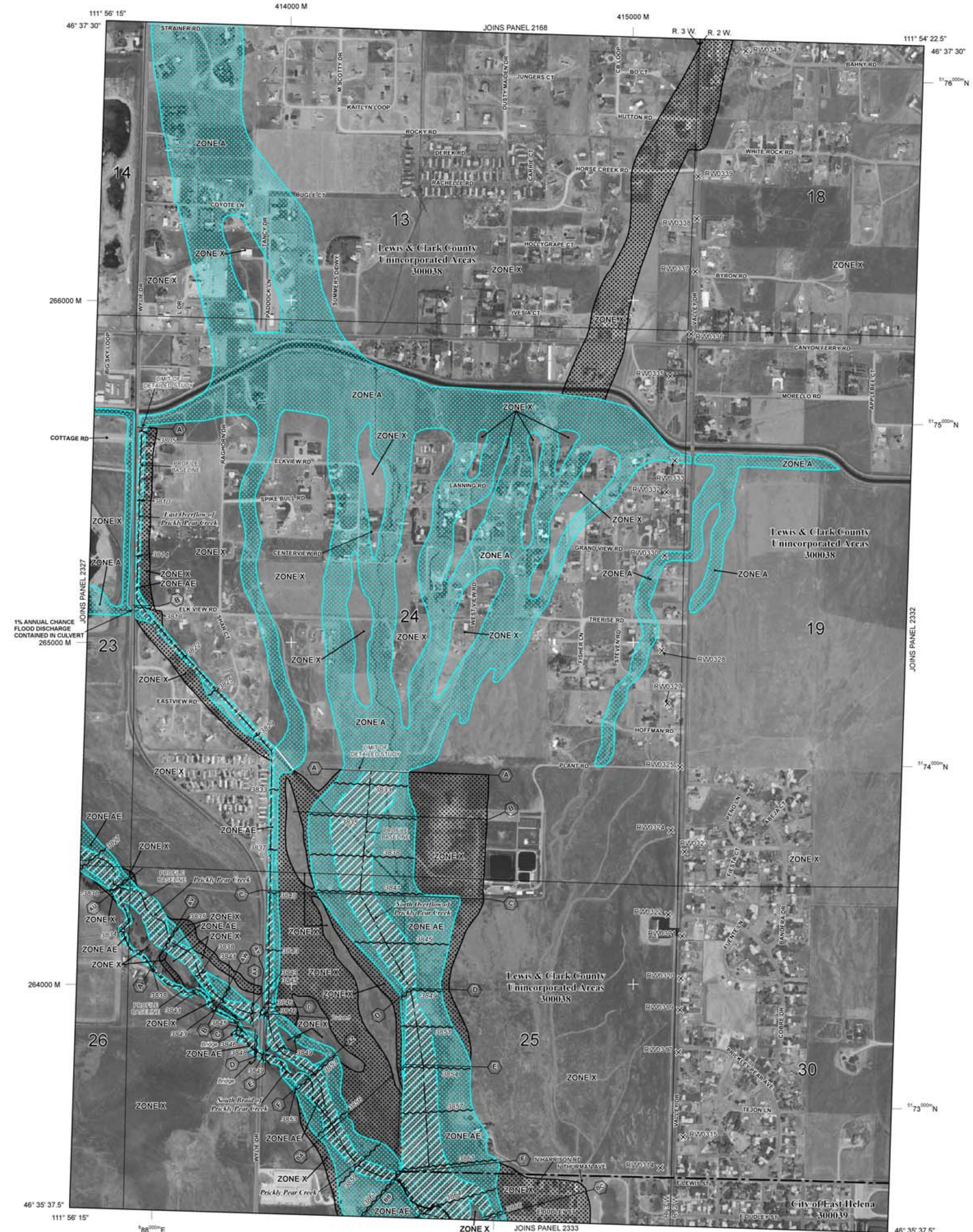
Lewis & Clark County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)	Flooding Source	Vertical Datum Offset (ft)
Blackfoot River	3.7	Orofino Gulch	3.5
East Overflow of Prickly Pear Creek	3.4	Prickly Pear Creek	3.4
Elk Creek	3.3	Silver Creek	3.3
Grizzly Gulch	3.5	South Braid of Prickly Pear Creek	3.4
Last Chance Gulch	3.4	Ten Mile Creek	3.4
North Overflow of Prickly Pear Creek	3.4		

Example: To convert Blackfoot River elevations to NAVD 88, 3.7 feet were added to the NGVD 29 elevations.



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 10 NORTH, RANGE 2 WEST AND TOWNSHIP 10 NORTH, RANGE 3 WEST.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% Annual Chance Floodplain Boundary
	0.2% Annual Chance Floodplain Boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
~~ 513 ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 - - - - 23	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
4989000 M	1000-meter ticks: Montana State Plane Zone (FIPS Zone 2500), Lambert Conformal Conic projection
$^{48}89^{000m}$ N	1000-meter Universal Transverse Mercator grid values, zone 11
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 19, 2012

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2331E

FIRM

FLOOD INSURANCE RATE MAP

LEWIS AND CLARK COUNTY, MONTANA AND INCORPORATED AREAS

PANEL 2331 OF 2450

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EAST HELENA, CITY OF	300039	2331	E
LEWIS & CLARK COUNTY, UNINCORPORATED AREAS	300038	2331	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
30049C2331E

EFFECTIVE DATE
SEPTEMBER 19, 2012

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

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Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Montana State Plane Zone (FIPS zone 2500). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

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National Geodetic Survey
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Silver Spring, Maryland 20910-3282
(301) 713-3242

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Base map information shown on this FIRM was derived from NAIP Orthophotography produced with a one meter ground resolution from photography dated 2005.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

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Lewis & Clark County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)	Flooding Source	Vertical Datum Offset (ft)
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Last Chance Gulch	3.4	Ten Mile Creek	3.4
North Overflow of Prickly Pear Creek	3.4		

Example: To convert Blackfoot River elevations to NAVD 88, 3.7 feet were added to the NGVD 29 elevations.

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 10 NORTH, RANGE 2 WEST.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
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ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
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COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary
0.2% Annual Chance Floodplain Boundary
Floodway boundary
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CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
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4989000 M	1000-meter ticks: Montana State Plane Zone (FIPS Zone 2500), Lambert Conformal Conic projection
$^{47}89^{000m}$ N	1000-meter Universal Transverse Mercator grid values, zone 11
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 19, 2012

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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N

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2332E

FIRM
FLOOD INSURANCE RATE MAP
LEWIS AND CLARK COUNTY, MONTANA AND INCORPORATED AREAS

PANEL 2332 OF 2450
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EAST HELENA, CITY OF	300039	2332	E
LEWIS & CLARK COUNTY, UNINCORPORATED AREAS	300038	2332	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
30049C2332E

EFFECTIVE DATE
SEPTEMBER 19, 2012

Federal Emergency Management Agency

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Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

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Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

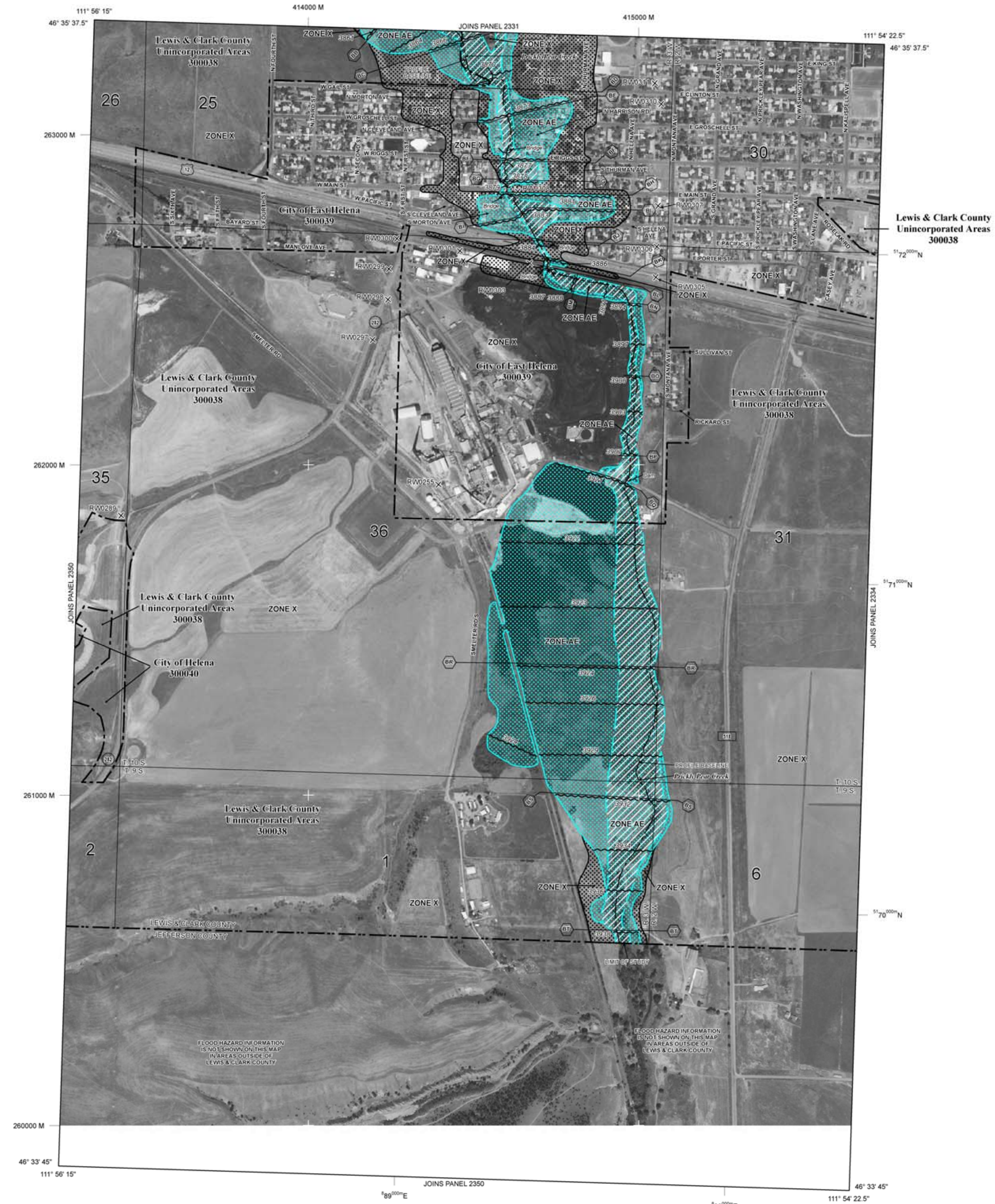
For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map,** how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

Lewis & Clark County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)	Flooding Source	Vertical Datum Offset (ft)
Blackfoot River	3.7	Orofino Gulch	3.5
East Overflow of Prickly Pear Creek	3.4	Prickly Pear Creek	3.4
Elk Creek	3.3	Silver Creek	3.3
Grizzly Gulch	3.5	South Braid of Prickly Pear Creek	3.4
Last Chance Gulch	3.4	Ten Mile Creek	3.4
North Overflow of Prickly Pear Creek	3.4		

Example: To convert Blackfoot River elevations to NAVD 88, 3.7 feet were added to the NGVD 29 elevations.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.

~~ 513 ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

(A)———(A)	Cross section line
(23)- - - - -(23)	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
4989000 M	1000-meter ticks: Montana State Plane Zone (FIPS Zone 2500), Lambert Conformal Conic projection
$^{49}89^{000m}$ N	1000-meter Universal Transverse Mercator grid values, zone 11
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 19, 2012

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

N

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2333E

FIRM
FLOOD INSURANCE RATE MAP
LEWIS AND CLARK COUNTY, MONTANA AND INCORPORATED AREAS

PANEL 2333 OF 2450
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EAST HELENA, CITY OF	300039	2333	E
HELENA, CITY OF	300040	2333	E
LEWIS & CLARK COUNTY, UNINCORPORATED AREAS	300038	2333	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
30049C2333E

EFFECTIVE DATE
SEPTEMBER 19, 2012

Federal Emergency Management Agency

Montana Natural Heritage - SOC Report

Animal Species of Concern

Species List Last Updated **10/31/2019**

A program of the **Montana State Library's Natural Resource Information System** operated by the **University of Montana**.

24 Species of Concern
1 Special Status Species
Filtered by the following criteria:
LL = 28A3 (based on mapped Species Occurrences)

Expand All | Collapse All

Introduction

Species of Concern

Species of Concern

24 Species
Filtered by the following criteria:
LL = 28A3 (based on mapped **Species Occurrences**)

MAMMALS (MAMMALIA)

LL = 28A3 (based on map

SCIENTIFIC NAME COMMON NAME TAXA SORT	FAMILY (SCIENTIFIC) FAMILY (COMMON)	GLOBAL RANK	STATE RANK	USFWS	USFS	BLM	FWP SWAP	% OF GLOBAL BREEDING RANGE IN MT	% OF MT THAT IS BREEDING RANGE
Corynorhinus townsendii Townsend's Big-eared Bat	Vespertilionidae Bats	G4	S3		Sensitive - Known on Forests (BD, BRT, CG, HLC, KOOT, LOLO)	SENSITIVE	SGCN3	5%	87%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Fergus, Flathead, Galla Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Mccone, Meagher, Mineral, Missoula, Musselshell, Park, Phillips, Powder River, Powell, Prairie, R Rosebud, Sanders, Silver Bow, Stillwater, Treasure, Valley, Yellowstone **State Rank Reason:** Species is widespread, but uncommon and appears to occur at low densities. Disturbance of cave and mine roosts and the hard closure of occ term persistence.							
Cynomys ludovicianus Black-tailed Prairie Dog	Sciuridae Squirrels	G4	S3		Sensitive - Known on Forests (CG)	SENSITIVE	SGCN3	15%	71%
		Species Occurrences verified in these Counties: Big Horn, Blaine, Carbon, Carter, Cascade, Chouteau, Custer, Fallon, Fergus, Garfield, Golden Valley, Hill, Jeffe Clark, Liberty, Mccone, Musselshell, Petroleum, Phillips, Powder River, Prairie, Richland, Rosebud, Stillwater, Sweet Grass, Toole, Treasure, Valley, Wheatland, Y **State Rank Reason:** Across much of eastern Montana this species occurs in areas with suitable soil and topography. However sylvatic plague has caused the specie colony size and dynamics. Ongoing threats from disease and persecution due to perceived competition with grazing make long-term status of this species uncertai							
Euderma maculatum Spotted Bat	Vespertilionidae Bats	G4	S3		Sensitive - Known on Forests (BD, CG)	SENSITIVE	SGCN3, SGIN	5%	27%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Cascade, Chouteau, Dawson, Fergus, Gallatin, Jefferson, Ju Madison, Musselshell, Phillips, Powder River, Richland, Rosebud, Silver Bow, Stillwater, Treasure, Yellowstone **State Rank Reason:** Little is known about this species in Montana. Although widely distributed, the species is quite rare in almost all of its range. Little is known a abundance or occupancy, or life history.							
Gulo gulo Wolverine	Mustelidae Weasels	G4	S3	P	Proposed on Forests (BD, BRT, CG, HLC, KOOT, LOLO)	SENSITIVE	SGCN3	0%	37%
		Species Occurrences verified in these Counties: Beaverhead, Broadwater, Carbon, Cascade, Deer Lodge, Flathead, Gallatin, Glacier, Granite, Jefferson, Judith Lincoln, Madison, Meagher, Mineral, Missoula, Park, Pondera, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland							
Lasiurus cinereus Hoary Bat	Vespertilionidae Bats	G3G4	S3				SGCN3	2%	100%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Deer L Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mi Park, Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, T Valley, Wheatland, Wibaux, Yellowstone							
Myotis lucifugus Little Brown Myotis	Vespertilionidae Bats	G3	S3				SGCN3	3%	100%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Deer L Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mineral, Mi Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland, Wibaux, Yellowstone **State Rank Reason:** Species is common and widespread, but under significant threat of catastrophic declines due to White-Nose Syndrome, a fungal disease respo populations of this species in the eastern US.							

BIRDS (AVES)

LL = 28A3 (based on map

SCIENTIFIC NAME COMMON NAME TAXA SORT	FAMILY (SCIENTIFIC) FAMILY (COMMON)	GLOBAL RANK	STATE RANK	USFWS	USFS	BLM	FWP SWAP	% OF GLOBAL BREEDING RANGE IN MT	% OF MT THAT IS BREEDING RANGE
Accipiter gentilis Northern Goshawk	Accipitridae Hawks / Kites / Eagles	G5	S3	MBTA			SGCN3	2%	68%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Broadwater, Carbon, Carter, Cascade, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, G Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Pondera, Powder River, Powell, Ravalli, Rosebud, Sanders, Silver Bow, S Teton, Wheatland							
Aechmophorus clarkii Clark's Grebe	Podicipedidae Grebes	G5	S3B	MBTA			SGCN3	1%	2%
		Species Occurrences verified in these Counties: Lake, Lewis and Clark, Phillips, Teton							
Aquila chrysaetos Golden Eagle	Accipitridae Hawks / Kites / Eagles	G5	S3	BGEPA; MBTA; BCC17		SENSITIVE	SGCN3	3%	100%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Dawson, Deer Lodge, Fa Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Missoula, M Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Trea Wibaux, Yellowstone							
Ardea herodias Great Blue Heron	Ardeidae Bitterns / Egrets / Herons / Night-Herons	G5	S3	MBTA			SGCN3	3%	100%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Dawson, Deer Lodge, Fa Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mineral, Miss Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Teton, Wibaux, Yellowstone **State Rank Reason:** Small breeding population size, evidence of recent declines, and declining regeneration of riparian cottonwood forests due to altered hydrolo							

Catharus fuscescens Veery	**Turdidae** Thrushes	G5	S3B	MBTA		SENSITIVE	SGCN3	6%	100%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Cascade, Chouteau, Custer, Deer Lodge, Fergus, Flathead, (Hill, Jefferson, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Pondera, Powder Riv Roosevelt, Rosebud, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland, Yellowstone							
Coccothraustes vespertinus Evening Grosbeak	**Fringillidae** Finches	G5	S3	MBTA			SGCN3	3%	100%
		Species Occurrences verified in these Counties: Beaverhead, Broadwater, Carbon, Carter, Cascade, Chouteau, Fergus, Flathead, Gallatin, Glacier, Golden Valle Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Musselshell, Park, Pondera, Powder River, Powell, Ravalli, Sanders, Silver Bow, Stillwa Wheatland **State Rank Reason:** Populations in Montana and across North America have experienced rangewide declines, although the causes of these declines are unclear (Bc							
Dolichonyx oryzivorus Bobolink	**Icteridae** Blackbirds	G5	S3B	MBTA			SGCN3	9%	100%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Fallon Garfield, Glacier, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Madison, Mccone, Meagher, Missoula, Musselshell, Park, Petroleum, Phillip Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Stillwater, Sweet Grass, Teton, Valley, Wheatland, Wibaux, Yellowstone **State Rank Reason:** Species has undergone recent large population declines in Montana and a patchwork of declines and increases have been documented in surrc							
Dryocopus pileatus Pileated Woodpecker	**Picidae** Woodpeckers	G5	S3	MBTA			SGCN3	1%	27%
		Species Occurrences verified in these Counties: Beaverhead, Broadwater, Cascade, Deer Lodge, Flathead, Gallatin, Glacier, Granite, Jefferson, Lake, Lewis anc Meagher, Mineral, Missoula, Park, Powell, Ravalli, Sanders, Silver Bow							
Falco peregrinus Peregrine Falcon	**Falconidae** Falcons	G4	S3	DM; MBTA; BCC10; BCC11; BCC17	Sensitive - Known on Forests (BD, BRT, CG, HLC, KOOT, LOLO)	SENSITIVE	SGCN3	2%	100%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Cascade, Chouteau, Deer Lodge, Flathead, Gallatin, Glacier Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Pondera, Powell, Prairie, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Toole,							
Haemorhous cassinii Cassin's Finch	**Fringillidae** Finches	G5	S3	MBTA; BCC10			SGCN3	11%	62%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Broadwater, Carbon, Cascade, Chouteau, Custer, Deer Lodge, Fergus, Flathead, Gallatin Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Powder River, Powel Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland, Yellowstone **State Rank Reason:** Data show recent short-term declines in population for this species							
Himantopus mexicanus Black-necked Stilt	**Recurvirostridae** Avocets	G5	S3B	MBTA			SGCN3	1%	8%
		Species Occurrences verified in these Counties: Cascade, Chouteau, Gallatin, Glacier, Golden Valley, Lake, Lewis and Clark, Missoula, Phillips, Ravalli, Stillwate							
Melanerpes lewis Lewis's Woodpecker	**Picidae** Woodpeckers	G4	S2B	MBTA; BCC10; BCC17		SENSITIVE	SGCN2	8%	78%
		Species Occurrences verified in these Counties: Big Horn, Carter, Cascade, Deer Lodge, Flathead, Granite, Jefferson, Lake, Lewis and Clark, Lincoln, Missoula, / Powell, Ravalli, Rosebud, Sanders, Sweet Grass, Yellowstone							
Nucifraga columbiana Clark's Nutcracker	**Corvidae** Jays / Crows / Magpies	G5	S3	MBTA	Species of Conservation Concern on Forests (FLAT)		SGCN3	9%	84%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Deer Lodge, Fergus, Flathead, (Valley, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Ponc Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Wheatland, Yellowstone							
Numenius americanus Long-billed Curlew	**Scolopacidae** Sandpipers	G5	S3B	MBTA; BCC10; BCC11; BCC17		SENSITIVE	SGCN3	19%	100%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Deer L Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Madison, Mccone, Meagher, Missoula, M Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley Yellowstone							
Pipilo chlorurus Green-tailed Towhee	**Passerellidae** New World Sparrows	G5	S3B	MBTA			SGCN3	3%	60%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Chouteau, Custer, Deer Lodge, Fergus, Gallatin, Garfield, G Basin, Lewis and Clark, Madison, Meagher, Musselshell, Park, Petroleum, Phillips, Powder River, Silver Bow, Stillwater, Sweet Grass, Valley, Wheatland, Yellowsto **State Rank Reason:** Populations in Montana and across the Northern Rockies have undergone recent declines.							
Spizella breweri Brewer's Sparrow	**Passerellidae** New World Sparrows	G5	S3B	MBTA; BCC10; BCC17		SENSITIVE	SGCN3	12%	100%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Chouteau, Custer, Dawson, Deer Lodge, Fallon, Ferg Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Missoula, Musselshell, Park, Petrole River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, \ **State Rank Reason:** Species faces threats from loss of sagebrush habitats it is dependent on as a result of habitat conversion for agriculture and increased frequer encroachment and drought.							
Sterna forsteri Forster's Tern	**Laridae** Gulls / Terns	G5	S3B	MBTA		SENSITIVE	SGCN3	1%	59%
		Species Occurrences verified in these Counties: Beaverhead, Blaine, Cascade, Chouteau, Hill, Lake, Lewis and Clark, Petroleum, Phillips, Powell, Roosevelt, She							

FISH (ACTINOPTERYGII)

LL = 28A3 (based on mar

SCIENTIFIC NAME COMMON NAME TAXA SORT	FAMILY (SCIENTIFIC) FAMILY (COMMON)	GLOBAL RANK	STATE RANK	USFWS	USFS	BLM	FWP SWAP	% OF GLOBAL BREEDING RANGE IN MT	% OF MT THAT IS BREEDING RANGE
Oncorhynchus clarkii lewisi Westslope Cutthroat Trout	**Salmonidae** Trout	G5T4	S2		Sensitive - Known on Forests (BD, BRT, CG, HLC, KOOT, LOLO)	SENSITIVE	SGCN2		34%
		Species Occurrences verified in these Counties: Beaverhead, Broadwater, Cascade, Chouteau, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, Granite, Jefferso and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Pondera, Powell, Ravalli, Sanders, Silver Bow, Teton, Wheatland **State Rank Reason:** The Westslope Cutthroat trout is currently ranked "S2" in Montana because it is at risk due to very limited and/or potentially declining popula habitat, making it vulnerable to extirpation in the state.							

Potential Species of Concern

Potential Species of Concern
0 Species
Filtered by the following criteria:
LL = 28A3 (based on mapped **Species Occurrences**)

Special Status Species

Special Status Species

1 Species

Filtered by the following criteria:

LL = 28A3 (based on mapped **Species Occurrences**)

BIRDS (AVES)

LL = 28A3 (based on map

SCIENTIFIC NAME COMMON NAME TAXA SORT	FAMILY (SCIENTIFIC) FAMILY (COMMON)	GLOBAL RANK	STATE RANK	USFWS	USFS	BLM	FWP SWAP	% OF GLOBAL BREEDING RANGE IN MT	% OF MT THAT IS BREEDING RANGE
Haliaeetus leucocephalus Bald Eagle	Accipitridae Hawks / Kites / Eagles	G5	S4	DM; BGEPA; MBTA; BCC10; BCC11; BCC17	Sensitive - Known on Forests (BD, BRT, CG, HLC, KOOT, LOLO)	SENSITIVE		2%	100%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Dawson, Deer Lodge, Fa Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mineral, Miss Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Tr Wibaux, Yellowstone **State Rank Reason:** Populations numbers have steadily increased since the 1980s and breeding pairs now occupy a high percentage of suitable habitat across the s still protected under the Bald and Golden Eagle Protection Act of 1940.							

Additions To Statewide List

Species Removed From Statewide List

Species of Greatest Inventory Need

Citation for data on this website:
Montana Animal Species of Concern Report. Montana Natural Heritage Program and Montana Fish, Wildlife and Parks. Retrieved on 4/1/2020, from http://mtnhp.org/SpeciesOfConcern/?AorP=a

ROBERT PECCIA & ASSOCIATES

RPA

HELENA, MT
KALISPELL, MT
BOZEMAN, MT

February 21, 2020

Sara Nelsen, Support Coordinator
Montana Department of Environmental Quality
Director's Office
P.O. Box 200901
Helena, MT 59620-0901

Subject: East Helena Wastewater Master Plan
East Helena, Montana

Dear Ms. Nelsen:

Our firm was retained by the City of East Helena to complete the *East Helena Wastewater Master Plan*. As part of our work for the City, we are compiling information for an environmental checklist to be included with the document and funding applications for this project. Guidelines for the funding applications require us to advise appropriate agencies of the scope of the project and request their comments.

The City of East Helena is currently experiencing a high volume of groundwater infiltration into their collection system. An infiltration study was completed during the Spring of 2019 to help determine areas where groundwater may be entering the collection system. This proposed project would include the installation of cast-in-place pipe lining (CIPP) within existing sewer mains where the most infiltration was identified. Eliminating as much groundwater infiltration as possible will improve the performance of the wastewater treatment system, reduce annual operations and maintenance costs, and increase the capacity of the existing system.

The City of East Helena is anticipating a large number of wastewater connections to be added to their system over the next several years due to new developments. Therefore, improvements at the wastewater treatment facility are also included as part of the proposed project. These improvements include upgrades to the existing screening system, upgrades to the existing grit removal system, and rehabilitation of the existing screw pumps.

The existing screens used at the wastewater treatment facility are approximately 20 years old and are not sized for the additional growth that the City is anticipating. Also, the current headworks building, which includes the screen, should be upgraded.

The existing grit removal system is simplistic at best. Operators must manually shovel the grit from the grit chambers in order to remove the grit. Also, the existing system does not wash and separate the grit. By washing and separating the grit, the grit would be much cleaner for disposal and the organic matter attached to the grit would be recirculated back into the plant, improving plant operations. Additionally, the existing grit removal system was not sized for the additional growth the City is anticipating.

Helena
3147 Saddle Drive
P.O. Box 5653
Helena, MT 59601
Tele: 406.447.5000
Fax: 406.447.5036
www.rpa-hln.com

The existing screw pumps are aging and need of rehabilitation. Rehabilitation would include replacement of the upper and lower bearings, re-grouting the screw pump troughs and cleaning and painting the screws. Rehabilitation allows the pumps to be more efficient and the City can continue using the existing pumps instead of a costly replacement.

To satisfy our requirements, please identify any environmental permitting requirements or other issues of interest to your agency we should consider in the development of this project. Maps showing the proposed improvements to the collection system and the location of the wastewater treatment facility are included for your reference. Any other statements you may have on this project will help us determine the need for further coordination and for more detailed evaluation for the potential project impacts. If we do not receive a reply, we will assume that your agency has no comments to offer regarding this project.

If you have any questions, please contact Brad Koenig, P.E. or me at 406-447-5000 or tbodlovic@rpa-hln.com

Sincerely,
ROBERT PECCIA & ASSOCIATES

Trisha Bodlovic

Trisha Bodlovic
Project Designer

Enclosure

February 21, 2020

Jodi Bush
Field Supervisor
U.S. Fish and Wildlife Services
Ecological Services
Montana Field Office
585 Shepard Way, Suite 1
Helena, MT 59601

Subject: East Helena Wastewater Master Plan
East Helena, Montana

Dear Ms. Bush:

Our firm was retained by the City of East Helena to complete the *East Helena Wastewater Master Plan*. As part of our work for the City, we are compiling information for an environmental checklist to be included with the document and funding applications for this project. Guidelines for the funding applications require us to advise appropriate agencies of the scope of the project and request their comments.

The City of East Helena is currently experiencing a high volume of groundwater infiltration into their collection system. An infiltration study was completed during the Spring of 2019 to help determine areas where groundwater may be entering the collection system. This proposed project would include the installation of cast-in-place pipe lining (CIPP) within existing sewer mains where the most infiltration was identified. Eliminating as much groundwater infiltration as possible will improve the performance of the wastewater treatment system, reduce annual operations and maintenance costs, and increase the capacity of the existing system.

The City of East Helena is anticipating a large number of wastewater connections to be added to their system over the next several years due to new developments. Therefore, improvements at the wastewater treatment facility are also included as part of the proposed project. These improvements include upgrades to the existing screening system, upgrades to the existing grit removal system, and rehabilitation of the existing screw pumps.

The existing screens used at the wastewater treatment facility are approximately 20 years old and are not sized for the additional growth that the City is anticipating. Also, the current headworks building, which includes the screen, should be upgraded.

The existing grit removal system is simplistic at best. Operators must manually shovel the grit from the grit chambers in order to remove the grit. Also, the existing system does not wash and separate the grit. By washing and separating the grit, the grit would be much cleaner for disposal and the organic matter attached to the grit would be recirculated back

into the plant, improving plant operations. Additionally, the existing grit removal system was not sized for the additional growth the City is anticipating.

The existing screw pumps are aging and need of rehabilitation. Rehabilitation would include replacement of the upper and lower bearings, re-grouting the screw pump troughs and cleaning and painting the screws. Rehabilitation allows the pumps to be more efficient and the City can continue using the existing pumps instead of a costly replacement.

To satisfy our requirements, please identify any federally-listed threatened or endangered species or critical habitat for such species that occur or may occur in the Kalispell area. Maps showing the proposed improvements to the collection system and the location of the wastewater treatment facility are included for your reference. Any other statements you may have on this project will help us determine the need for further coordination and for more detailed evaluation for the potential project impacts. If we do not receive a reply, we will assume that your agency has no comments to offer regarding this project.

If you have any questions, please contact Brad Koenig, P.E. or me at 406-447-5000 or tbodlovic@rpa-hln.com

Sincerely,
ROBERT PECCIA & ASSOCIATES

Trisha Bodlovic

Trisha Bodlovic
Project Designer

Enclosure

ROBERT PECCIA & ASSOCIATES

RPA

HELENA, MT
KALISPELL, MT
BOZEMAN, MT

February 21, 2020

Sage Joyce, P.E.
Temporary Montana Program Manager
U.S. Army Corps of Engineers
10 West 15th Street, Suite 2200
Helena, MT 59626

Subject: East Helena Wastewater Master Plan
East Helena, Montana

Dear Ms. Joyce:

Our firm was retained by the City of East Helena to complete the *East Helena Wastewater Master Plan*. As part of our work for the City, we are compiling information for an environmental checklist to be included with the document and funding applications for this project. Guidelines for the funding applications require us to advise appropriate agencies of the scope of the project and request their comments.

The City of East Helena is currently experiencing a high volume of groundwater infiltration into their collection system. An infiltration study was completed during the Spring of 2019 to help determine areas where groundwater may be entering the collection system. This proposed project would include the installation of cast-in-place pipe lining (CIPP) within existing sewer mains where the most infiltration was identified. Eliminating as much groundwater infiltration as possible will improve the performance of the wastewater treatment system, reduce annual operations and maintenance costs, and increase the capacity of the existing system.

The City of East Helena is anticipating a large number of wastewater connections to be added to their system over the next several years due to new developments. Therefore, improvements at the wastewater treatment facility are also included as part of the proposed project. These improvements include upgrades to the existing screening system, upgrades to the existing grit removal system, and rehabilitation of the existing screw pumps.

The existing screens used at the wastewater treatment facility are approximately 20 years old and are not sized for the additional growth that the City is anticipating. Also, the current headworks building, which includes the screen, should be upgraded.

The existing grit removal system is simplistic at best. Operators must manually shovel the grit from the grit chambers in order to remove the grit. Also, the existing system does not wash and separate the grit. By washing and separating the grit, the grit would be much cleaner for disposal and the organic matter attached to the grit would be recirculated back into the plant, improving plant operations. Additionally, the existing grit removal system was not sized for the additional growth the City is anticipating.

Helena
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P.O. Box 5653
Helena, MT 59601
Tele: 406.447.5000
Fax: 406.447.5036

www.rpa-hln.com

The existing screw pumps are aging and need of rehabilitation. Rehabilitation would include replacement of the upper and lower bearings, re-grouting the screw pump troughs and cleaning and painting the screws. Rehabilitation allows the pumps to be more efficient and the City can continue using the existing pumps instead of a costly replacement.

To satisfy our requirements, please identify any environmental permitting requirements or other issues of interest to your agency we should consider in the development of this project. Maps showing the proposed improvements to the collection system and the location of the wastewater treatment facility are included for your reference. Any other statements you may have on this project will help us determine the need for further coordination and for more detailed evaluation for the potential project impacts. If we do not receive a reply, we will assume that your agency has no comments to offer regarding this project.

If you have any questions, please contact Brad Koenig, P.E. or me at 406-447-5000 or tbodlovic@rpa-hln.com

Sincerely,
ROBERT PECCIA & ASSOCIATES

Trisha Bodlovic

Trisha Bodlovic
Project Designer

Enclosure

February 21, 2020

Bryan Gartland
Deputy Regional Manager
Montana Department of Natural Resources and Conservation
Water Resources Bureau
1424 Ninth Avenue
P.O. Box 201601
Helena, MT 59620-1601

Subject: East Helena Wastewater Master Plan
East Helena, Montana

Dear Mr. Gartland:

Our firm was retained by the City of East Helena to complete the *East Helena Wastewater Master Plan*. As part of our work for the City, we are compiling information for an environmental checklist to be included with the document and funding applications for this project. Guidelines for the funding applications require us to advise appropriate agencies of the scope of the project and request their comments.

The City of East Helena is currently experiencing a high volume of groundwater infiltration into their collection system. An infiltration study was completed during the Spring of 2019 to help determine areas where groundwater may be entering the collection system. This proposed project would include the installation of cast-in-place pipe lining (CIPP) within existing sewer mains where the most infiltration was identified. Eliminating as much groundwater infiltration as possible will improve the performance of the wastewater treatment system, reduce annual operations and maintenance costs, and increase the capacity of the existing system.

The City of East Helena is anticipating a large number of wastewater connections to be added to their system over the next several years due to new developments. Therefore, improvements at the wastewater treatment facility are also included as part of the proposed project. These improvements include upgrades to the existing screening system, upgrades to the existing grit removal system, and rehabilitation of the existing screw pumps.

The existing screens used at the wastewater treatment facility are approximately 20 years old and are not sized for the additional growth that the City is anticipating. Also, the current headworks building, which includes the screen, should be upgraded.

The existing grit removal system is simplistic at best. Operators must manually shovel the grit from the grit chambers in order to remove the grit. Also, the existing system does not wash and separate the grit. By washing and separating the grit, the grit would be much cleaner for disposal and the organic matter attached to the grit would be recirculated back

into the plant, improving plant operations. Additionally, the existing grit removal system was not sized for the additional growth the City is anticipating.

The existing screw pumps are aging and need of rehabilitation. Rehabilitation would include replacement of the upper and lower bearings, re-grouting the screw pump troughs and cleaning and painting the screws. Rehabilitation allows the pumps to be more efficient and the City can continue using the existing pumps instead of a costly replacement.

To satisfy our requirements, please identify any environmental permitting requirements or other issues of interest to your agency we should consider in the development of this project. Maps showing the proposed improvements to the collection system and the location of the wastewater treatment facility are included for your reference. Any other statements you may have on this project will help us determine the need for further coordination and for more detailed evaluation for the potential project impacts. A similar request has also been sent to Lindsay Morgan, Lewis and Clark County Floodplain Administrator, and we are working closely with Scott St. Claire, City of East Helena's Floodplain Administrator. If we do not receive a reply, we will assume that your agency has no comments to offer regarding this project.

If you have any questions, please contact Brad Koenig, P.E. or me at 406-447-5000 or tbodlovic@rpa-hln.com

Sincerely,
ROBERT PECCIA & ASSOCIATES
Trisha Bodlovic

Trisha Bodlovic
Project Designer

Enclosure

February 21, 2020

Damon Murdo, Cultural Records Manager
State Historic Preservation Office
Montana Historical Society
P.O. Box 201802
Helena, MT 59620-1202

Subject: East Helena Wastewater Master Plan
East Helena, Montana

Dear Mr. Murdo:

Our firm was retained by the City of East Helena to complete the *East Helena Wastewater Master Plan*. As part of our work for the City, we are compiling information for an environmental checklist to be included with the document and funding applications for this project. Guidelines for the funding applications require us to advise appropriate agencies of the scope of the project and request their comments.

The City of East Helena is currently experiencing a high volume of groundwater infiltration into their collection system. An infiltration study was completed during the Spring of 2019 to help determine areas where groundwater may be entering the collection system. This proposed project would include the installation of cast-in-place pipe lining (CIPP) within existing sewer mains where the most infiltration was identified. Eliminating as much groundwater infiltration as possible will improve the performance of the wastewater treatment system, reduce annual operations and maintenance costs, and increase the capacity of the existing system.

The City of East Helena is anticipating a large number of wastewater connections to be added to their system over the next several years due to new developments. Therefore, improvements at the wastewater treatment facility are also included as part of the proposed project. These improvements include upgrades to the existing screening system, upgrades to the existing grit removal system, and rehabilitation of the existing screw pumps.

The existing screens used at the wastewater treatment facility are approximately 20 years old and are not sized for the additional growth that the City is anticipating. Also, the current headworks building, which includes the screen, should be upgraded.

The existing grit removal system is simplistic at best. Operators must manually shovel the grit from the grit chambers in order to remove the grit. Also, the existing system does not wash and separate the grit. By washing and separating the grit, the grit would be much cleaner for disposal and the organic matter attached to the grit would be recirculated back into the plant, improving plant operations. Additionally, the existing grit removal system was not sized for the additional growth the City is anticipating.

The existing screw pumps are aging and need of rehabilitation. Rehabilitation would include replacement of the upper and lower bearings, re-grouting the screw pump troughs and cleaning and painting the screws. Rehabilitation allows the pumps to be more efficient and the City can continue using the existing pumps instead of a costly replacement.

In an effort to help us identify any historical or archaeological resources that may be affected by the proposed project, we would like to request a cultural resource file search for the following areas:

> T-10-N, R-2-W, Section 30
> T-10-N, R-3-W, Sections 24 and 25

Maps showing the proposed improvements to the collection system and the location of the wastewater treatment facility are included for your reference.

Any other statements you may have on this project will help us determine the need for further coordination and for more detailed evaluation for the potential project impacts. If we do not receive a reply, we will assume that your agency has no comments to offer regarding this project.

If you have any questions, please contact Brad Koenig, P.E. or me at 406-447-5000 or tbodlovic@rpa-hln.com

Sincerely,
ROBERT PECCIA & ASSOCIATES

Trisha Bodlovic

Trisha Bodlovic
Project Designer

Enclosure

CIVIL ENGINEERING | TRANSPORTATION | PLANNING | SURVEYING

ROBERT PECCIA & ASSOCIATES

HELENA, MT
KALISPELL, MT
BOZEMAN, MT

February 21, 2020

Mark Deleray
Regional Supervisor
Montana Department of Fish, Wildlife & Parks
Region 3
1400 South 19th
Bozeman, MT 59718

Subject: East Helena Wastewater Master Plan
East Helena, Montana

Dear Mr. Deleray:

Our firm was retained by the City of East Helena to complete the *East Helena Wastewater Master Plan*. As part of our work for the City, we are compiling information for an environmental checklist to be included with the document and funding applications for this project. Guidelines for the funding applications require us to advise appropriate agencies of the scope of the project and request their comments.

The City of East Helena is currently experiencing a high volume of groundwater infiltration into their collection system. An infiltration study was completed during the Spring of 2019 to help determine areas where groundwater may be entering the collection system. This proposed project would include the installation of cast-in-place pipe lining (CIPP) within existing sewer mains where the most infiltration was identified. Eliminating as much groundwater infiltration as possible will improve the performance of the wastewater treatment system, reduce annual operations and maintenance costs, and increase the capacity of the existing system.

The City of East Helena is anticipating a large number of wastewater connections to be added to their system over the next several years due to new developments. Therefore, improvements at the wastewater treatment facility are also included as part of the proposed project. These improvements include upgrades to the existing screening system, upgrades to the existing grit removal system, and rehabilitation of the existing screw pumps.

The existing screens used at the wastewater treatment facility are approximately 20 years old and are not sized for the additional growth that the City is anticipating. Also, the current headworks building, which includes the screen, should be upgraded.

The existing grit removal system is simplistic at best. Operators must manually shovel the grit from the grit chambers in order to remove the grit. Also, the existing system does not wash and separate the grit. By washing and separating the grit, the grit would be much cleaner for disposal and the organic matter attached to the grit would be recirculated back

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The existing screw pumps are aging and need of rehabilitation. Rehabilitation would include replacement of the upper and lower bearings, re-grouting the screw pump troughs and cleaning and painting the screws. Rehabilitation allows the pumps to be more efficient and the City can continue using the existing pumps instead of a costly replacement.

To satisfy our requirements, please identify any wildlife or fisheries concerns or other issues important to your agency we should consider in the development of this project. Maps showing the proposed improvements to the collection system and the location of the wastewater treatment facility are included for your reference. Any other statements you may have on this project will help us determine the need for further coordination and for more detailed evaluation for the potential project impacts. If we do not receive a reply, we will assume that your agency has no comments to offer regarding this project.

If you have any questions, please contact Brad Koenig, P.E. or me at 406-447-5000 or tbodlovic@rpa-hln.com

Sincerely,
ROBERT PECCIA & ASSOCIATES

Trisha Bodlovic

Trisha Bodlovic
Project Designer

Enclosure

February 21, 2020

Lindsay Morgan
Lewis & Clark County Floodplain Administrator
221 Breckenridge Ave
Helena, MT 59601-4230

Subject: East Helena Wastewater Master Plan
East Helena, Montana

Dear Ms. Morgan:

Our firm was retained by the City of East Helena to complete the *East Helena Wastewater Master Plan*. As part of our work for the City, we are compiling information for an environmental checklist to be included with the document and funding applications for this project. Guidelines for the funding applications require us to advise appropriate agencies of the scope of the project and request their comments.

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The existing screens used at the wastewater treatment facility are approximately 20 years old and are not sized for the additional growth that the City is anticipating. Also, the current headworks building, which includes the screen, should be upgraded.

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If you have any questions, please contact Brad Koenig, P.E. or me at 406-447-5000 or tbodlovic@rpa-hln.com

Sincerely,
ROBERT PECCIA & ASSOCIATES

Trisha Bodlovic

Trisha Bodlovic
Project Designer

Enclosure

February 21, 2020

Jonathan George
District Conservationist
USDA Natural Resources Conservation Services
Helena Field Office
790 Colleen Street
Helena, MT 59601-9713

Subject: East Helena Wastewater Master Plan
East Helena, Montana

Dear Mr. George:

Our firm was retained by the City of East Helena to complete the *East Helena Wastewater Master Plan*. As part of our work for the City, we are compiling information for an environmental checklist to be included with the document and funding applications for this project. Guidelines for the funding applications require us to advise appropriate agencies of the scope of the project and request their comments.

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The existing screens used at the wastewater treatment facility are approximately 20 years old and are not sized for the additional growth that the City is anticipating. Also, the current headworks building, which includes the screen, should be upgraded.

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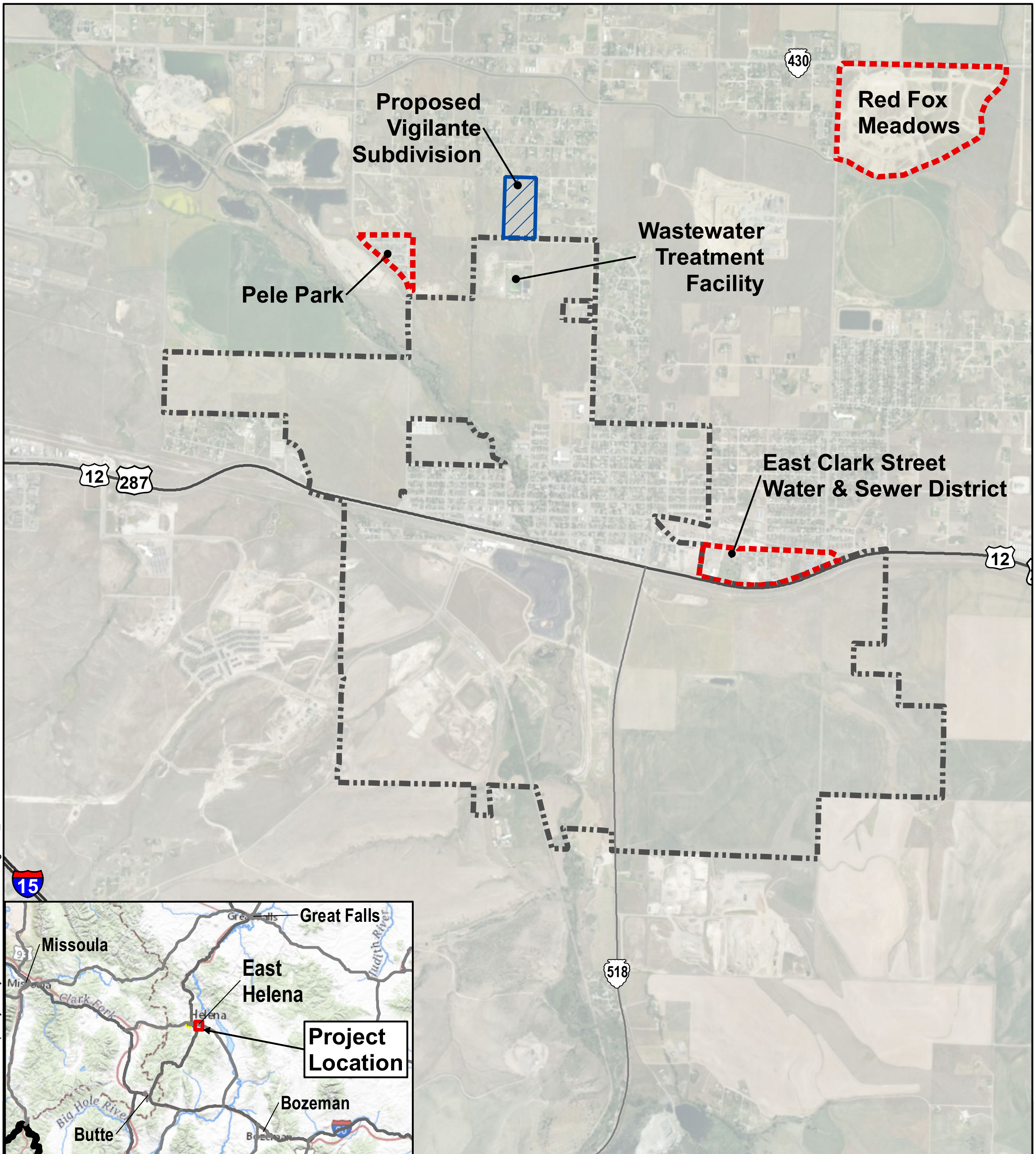
Sincerely,
ROBERT PECCIA & ASSOCIATES

Trisha Bodlovic

Trisha Bodlovic
Project Designer

Enclosure



East Helena City Limits
Wastewater Service Area Outside City Limits
Future Wastewater Service Area Outside City Limits

N

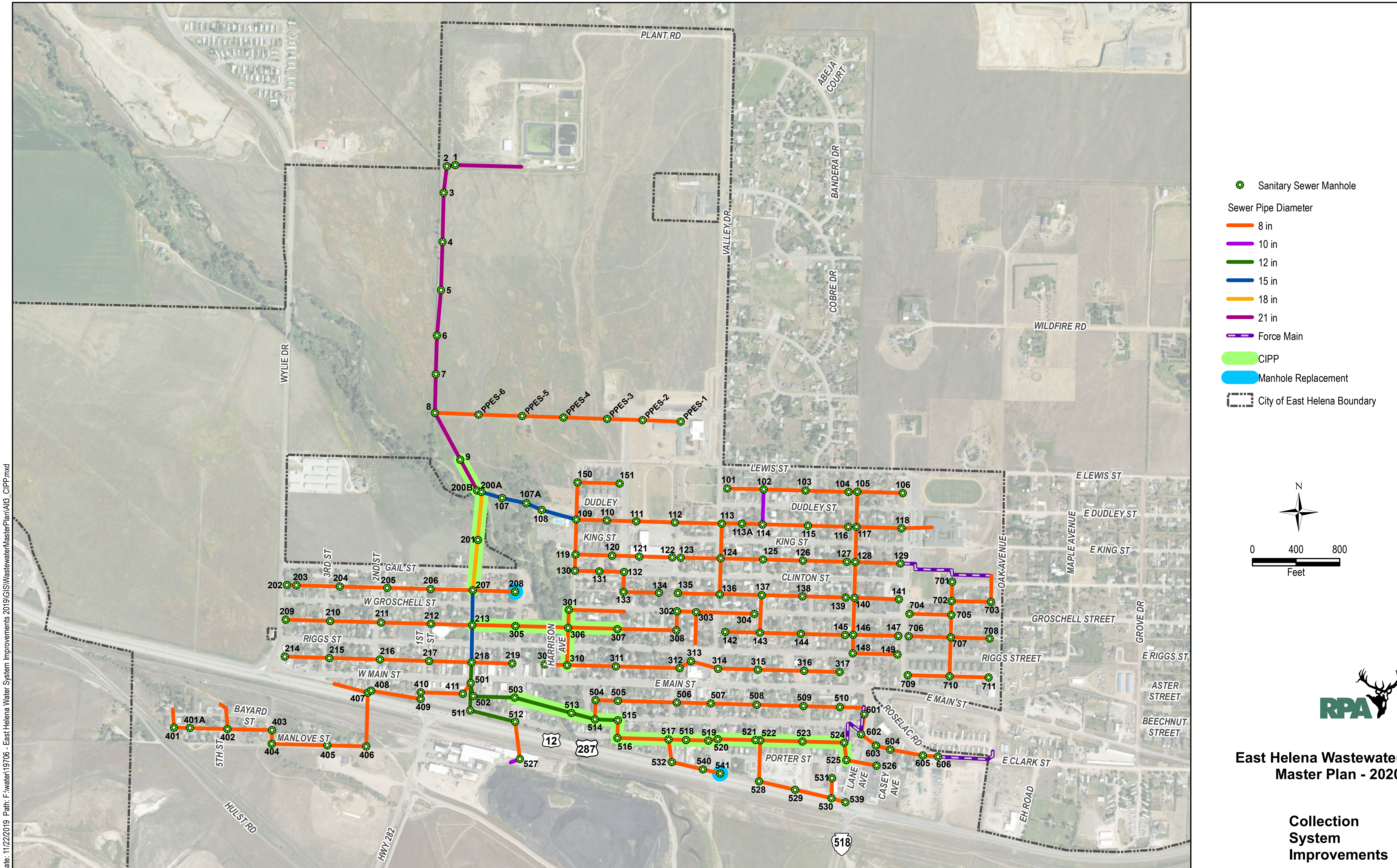
0 1,500 3,000
Feet

East Helena Wastewater Master Plan - 2020

Project Location Map

RPA

Date: 2/18/2020 Path: F:\waste\18801 - East Helena Wastewater Capacity Study\GIS\MasterPlan\PlanningArea_WWServiceAreas.mxd



Date: 11/22/2019 Path: F:\water\19706 - East Helena Water System Improvements 2019\GIS\WastewaterMasterPlan\Alt3_CIPP.mxd

From:	Murdo, Damon
To:	Trisha Bodlovic
Subject:	EAST HELENA WASTEWATER MASTER PLAN
Date:	Tuesday, February 25, 2020 1:49:51 PM
Attachments:	CRABS.pdf CRIS.pdf 2020022503.pdf

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

February 25, 2020

Trisha Bodlovic
RP&A
PO Box 5653
Helena MT 59604

RE: EAST HELENA WASTEWATER MASTER PLAN. SHPO Project #: 2020022503

Dear Trisha:

I have conducted a cultural resource file search for the above-cited project located in Section 30, T10N R2W, and Sections 24, 25, T10N R3W. According to our records there have been a few previously recorded sites within the designated search locale. In addition to the sites there have been a few previously conducted cultural resource inventories done in the area. I've attached a list of these sites and reports. If you would like any further information regarding these sites or reports, you may contact me at the number listed below.

It is SHPO's position that any structure over fifty years of age is considered historic and is potentially eligible for listing on the National Register of Historic Places. As long as the improvements and upgrades are located within previously disturbed ground, we feel that a recommendation for a cultural resource inventory is unwarranted at this time. However, should structures need to be altered or if cultural materials be inadvertently discovered during this project, we would ask that our office be contacted, and the site investigated.

If you have any further questions or comments you may contact me at (406) 444-7767 or by e-mail at dmurdo@mt.gov. I have attached an invoice for the file search. Thank you for consulting with us.

Sincerely,

Damon Murdo
Cultural Records Manager
State Historic Preservation Office

File: DEQ/AIR&WATER WASTE MNG/2020

Township:10 N Range:3 W Section: 24

BROWNELL JOAN, ET AL.

7/1/1994 HELENA CITY GATE/EAST HELENA GAS LINE

CRABS Document Number: LC 6 16161 Agency Document Number: HV-94-24

Township:10 N Range:2 W Section: 30

SCHWAB DAVID C.

9/1/1995 LACASE SUBDIVISION WATER WELL

CRABS Document Number: LC 6 17958 Agency Document Number: mt-95-59

Township:10 N Range:3 W Section: 25

AXLINE JON A.

3/1/2000 INVENTORY AND ASSESSMENT: REINFORCED CONCRETE T-BEAM BRIDGES

CRABS Document Number: ZZ 4 24227 Agency Document Number:

Township:10 N Range:3 W Section: 24

ROSSILLON MITZI

10/9/2001 A CULTURAL RESOURCE INVENTORY OF CANYON FERRY ROAD HIGHWAY PROJECT STPS 430-1(5)1 IN LEWIS AND CLARK COUNTY MONTANA

CRABS Document Number: LC 4 24429 Agency Document Number: STPS 430-1(5)1

Township:10 N Range:3 W Section: 24

AXLINE JON

11/29/2004 CULTURAL RESOURCE SURVEY OF THE WYLIE DRIVE - NORTH OF EAST HELENA IN LEWIS AND CLARK COUNTY, MONTANA

CRABS Document Number: LC 4 27579 Agency Document Number: STPHS 25(37)

Township:10 N Range:3 W Section: 25

AXLINE JON

11/29/2004 CULTURAL RESOURCE SURVEY OF THE WYLIE DRIVE - NORTH OF EAST HELENA IN LEWIS AND CLARK COUNTY, MONTANA

CRABS Document Number: LC 4 27579 Agency Document Number: STPHS 25(37)

Township:10 N Range:3 W Section: 25

AXLINE JON

4/26/2010 ASARCO RESIDENCES ASSOCIATED WITH THE EAST HELENA SMELTER (24LC2036)

CRABS Document Number: LC 6 32000 Agency Document Number:

Township:10 N Range:3 W Section: 25

AXLINE JON

7/1/2010 REPORT ON RANCHING AND FARMING IN THE PRICKLY PEAR VALLEY, 1864-1883 LEWIS AND CLARK COUNTY, MONTANA. (RE FEATURE 5 AT THE MERRITT-DARTMAN FARMSTEAD (24LC2177)

CRABS Document Number: LC 6 36632 Agency Document Number:

Township:10 N Range:3 W Section: 24

LEE JENNIFER

7/3/2018 DARTMAN FIELD MINOR SUBDIVISION PROJECT IN EAST HELENA

CRABS Document Number: LC 6 39599 Agency Document Number:

Township:10 N Range:3 W Section: 25

LEE JENNIFER

7/3/2018 DARTMAN FIELD MINOR SUBDIVISION PROJECT IN EAST HELENA

CRABS Document Number: LC 6 39599 Agency Document Number:

STATE HISTORIC PRESERVATION OFFICE
Cultural Resource Information Systems
CRIS Township, Range, Section Report
Report Date:2/25/2020

Site #	Twp	Rng	Sec	Qs	Site Type 1	Site Type 2	Time Period	Owner	NR Status
24LC0504	10N	3W	25	SE	Historic Vehicular/Foot Bridge		Historic More Than One Decade	MDOT	Undetermined*
24LC0877	10N	3W	25	SE	Historic Religion	Historic Church	1890-1899	Private	DOE
24LC1062	10N	3W	24	comb	Historic Irrigation System		1950-1959	Combination	Ineligible
24LC1139	10N	3W	25	comb	Historic Railroad		Historic More Than One Decade	Other	Eligible
24LC1292	10N	3W	25	SW	Historic Railroad		1910-1919	Private	Eligible
24LC1688	10N	3W	24	NW	Historic Residence		Historic More Than One Decade	Private	Ineligible
24LC1693	10N	3W	24	Comb	Historic Irrigation System		Historic More Than One Decade	Private	Unresolved
24LC1693	10N	3W	25	Comb	Historic Irrigation System		Historic More Than One Decade	Private	Unresolved
24LC1694	10N	3W	24	Comb	Historic Irrigation System		Historic More Than One Decade	Private	Unresolved
24LC1695	10N	3W	24	comb	Historic Irrigation System		Historic More Than One Decade	Private	Unresolved
24LC2177	10N	3W	25	NE	Historic Homestead/Farmstead		Historic More Than One Decade	National Park	Unresolved
24LC2184	10N	3W	25	SE	Historic Political/Government		Historic More Than One Decade	Other	Eligible
24LC0542	10N	3W	25	SE	Historic Railroad Building/Structure		Historic Period	Private	Undetermined*
24LC2604	10N	3W	24	SE	Lithic Material Concentration		Prehistoric More Than One Period	Private	Undetermined*
24LC2605	10N	3W	25	NE	Lithic Material Concentration		Prehistoric More Than One Period	Private	Undetermined*
24LC2606	10N	3W	24	SE	Historic Irrigation System		Historic Period	Private	Undetermined*
24LC2606	10N	3W	25	NE	Historic Irrigation System		Historic Period	Private	Undetermined*
24LC2607	10N	3W	24	SE	Historic Irrigation System		Historic Period	Private	Undetermined*
24LC2608	10N	3W	24	SE	Historic Irrigation System		Historic Period	Private	Undetermined*
24LC2608	10N	3W	25	NE	Historic Irrigation System		Historic Period	Private	Undetermined*
24LC2609	10N	3W	25	Comb	Historic Irrigation System		Historic Period	Private	Undetermined*

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

REPLY TO
ATTENTION OF

March 24, 2020

Regulatory Branch
Montana State Program
Corps No. **NWO-2010-00541-MTH**

Subject: East Helena (RPA) Wastewater Facilities Master Plan - Prickly Pear Creek (Lewis & Clark County)

Trisha Bodlavic
Robert Peccia & Associates
PO Box 5653
Helena, Montana 59604-5653

Dear Ms. Bodlavic:

We are responding to your request for comment regarding the above-referenced project. Specifically, you are proposing upgrade the City of East Helena's wastewater system by upgrading the existing screen system, upgrade the existing grit removal system, and rehabilitation to the existing screw pumps. As proposed there does not appear to be any fill or dredged material placed in Water of the US as defined in Section 404 of the Clean Water Act, nor is it near or around a Navigable Water as defined by Section 10 of the Rivers and Harbors Act. The project is located at Latitude 46.58657°, Longitude -111.89998°, within Section 31, Township 10 N, Range 2 W, Principal Meridian, Lewis and Clark County, Montana.

This project has been reviewed in accordance with Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. Under the authority of Section 404, Department of the Army (DA) permits are required for the discharge of fill material into waters of the U.S. Waters of the U.S. include the area below the ordinary high water mark of stream channels and lakes or ponds connected to the tributary system, and wetlands adjacent to these waters. Isolated waters and wetlands, as well as man-made channels, may be waters of the U.S. in certain circumstances, which must be determined on a case-by-case basis. Under the authority of Section 10, DA permits are required for structures or work in, over, or under a navigable water of the U.S., or work which affects the course, location, condition or capacity of such waters. Based on the information provided, a Department of the Army permit will not be required for this activity

Based on the information you have provided on February 24, 2020, the proposed work will not result in the discharge of dredged or fill material within waters of the United States and does not involve work in, over or under navigable waters of the United States. Therefore, a DA permit is not required for this work. Measures should be taken to prevent construction materials and/or activities from entering any waters of the United States. Appropriate soil erosion and sediment controls should be implemented onsite to achieve this end.

Although a Department of the Army permit will not be required for this activity, this does not eliminate the requirements that other applicable federal, state, tribal, and local permits are obtained if needed. Please be advised that deviations from the original plans and specifications of this project could require additional authorization from this office.

Please refer to identification number NWO-2010-00541-MTH in any correspondence concerning this project. If you have any questions, please contact Timothy McNew at Helena Regulatory Office 10 West 15 Street, Suite 2200 Helena, Montana 59626, by email at *Timothy.M.McNew@usace.army.mil*, or telephone at (406) 441-1375.

Sincerely,

Timothy M. McNew
Regulatory Project Manager

MT Fish, Wildlife & Parks
Region 3 Headquarters
1400 S 19th Avenue
Bozeman, MT 59718

March 16, 2020

ROBERT PECCIA & ASSOCIATES
3147 Saddle Drive
P.O. 13ox 5653
Helena, MT 59601
Tele 406.447 5000
Fax: 406.447.5036

RE: East Helena Wastewater Master Plan

Dear Trisha Bodlovic:

Montana Fish, Wildlife & Parks has no comment currently regarding the proposed East Helena Wastewater Master Plan.

Thank you for the opportunity to comment.

Sincerely,

Montana Fish Wildlife & Parks
Region 3 Office, Bozeman

From:	Martin, Jacob
To:	Trisha Bodlovic
Cc:	Davies, Jess J
Subject:	East Helena Wastewater Master Plan
Date:	Tuesday, March 17, 2020 2:09:50 PM

Dear Ms. Bodlovic:

Thank you for your February 21, 2020, letter requesting U.S. Fish and Wildlife Service comment on the proposed subject project in East Helena, Montana.

This email represents our official response to your inquiry for your records.

The U.S. Fish and Wildlife Service reviewed the project description and has no comments regarding federally-listed or proposed threatened or endangered species or other trust species. Additional information may be obtained using the IPaC project-planning tool, which streamlines the USFWS environmental review process at https://ecos.fws.gov/ipac/.

Thank you for the opportunity to comment. If you have any questions or comments about this correspondence please contact Jess Davies at jess_davies@fws.gov or 406-449-5225, extension 214.

Sincerely,

Jacob M. (Jake) Martin
Assistant Field Supervisor
Montana Ecological Services Office
Helena, Montana 59601
(406) 449-5225x215
jacob_martin@fws.gov

UNIFORM ENVIRONMENTAL CHECKLIST

As the engineer that prepared the preliminary engineering report, I Brad Koenig, P.E. ,
(print name of engineer)
have reviewed the information presented in this checklist and believe that it accurately identifies the environmental resources in the area and the potential impacts that the project could have on those resources. In addition, the required state and federal agencies were provided with the required information about the project and requested to provide comments on the proposed public facility project. Their comments have been incorporated into and attached to the Preliminary Engineering Report.

Engineer's Signature: BJK **Date:** 5/27/20

Key Letter: N – No Impact **B** – Potentially Beneficial **A** – Potentially Adverse
P – Approval/Permits Required **M** – Mitigation Required

PHYSICAL ENVIRONMENT	
Key N, P	**1. Soil Suitability, Topographic and/or Geologic Constraints (e.g., soil slump, steep slopes, subsidence, seismic activity)** *Comments and Source of Information*: **Comment.** No topographic, or geological conditions are likely to affect the recommended East Helena wastewater system improvements. The East Helena wastewater improvements are located within the Administrative Boundary of the East Helena Superfund Area. Regulations governing soils displacement and disposal in the East Helena Superfund in Lewis and Clark County, Montana must be followed. These regulations are necessary to prevent lead and arsenic contamination of uncontaminated areas, prevent recontamination of remediated areas, and prevent potential health risks to humans. **Permit.** According to the Regulations, all persons engaging in soil displacement in excess of one cubic yard within the Administrative Boundary of the East Helena Superfund Area must obtain a permit from the Lead Education and Abatement Program (LEAP) of the Lewis and Clark City-County Health Department.
Key N, M, P	**2. Hazardous Facilities (e.g., power lines, EPA hazardous waste sites, acceptable distance from explosive and flammable hazards including chemical/petrochemical storage tanks, underground fuel storage tanks, and related facilities such as natural gas storage facilities & propane storage tanks)** *Comments and Source of Information*: **Comment.** The City of East Helena, the old smelter site, nearby residential subdivisions, numerous rural developments, and the surrounding undeveloped and rural agricultural lands are all part of the East Helena Superfund Site. This site was proposed for addition to the EPA's Superfund National Priorities List (NPL) in September 1983 and the listing became final one year later.

MONTANA
BRADLEY J. KOENIG
14835PE
LICENSED
PROFESSIONAL ENGINEER

Under the direction of the EPA and MDEQ, ASARCO has excavated and replaced numerous residential yards, the surface material from sections of adjacent alleys, road aprons, public parks, day-care centers, schools, gas stations, parking lots, an irrigation ditch and a field planned for development. In addition to this clean-up, a long-term monitoring program has been put into effect.

In 1995, the Resource Conservation and Recovery Act (RCRA) Program, became responsible for the disposal of process ponds cleanup residue, process ponds, ground and surface water, the slag pile and former ore storage areas.

Mitigation. The recommended wastewater system improvements will result in limited disturbance of soils. It is possible that contaminated soils may exist in some areas of the recommended improvements. If this contamination exists, it is likely that the top 12-inches of soil will be removed and disposed of off-site in an area approved for such waste.

The City of East Helena has and will continue to coordinate its plans for wastewater infrastructure improvements with the Montana Department of Environmental Quality and the Environmental Protection Agency to identify areas where soil contamination may exist and the requirements pertaining to its removal and disposal.

Permit. As stated above, all persons engaging in soil displacement in excess of one cubic yard within the Administrative Boundary of the East Helena Superfund Area must obtain a permit from the Lead Education and Abatement Program (LEAP) of the Lewis and Clark City-County Health Department.

Key

N, M

3. Effects of Project on Surrounding Air Quality or Any Kind of Effects of Existing Air Quality on Project (e.g., dust, odors, emissions)

Comments and Source of Information:

Comment. The recommended improvements are located within the East Helena sulfur dioxide and lead Nonattainment Area.

Impacts. The recommended improvements would not create any new violations of the Federal air quality standards, increase the frequency or severity of existing violations of the standards, or delay attainment of the standards in the East Helena area.

The recommended East Helena wastewater system improvements may result in temporary decrease in air quality in construction zones. This impact will be short-term and generally confined to the area where construction equipment is operating.

Mitigation. The application of water or chemicals to control dust in areas subject to heavy vehicle traffic can be included, if deemed necessary, during the construction of the proposed project. Newly disturbed areas would be promptly reseeded or restored when construction activities are completed.

Key Letter: N – No Impact **B –** Potentially Beneficial **A –** Potentially Adverse
P – Approval/Permits Required **M –** Mitigation Required

Key **B**	**4. Groundwater Resources & Aquifers (e.g., quantity, quality, distribution, depth to groundwater, sole source aquifers)** *Comments and Source of Information*: **Comment.** The City of East Helena utilizes two groundwater sources. The first source is a set of three wells located north of the City known as the “Wylie source”. These wells have been drilled to depths ranging from 90 feet to more than 150 feet and each well produces at least 450 gallons per minute or more. These wells utilize the Helena Valley aquifer comprised of discontinuous and variable alluvium that is continuously saturated from the water table to a depth of at least 500 feet. The second source is a pair of infiltration galleries that draw water from below McClellan Creek known as the “McClellan source”. The City is in the process of drilling a new well and will abandon one of the three Wylie wells that is in danger of contamination from a plume of groundwater contaminated by selenium and arsenic. **Impacts.** The proposed wastewater improvements project will have no adverse effects on groundwater resources or aquifers in the area. Lining leaking sewer mains will eliminate the infiltration of groundwater into the collection system as well as potential groundwater contamination from the collection system.
Key **B, P, M**	**5. Surface Water/Water Quality, Quantity & Distribution (e.g., streams, lakes, storm runoff, irrigation systems, canals)** *Comments and Source of Information*: **Comment.** The surface water resources in the East Helena area include Prickly Pear Creek and its tributaries. Prickly Pear Creek originates in the Elkhorn Mountains several miles south of the City and flows in a northwesterly direction through the City. Prickly Pear discharges into Lake Helena which is located north of the City. **Impacts.** The recommended East Helena wastewater system improvements would benefit Prickly Pear Creek by allowing more water to remain in the stream by excluding this water from the collection system. **Permitting:** **Section 404 Permit.** A Section 404 permit is required by the Department of the Army Corps of Engineers for the discharge of fill material into waters of the United States. Waters of the United States include the area below the ordinary high-water mark of stream channels and lakes or ponds connected to the tributary system and wetlands of adjacent waters. The Department of the Army (DA) Corps of Engineers was advised of the recommended improvements in correspondence dated February 21, 2020. A response dated March 24, 2020 suggested that is there is any discharge of fill material into waters of the United Stated, a Section 404 permit would be required. **Stream Protection Act (124 SPA) Permit.** If project-related activities affect the beds and banks of the streams, a 124 SPA permit will be required from the Montana Department of Fish, Wildlife & Parks (MFWP). The MFWP was advised of the recommended alternative in correspondence dated February 21, 2020. According to the response dated March 16, 2020, the MFWP has no comment currently regarding the project.

	Storm Water Discharge Permit. If construction disturbs more than 1 acre, a General Discharge Permit for Storm Water Associated with Construction Activity under the Montana Pollution Discharge Elimination System (MPDES) must be obtained. As a requirement of the Storm Water Discharge Permit, a Notice of Intent (NOI) form including a storm water erosion control plan specifying the measures that would be employed during construction to control erosion and sediment transport by storm runoff must be prepared and submitted to the Montana Department of Environmental Quality. **Mitigation:** Employing erosion control measures is especially important in areas adjacent to surface waters where construction activities could encounter wetlands or riparian areas. Measures to control runoff and erosion from disturbed areas will be required of the Contractor to minimize potential water quality impacts during construction.
Key **N, P**	**6. Floodplains & Floodplain Management (Identify any floodplains within one mile of the boundary of the project.)** *Comments and Source of Information*: **Comment.** Flood Insurance Rate Mapping (FIRM) for Lewis and Clark County and Incorporated Areas map #30049C331E and map #30049C2333E, effective September 19, 2012 shows portions of the recommended improvements to the East Helena wastewater system are located within special flood hazard areas. The Montana Department of Natural Resources and Conservation (DNRC) Regional Engineering Bryan Gartland was advised of the recommended improvements on February 21, 2020. A response has not been received as of this writing. Lewis and Clark County's Floodplain Administrator Lindsay Morgan was contacted on February 21, 2020 regarding the recommended alternatives. A response has not been received as of this writing. The City of East Helena's Floodplain Administrator is working closely with consultants on the development of the recommended alternatives. **Impacts.** The proposed work is located within areas that have been previously disturbed. The proposed construction will not adversely affect the natural values and functions of the floodplain in this area. **Permit.** If the recommended improvements to the wastewater system are located within the 100-year floodplain, a floodplain development permit will be required.
Key **N**	**7. Wetlands Protection (Identify any wetlands within one mile of the boundary of the project.)** *Comments and Source of Information*: **Comment.** According to the National Wetlands Inventory Wetlands Mapper, various wetlands including Freshwater Pond and Riverine wetlands are located within 1 mile of the recommended wastewater improvements. It is not anticipated that any designated wetlands will be impacted as part of the recommended wastewater system improvements.

Key Letter: N – No Impact **B –** Potentially Beneficial **A –** Potentially Adverse
P – Approval/Permits Required **M –** Mitigation Required

Key **N**	**8. Agricultural Lands, Production, & Farmland Protection (e.g., grazing, forestry, cropland, prime or unique agricultural lands) (Identify any prime or important farm ground or forest lands within one mile of the boundary of the project.)** *Comments and Source of Information*: **Comment.** The recommended East Helena wastewater system improvements are located in areas that are considered prime, unique, or important farmland. The USDA Natural Resources Conservation Service (NRCS) was advised of this project by letter dated February 21. 2020. No response has been made as of this writing. **Impacts.** The recommended improvements are located on land already irreversibly converted.
Key **N, M**	**9. Vegetation & Wildlife Species & Habitats, Including Fish (e.g., terrestrial, avian and aquatic life and habitats)** *Comments and Source of Information*: **Comment.** Typical wildlife species in the East Helena planning area include: mule deer, white-tailed deer, eastern fox squirrel, mountain cottontail, white-tailed jack rabbit, muskrat, red fox and meadow vole, and numerous nesting and migrant bird species. Surface waters associated channels, tributaries, wetlands and adjoining uplands provide important wildlife habitats in the project area. Various wildlife species depend on these habitats which are intermixed with urban development, rural homes, and agricultural uses. **Impacts.** The recommended improvements would not cause any long-term adverse impacts to wildlife and their habitat since work is confined within previously disturbed areas. Short-term impacts on small mammals and bird species may occur during construction. Temporary displacement due to noise or construction activities could affect such species. The Montana Department of Fish, Wildlife and Parks (FWP) was contacted on February 21, 2020 regarding potential impacts on wildlife and fishery resources. A response dated March 16, 2020 stated that the Montana Fish, Wildlife & Parks has no comments regarding the proposed East Helena project. **Mitigation Required.** The Contractor will be required to implement erosion control measures to minimize the potential for erosion and sedimentation impacts on nearby surface waters and fisheries. Additionally, surface areas disturbed by construction will be promptly revegetated.

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Key	
N, M	**10. Unique, Endangered, Fragile, or Limited Environmental Resources, Including Endangered Species (e.g., plants, fish, sage grouse, or other wildlife)** *Comments and Source of Information*: **Comment.** The following paragraphs discuss unique, endangered, fragile, or limited environmental resources in the project area: ○ Threatened or Endangered Wildlife - The U.S. Fish and Wildlife Service (USFWS) was contacted on February 21, 2020 regarding the presence of threatened or endangered species in the proposed East Helena planning area. Correspondence from the USFWS dated March 17, 2020 had no comments regarding federally-listed or proposed threatened or endangered species or other trust species. The USFWS also suggested using the Department's online Information for Planning and Consultation (IPaC) website for updated information on the planning area. According to IPaC, there are 3 threatened or endangered species (the Canada Lynx, the Grizzly Bear, and the North American Wolverine) that may occur in the planning area as well as migratory birds. There is no designated critical habitat in the planning area. ○ Threatened or Endangered Plants - There are three federally-listed threatened plant species in Montana: Water Howellia, Spalding's Catchfly, and Ute Ladies'-tress. The USFWS does not list any of these species within the planning area. ○ Species of Special Interest or Concern - The Montana Natural Heritage Program lists 24 animal species and 4 plant species of special concern, 1 animal species of special status and 1 plant species considered a potential species of concern that have been observed within the areas quarter-quarter lat. long. that includes the East Helena project. ○ Sage Grouse - According to the Montana Sage Grouse Habitat Conservation Map, the recommended improvements to the East Helena wastewater system are not located in sage grouse habitat designated as core, general, connectivity habitats or BLM priority areas. Therefore, no further coordination regarding sage grouse is required. **Impacts.** Based on the nature, scope, and location of the recommended improvements, no adverse impacts to unique, endangered, fragile, or limited environmental resources are expected. **Mitigation.** If active eagle nests are present within 0.5 mile of the project during construction, seasonal restrictions and construction / development distance buffers specified in the 2010 Montana Bald Eagle Management Guidelines: An Addendum to Montana Bald Eagle Management Plan (1994) should be followed in order to avoid/minimize the risk for eagle take.
Key N	**11. Unique Natural Features (e.g., geologic features)** *Comments and Source of Information*: **Comment.** There are no known unique natural features that are anticipated to be impacted in the East Helena area as a result of the recommended alternatives.

Key Letter: N – No Impact **B –** Potentially Beneficial **A –** Potentially Adverse
P – Approval/Permits Required **M –** Mitigation Required

Key	Item
N	**12. Access to, and Quality of, Recreational & Wilderness Activities, Public Lands and Waterways (including Federally Designated Wild & Scenic Rivers), and Public Open Space** *Comments and Source of Information*: **Comment.** The recommended East Helena wastewater system improvements would have no effect on the access to or the quality of recreational and wilderness activities, public lands and waterways, and public open space.
HUMAN POPULATION	
N	**1. Visual Quality – Coherence, Diversity, Compatibility of Use and Scale, Aesthetics** *Comments and Source of Information*: **Comment.** The recommended East Helena wastewater system improvements would have no long-term adverse effects on the visual quality of the area. Land surfaces would be temporarily disturbed during construction but returned to pre-project conditions after construction.
N	**2. Nuisances (e.g., glare, fumes)** *Comments and Source of Information*: **Comment.** There are no anticipated nuisances associated with the recommended alternatives.
N	**3. Noise -- suitable separation between noise sensitive activities (such as residential areas) and major noise sources (aircraft, highways & railroads)** *Comments and Source of Information*: **Comment.** Temporary increases in noise would be expected during the construction of the recommended East Helena wastewater system improvements. Such impacts would be localized to the area of construction and short-term in nature.
N, M	**4. Historic Properties, Cultural, and Archaeological Resources** *Comments and Source of Information*: **Comment.** The Montana State Historic Preservation Office (SHPO) was contacted on February 21, 2020 for information about previous cultural resource surveys completed and for a listing of previously recorded historical and archaeological sites in the East Helena wastewater planning area.

Key Letter: N – No Impact **B –** Potentially Beneficial **A –** Potentially Adverse
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	Impacts. In correspondence dated February 25, 2020, SHPO stated that any structure over fifty years of age is considered historic and is potentially eligible for listing on the National Register of Historic Places. SHPO also stated as long as the improvements and upgrades are located within previously disturbed ground, they feel that a recommendation for a cultural resource inventory is unwarranted at this time. **Mitigation.** If any structures are to be altered and are over fifty years old SHPO recommends that they be recorded and a determination of their eligibility be made. If there is to be new ground disturbance in previously undisturbed areas, SHPO also recommends that a cultural resource inventory be conducted in order to determine whether or not sites exist and if they will be impacted.
Key **B**	**5. Changes in Demographic (population) Characteristics (e.g., quantity, distribution, density)** *Comments and Source of Information*: **Comment.** While the recommended East Helena wastewater improvements will not increase the population of East Helena, the proposed project will allow for the additional flow that is anticipated in the near future by reducing the amount of clean water that is added to the system and replacement of the screening and grit removal systems that will be capable of handling the additional flow anticipated from not only the City of East Helena but additional wastewater contributors that are expected. The recommended improvements would not adversely affect any social or ethnic groups and will not isolate or divide existing residential areas.
Key **N**	**6. Environmental Justice – (Does the project avoid placing lower income households in areas where environmental degradation has occurred, such as adjacent to brownfield sites?)** *Comments and Source of Information*: **Comment.** The recommended East Helena wastewater system improvements will not place lower income households in areas where environmental degradation has occurred.
Key **N**	**7. General Housing Conditions - Quality, Quantity, Affordability** *Comments and Source of Information*: **Comment.** The recommended East Helena wastewater system improvements would have little effect on the quality, quantity, or affordability of housing in East Helena or surrounding portions of Lewis and Clark County.
Key **N**	**8. Displacement or Relocation of Businesses or Residents** *Comments and Source of Information*: **Comment.** The recommended East Helena wastewater system improvements would not displace or relocate any businesses or residents in the area.

Key Letter: N – No Impact **B –** Potentially Beneficial **A –** Potentially Adverse
P – Approval/Permits Required **M –** Mitigation Required

Key **B**	**9. Public Health and Safety** *Comments and Source of Information*: **Comment.** The proposed wastewater improvements project would benefit public health and safety by providing adequate collection and treatment of the City's wastewater by not only reducing the amount of groundwater infiltrating into the collection system but preventing wastewater from contaminating the surrounding soils and groundwater in the area. By reducing the groundwater infiltration, the wastewater treatment system will be able treat the incoming wastewater more efficiently by reducing the overloading to the existing system thus ensuring adequately treated wastewater that is discharged into Prickly Pear Creek. The wastewater improvements will also provide the wastewater treatment facility with adequate screening and grit removal that minimize the City operators from coming into contact with waste.
Key **N**	**10. Lead Based Paint and/or Asbestos** *Comments and Source of Information*: **Comment.** The handling of any lead-based paint and/or asbestos is not anticipated as part of the recommended improvements.
Key **B**	**11. Local Employment & Income Patterns - Quantity and Distribution of Employment, Economic Impact** *Comments and Source of Information:* **Comment.** Construction of the recommended East Helena wastewater system improvements would temporarily create jobs and the need for local goods and services resulting in short-term economic benefits to the City of East Helena and Lewis and Clark County. Completion of this project will not cause any long-term changes in the local economy.
Key **B**	**12. Local & State Tax Base & Revenues** *Comments and Source of Information*: **Comments.** The recommended East Helena wastewater system improvements will benefit the City of East Helena overtime by expanding the tax base through new residential and commercial development within the City as well as outside the City limits.
Key **B**	**13. Educational Facilities - Schools, Colleges, Universities** *Comments and Source of Information*: **Comment.** The recommended East Helena wastewater system improvements would not adversely affect any education facility in the area. The new East Helena High School along with the Prickly Pear Elementary school will continue to have a reliable wastewater system with the improvements that are proposed.

Key Letter: N – No Impact **B –** Potentially Beneficial **A –** Potentially Adverse
P – Approval/Permits Required **M –** Mitigation Required

Key	Item
N	**14. Commercial and Industrial Facilities - Production & Activity, Growth or Decline** *Comments and Source of Information*: **Comment.** The proposed project will not affect existing commercial or industrial facilities nor affect the productivity of such facilities.
Key N	**15. Health Care – Medical Services** *Comments and Source of Information*: **Comment.** The recommended East Helena wastewater system improvements will not affect existing health care or medical services nor create the demand for additional medical services.
Key N	**16. Social Services – Governmental Services (e.g., demand on)** *Comments and Source of Information*: **Comment.** The recommended improvements will not affect the demand for social or governmental services.
Key N	**17. Social Structures & Mores (Standards of Social Conduct/Social Conventions)** *Comments and Source of Information*: **Comment.** The recommended East Helena wastewater system improvements will not affect social structures or community mores.
Key B	**18. Land Use Compatibility (e.g., growth, land use change, development activity, adjacent land uses and potential conflicts)** *Comments and Source of Information*: **Comment.** The recommended improvements will allow the City of East Helena to better accommodate new residential and commercial development to the community. Any new development within the community will be subject to existing land use plans and land use controls.
Key N	**19. Energy Resources - Consumption and Conservation** *Comments and Source of Information*: **Comment.** There will be no long-lasting adverse impact on the energy supply of the areas. Energy use would increase for a short time during the construction of the recommended East Helena wastewater system improvements due to the need for construction equipment.

Key Letter: N – No Impact **B –** Potentially Beneficial **A –** Potentially Adverse
P – Approval/Permits Required **M –** Mitigation Required

Key N	**20. Solid Waste Management** *Comments and Source of Information*: **Comment.** The recommended wastewater system improvements would not affect the generation and management of solid waste within the community.
Key B	**21. Wastewater Treatment - Sewage System** *Comments and Source of Information*: **Comment.** An evaluation of the community's wastewater system and detailed discussion of its future needs are outlined in the East Helena Wastewater Master Plan – 2020 prepared by Robert Peccia & Associates. The study identified deficiencies in the existing wastewater system. **Impact.** The wastewater system improvements will result in beneficial impacts to the community. With the implementation of these improvements, the City of East Helena can reduce the amount of groundwater infiltration into their collection system which ultimately "frees up" capacity of the treatment facility. Additional improvements will allow portions of the treatment system to be capable of handling the additional flow anticipated from not only the City of East Helena but additional wastewater contributors that are expected.
Key N	**22. Storm Water – Surface Drainage** *Comments and Source of Information*: **Comment.** The recommended wastewater system improvements project would have no long-term effects on storm water and surface drainage.
Key N	**23. Community Water Supply** *Comments and Source of Information*: **Comment.** The proposed project would not affect municipal or private water supplies.
Key N	**24. Public Safety – Police** *Comments and Source of Information*: **Comment.** The recommended East Helena wastewater system improvements would not affect public safety or increase the need for additional law enforcement.

Key Letter: N – No Impact **B –** Potentially Beneficial **A –** Potentially Adverse
P – Approval/Permits Required **M –** Mitigation Required

Key **N**	**25. Fire Protection – Hazards** *Comments and Source of Information*: **Comments.** The proposed project would not affect the City of East Helena's fire protection system or limit the community's fire-fighting capabilities.
Key **N**	**26. Emergency Medical Services** *Comments and Source of Information*: **Comment.** The recommended East Helena wastewwater system improvements would not increase the need for emergency medical services.
Key **N**	**27. Parks, Playgrounds, & Open Space** *Comments and Source of Information*: **Comment.** No public parks, playgrounds, or open space would be adversely affected by the recommended East Helena wastewater system improvements.
Key **N**	**28. Cultural Facilities, Cultural Uniqueness & Diversity** *Comments and Source of Information*: **Comment.** The recommended wastewater system improvements would not affect cultural facilities or the cultural uniqueness and diversity of East Helena or Lewis and Clark County.
Key **N, P**	**29. Transportation Networks and Traffic Flow Conflicts (e.g., rail; auto including local traffic; airport runway clear zones - avoidance of incompatible land use in airport runway clear zones)** *Comments and Source of Information*: **Comment.** Construction of the recommended improvements may cause temporary disturbances to vehicle traffic on local streets and roads in area. However, traffic control plans will be implemented to ensure that alternate routes within the community are available and that work areas are marked to ensure that local traffic is safely accommodated during construction.
Key **N**	**30. Consistency with Local Ordinances, Resolutions, or Plans (e.g., conformance with local comprehensive plans, zoning, or capital improvement plans)** *Comments and Source of Information*: **Comment.** The recommended wastewater system improvements are consistent with the City of East Helena's long-term plans. The recommended East Helena wastewater system improvements project not conflict with any other local ordinances, resolutions, or plans.

Key Letter: N – No Impact **B –** Potentially Beneficial **A –** Potentially Adverse
P – Approval/Permits Required **M –** Mitigation Required

Key **N**	**31. Is There a Regulatory Action on Private Property Rights as a Result of this Project? (consider options that reduce, minimize, or eliminate the regulation of private property rights.)** *Comments and Source of Information*: **Comment.** The recommended East Helena wastewater system improvements will not involve any regulatory actions that would affect private property rights.

APPENDIX B

PUBLIC INVOLVEMENT

CITY OF EAST HELENA
NOTICE OF PUBLIC MEETING

DATE: February 18, 2020

The City of East Helena will be holding a public meeting to discuss the **Wastewater System Master Plan** efforts currently underway in East Helena as well as potential funding alternatives for future improvements. We invite the public to participate and comment during the development of the plan and value your participation in this process. Any interested person may appear and be heard. The meeting will be held at **East Helena Fireman's Recreation Hall** on **March 5** at **7:00 p.m.**

Attending will be Robert Peccia & Associates and the City Representatives. If you have any questions or comments, please contact East Helena City Hall at 227-5321.

The City of East Helena is committed to providing access to persons with disabilities for its meetings, in compliance with Title II of the Americans with Disabilities Act and the Montana Human Rights Act. The City will not exclude persons with disabilities from participation at its meetings, or otherwise deny them the City's services, programs, or activities. Persons with disabilities requiring accommodations to participate in the City's meetings, services, programs, or activities should contact the City Clerk, Gena Berry, as soon as possible to allow sufficient time to arrange for the requested accommodation, at any of the following:
(406) 227-5321 or
TTY Relay Service 1-800-253-4091 or 711
306 East Main Street, P.O. Box 1170, East Helena, MT 59635

INDEPENDENT RECORD
PUBLISH AS A LEGAL AD: Sunday, February 23, 2020, Sunday, March 1, 2018

Page	:	1 of 1 02/20/2020 12:18:43	**Ad Number**	:	11031139
Order Number	:	20468585	**Ad Key**	:	
PO Number	:	Amy Thorngren	**Salesperson**	:	Legal - Legals - Helena
Customer	:	60000224 CITY OF EAST HELENA	**Publication**	:	Independent Record
Contact	:	City Clerk	**Section**	:	Class Section
Address1	:	P.O. Box 1170	**Sub Section**	:	Legal
Address2	:		**Category**	:	9999 Legals
City St Zip	:	EAST HELENA MT 59635	**Dates Run**	:	02/23/2020-03/01/2020
Phone	:	[redacted]	**Days**	:	2
Fax	:		**Size**	:	2 x 3.33, 30 lines
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Entered By	:	Billie Jo Williams	**Ad Price**	:	60.24
			Amount Paid	:	0.00
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MAR 0 4 2020
CITY OF
EAST HELENA, MT

CITY OF EAST HELENA
NOTICE OF PUBLIC MEETING

DATE: February 19, 2020

The City of East Helena will be holding a public meeting to discuss the **Wastewater System Master Plan** efforts currently underway in East Helena as well as potential funding alternatives for future improvements. We invite the public to participate and comment during the development of the plan and value your participation in this process. Any interested person may appear and be heard. The meeting will be held at the **Fireman's Recreation Hall, 2 E. Pacific Street (behind Smith's Place), East Helena, on March 5, 2020, at 7:00 p.m.**

Attending will be Robert Peccia & Associates and the City Representatives. If you have any questions or comments, please contact East Helena City Hall at 227-5321.

The City of East Helena is committed to providing access to persons with disabilities for its meetings, in compliance with Title II of the Americans with Disabilities Act and the Montana Human Rights Act. The City will not exclude persons with disabilities from participation at its meetings, or otherwise deny them the City's services, programs, or activities. Persons with disabilities requiring accommodations to participate in the City's meetings, services, programs, or activities should contact the City Clerk, Amy Thorngren, as soon as possible to allow sufficient time to arrange for the requested accommodation, at any of the following:

(406) 227-5321 or
TTY Relay Service 1-800-253-4091 or 711
306 East Main Street, P.O. Box 1170, East Helena, MT 59635

February 23 & March 1, 2020 **MNAXLP**

AFFIDAVIT OF PUBLICATION
STATE OF MONTANA,
County of Lewis & Clark

Crystal Gray

Being duly sworn, deposes and says;

That she is the principal clerk of the Independent Record, a newspaper of general circulation published daily in the City of Helena, in the County of Lewis & Clark, State of Montana, and has charge of the advertisement therof:

That the Notice of Public Hearing

a true copy of which is hearto annexed, was published in said newspaper on the following dates: viz.:

February 23 & March 1, 2020

making in all_2_ publication(s)

Crystal Gray

Subscribed and sworn to me this _2_ day of _March_, 2020.

Billie Jo Williams

Notary Public for the State of Montana
Printed Name: Billie Jo Williams
Residing at Clancy, Montana 59634
My commission expires August 31, 2022

(Notary Seal)

BILLIE JO WILLIAMS NOTARIAL SEAL STATE OF MONTANA

BILLIE JO WILLIAMS
NOTARY PUBLIC for the
State of Montana
Residing at Clancy, Montana
My Commission Expires
August 31, 2022

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Public Notices for the City of East Helena

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PUBLIC NOTICE: City Council & Public Tour

The City of East Helena City Council will tour the Montana Environmental Trust Group (METG) property starting on Tuesday, February 25, 2020 at 5:00 p.m. The tour begins at the METG main office located at 325 Manlove Street, East Helena, MT. The tour is an open public meeting and the public is encouraged to attend and participate.

Please see the agenda for more information, available here (PDF).

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Notice of Public Meeting:

The City of East Helena will be holding a public meeting to discuss the Wastewater System Master Plan efforts currently underway in East Helena as well as potential funding alternatives for future improvements.

We invite the public to participate and comment during the development of the plan and value your participation in this process. Any interested person may appear and be heard. The meeting will be held at the Fireman's Recreation Hall, 2 E. Pacific Street (behind Smith's Place), East Helena, on March 5, 2020, at 7:00 p.m.

City of East Helena
Special Council Meeting
March 5, 2020

NAME: (Please Print)	ADDRESS/BUSINESS:	PHONE #:
DALE JENSEN	401 W. GATE ST	227-5583
BAUL JENSEN	〃	〃
Amy Thornquist	COEH	227-6321
Peter Elverum	COEH	570-3755
DON DAHL	COEH	227-6876
Judy Leland	COEH	7-6284
Kelly HARRIS	COEH	438-1031
JOY BOWEN	COEH	317-3633
Scott St. Clair	COEH	
Shane Pursley	COEH	439 2065
Steve Strong	908 E. Groschell	227-6221

Robert Peccia & Associates

City of East Helena Wastewater System Master Plan

Overview and Discussion on Preliminary Findings

Public Meeting – March 5, 2020

In General the Master Plan Includes:

- Review of the existing wastewater system and its operating parameters.
- Capacity analysis of the existing wastewater system.
- Identify any regulatory concerns.
- Identify areas where system improvements should be made. Develop alternatives to provide the community with reliable wastewater service and improve operations through the planning period.
- Complete a list of recommended improvements for the wastewater system and a funding strategy for implementation.

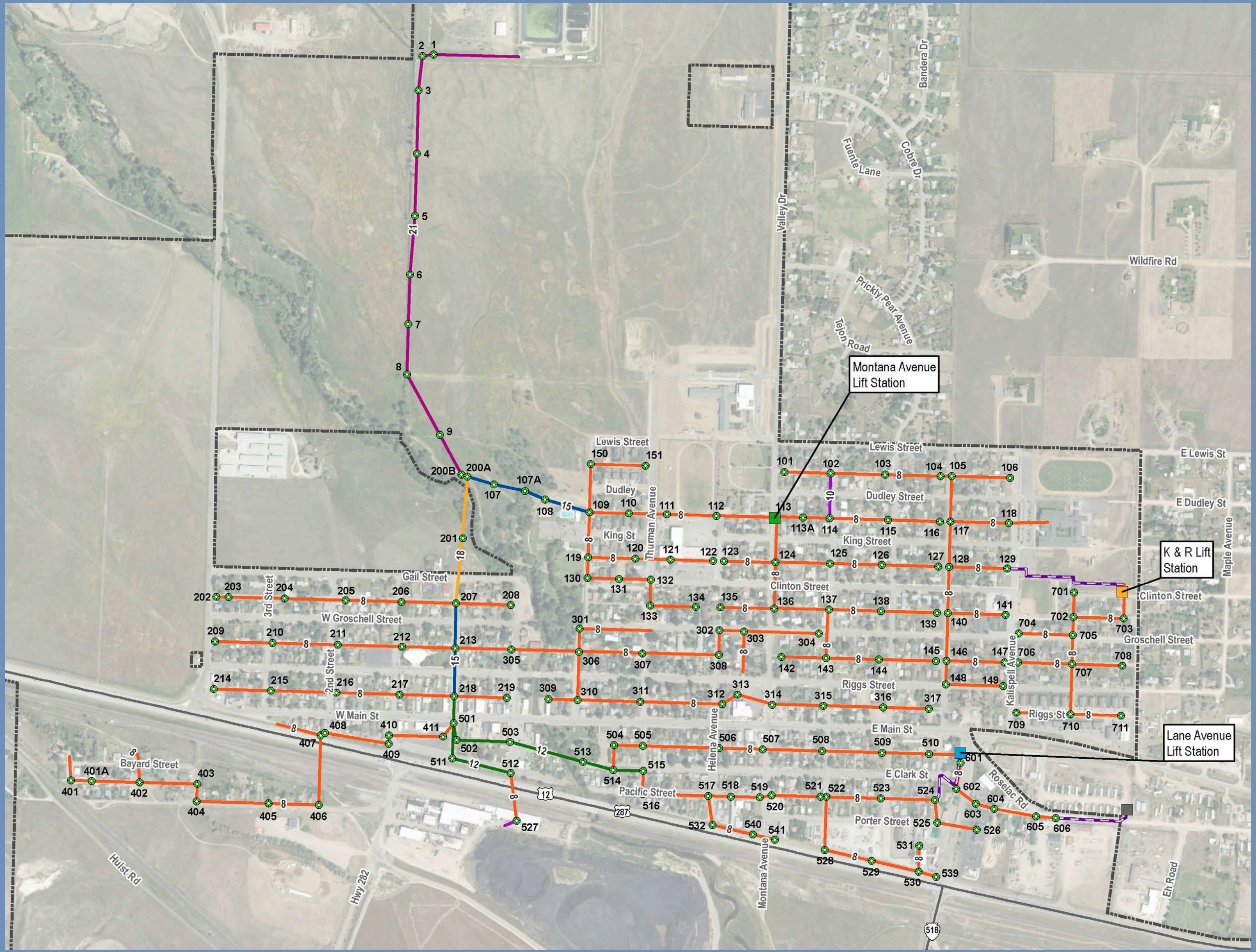
History of the East Helena Wastewater System:

- The City's wastewater system was first developed in the mid-1930's.
- The most significant expansions were completed in the 1950's, 1980's, and the early 2000's.
- In 2003, the City upgraded the wastewater treatment facility from an aerated lagoon system to its current extended aeration activated sludge treatment process.
- In 2014, a new metals removal building was added to the wastewater treatment in order for the City to meet very low permit limits for metals (copper, lead, zinc).

Existing Wastewater System Components:

- Gravity sewer mains (ranging in size from 6-inch to 21-inch and a mix of clay and PVC);
- Manholes;
- Force mains;
- 3 major lift stations (Montana Avenue, K&R, Lane Avenue);
- Wastewater treatment facility (WWTF); and
- Treated water outfall to Prickly Pear Creek.

City of East Helena
Existing Wastewater System



Robert Peccia & Associates

Issues Facing the Wastewater System:

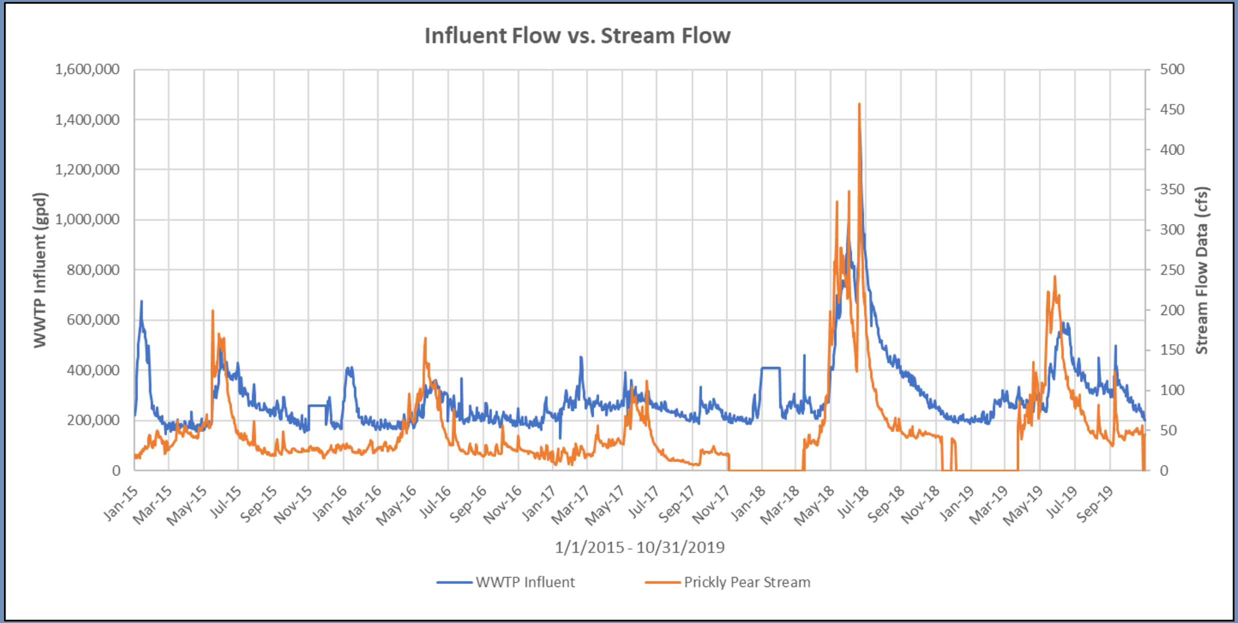
- Infiltration in the collection system;
- Capacity due to additional connections;
- Montana Avenue lift station;
- Future nutrient limits (currently have a variance);
- Current nitrogen limits (53.3 lbs/day); and
- Wastewater treatment facility improvements.

Infiltration in the Collection System:

- Infiltration is clean water that enters the collection system through manholes, pipes, and joints.
- Some infiltration is expected in a wastewater system.
- This clean water decreases the capacity available for future connections.
- Treating unnecessary amounts of infiltration:
  - Increases costs of operation and maintenance at the treatment facility;
  - Leads to more frequent pump replacements;
  - Collection system is more susceptible to back-ups when carrying additional flow.

Infiltration of the Collection System:

- Each year, the wastewater treatment facility receives increased flows due to infiltration of groundwater in the collection system.
- Seasonal increases correlate to increased flows in Prickly Pear Creek.

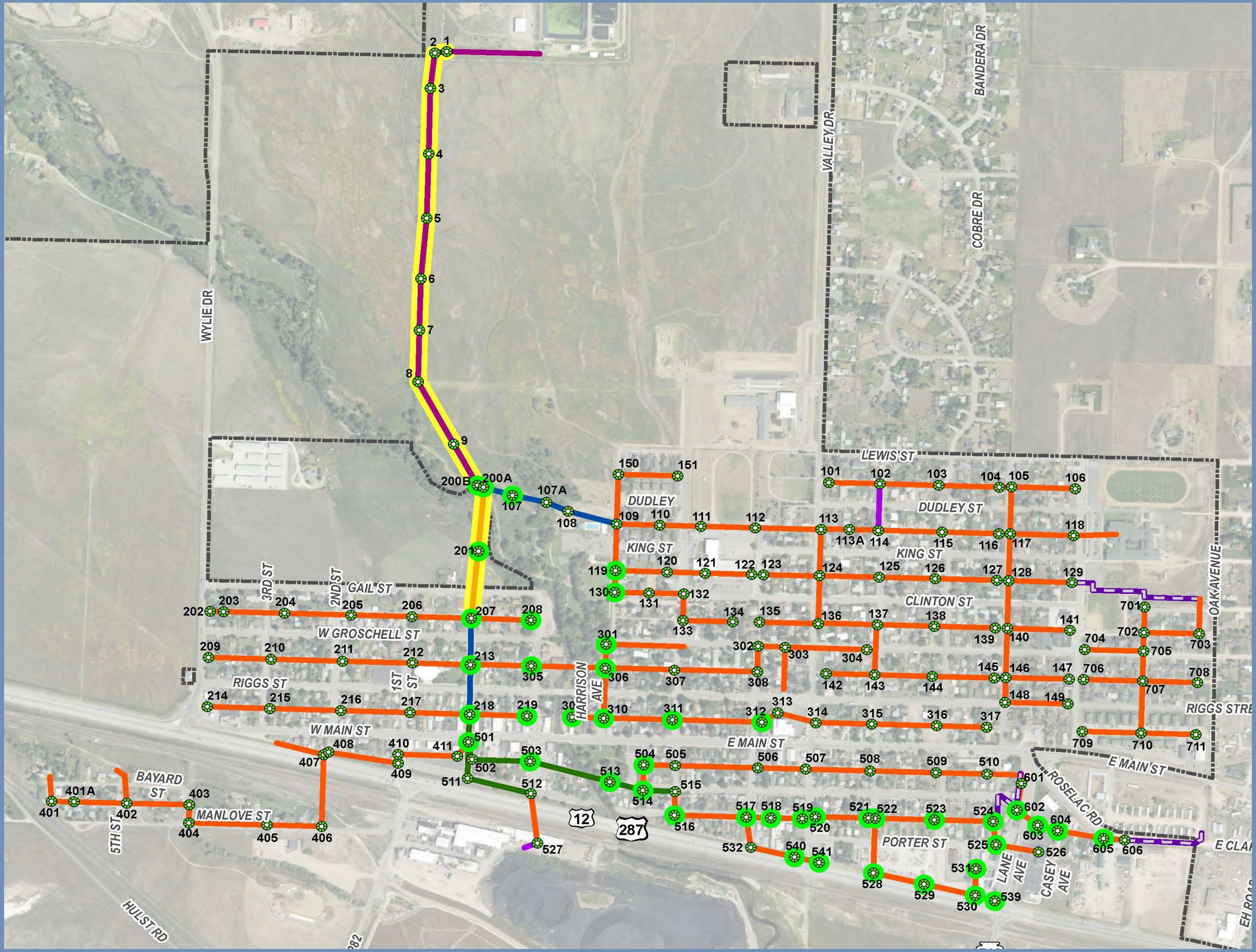


Robert Peccia & Associates

Infiltration Study:

- An infiltration study was completed as part of the Master Plan to help determine which sewer mains and manholes may be primary contributors of infiltration.
- The study was completed during the Spring of 2019 during peak discharge of Prickly Pear Creek.
- RPA staff observed flows in manholes located closest to Prickly Pear Creek during normal operation hours then again during the hours of 2:30 am to 5:00 am.
- Flow in the wastewater collection system during early morning hours should be minimal and can confirm excess water in the collection system.
- Videos inspection of collection system mains were also completed.

City of East Helena Infiltration Study Locations

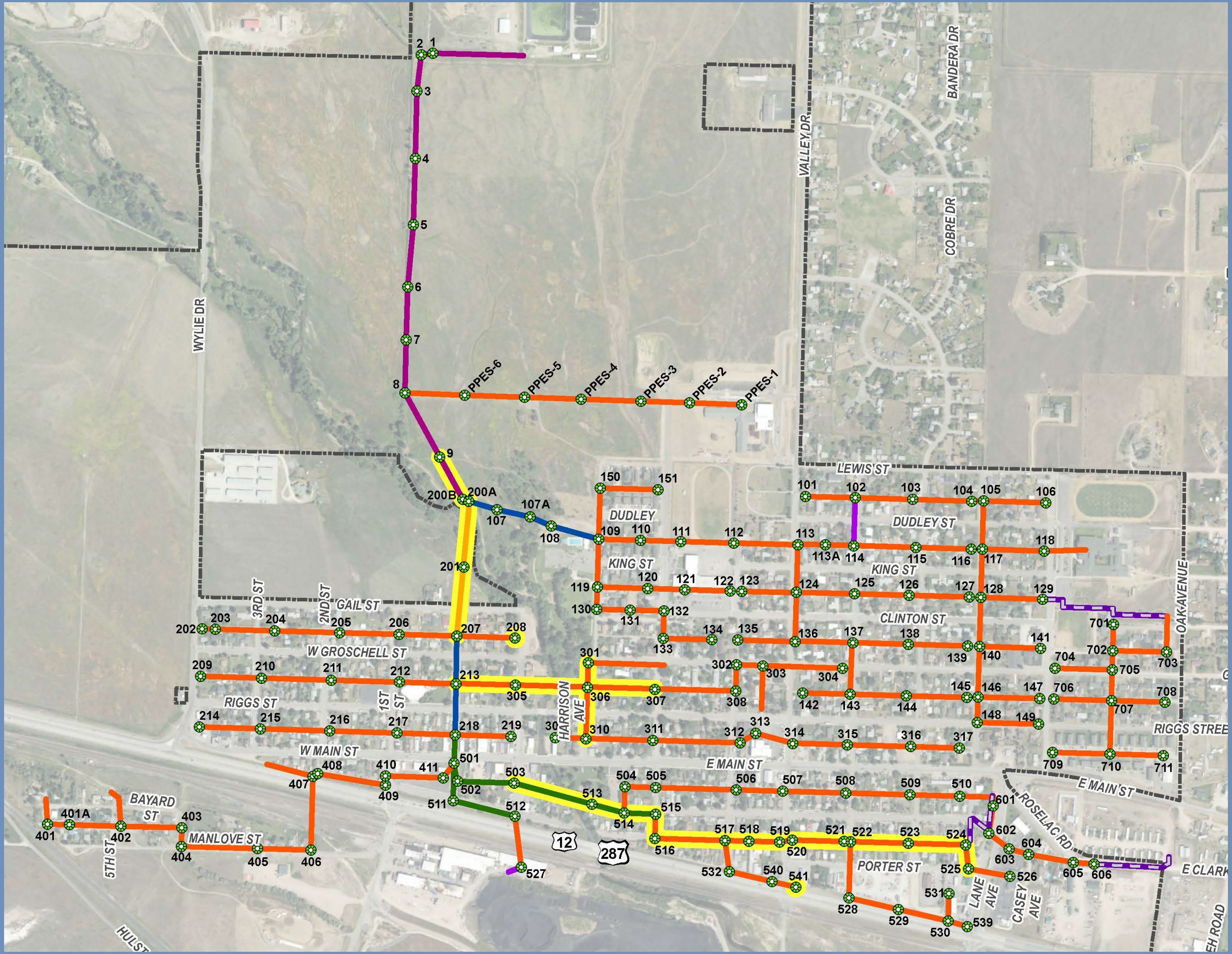


Robert Peccia & Associates

Infiltration Estimation:

- Comparing the videos of the manholes along with the inspection videos of sewer mains determined that several sewer mains and manholes have significant infiltration and should be repaired or replaced.
- Infiltration can be estimated using billed water usage data or using per capita usage.
- Estimations conclude that approximately **26%** of the influent coming in to the wastewater treatment plant is infiltration.

City of East Helena Infiltration Study Results



Robert Peccia & Associates

Capacity of the Wastewater Treatment System:

- Capacity of the existing Wastewater Treatment Facility – 434,400 gallons per day.
- Current flow includes Pele Park, and East Clark Street W&S District – 291,834 gallons per day.
- Future wastewater contributors over the next 10 years:
  - Red Fox Meadows
  - East Helena High School
  - Oakland Group Housing Development (Highland Meadows)
  - Brewery (minor)
  - Vigilante Subdivision

Capacity of the Wastewater Treatment System:

- The East Helena Wastewater Treatment Facility is expected to reach capacity by 2031 if some clean water (I&I) can be reduced.
- The East Helena Wastewater Treatment Facility is expected to reach capacity by 2027 if I & I is not reduced.
- Should begin planning for treatment system upgrade when 80% capacity is reached:
  - 2027 with I & I reduction
  - 2023 without I & I reduction
- Nutrient removal (nitrogen) will need to be managed with some interim minor improvements as development occurs.

Montana Avenue Lift Station:

- The Montana Avenue lift station is located in the middle of Montana Avenue.
- With the addition of the East Helena High School and future development, traffic on Valley Drive will increase dramatically.
- It will be difficult for City Operators to access and maintain this lift station.

Wastewater Treatment Facility Challenges:

- Flow equalization basin liner needs is aging (1980's) and needs replacement.
- Screening system is aging and not sized for the additional growth the City is anticipating. This system is nearing its useful life.
- Grit removal system is simplistic at best and not sized for the additional growth the City is anticipating. This system is nearing is useful life.
- Future nutrient limits (currently have a variance);
- Current nitrogen limits (53.3 lbs/day); and
- RAS pumps are connected to the blowers supplying air to the reaction basin which makes nitrogen removal difficult.

Other Wastewater Treatment Facility Challenges:

- Capacity analysis shows the wastewater treatment system will need to be upgraded in the near future. Therefore, it would be unwise at this time to make the following improvements:
  - Replace flow equalization basin liner; and
  - Replace RAS pump.

Summary of Recommended Improvements:

- Rehabilitate the collection system mains using as much CIPP lining as possible;
- Relocate the Montana Avenue lift station;
- New screening system using existing footprint;
- New grit removal system; and
- Rehabilitate screw pumps; and
- Replace Metals Reject Pumps.

Total Project Cost of Recommended Alternatives:

- Preliminary cost estimate for all recommended improvements is $3.1 million.
- Sewer rates for improvements may increase between $18.70 to $24.30 depending on final funding package.

Grant and Loan Funding Opportunities:

- TSEP Grants of $500,000 to $750,000 (biannual) – 7 criteria
  - Must exceed TSEP “Target Rate” (2.3% of MHI = $85.92/mo for water + sewer
  - Current residential average rate = $66.40
  - Maximum of $625,000
  - 50% match required
- RRGL Grants of $125,000 (biannual) – “Conservation of Water Resources”
  - Maximum $125,000
  - No match required

Grant and Loan Funding Opportunities:

- CDBG Grants of $450,000 (annual)
  - Requires >51% LMI Benefit (East Helena LMI = 46.85%)
- USDA Rural Development Grant and Loan Packages
  - Grant share is variable
- MDEQ State Revolving Fund (SRF) Loans
  - 20 year loans, 2.5% interest rate
- Most Grants require “financial need” and health and safety issues.
- Grant applications are ranked competitively and not all are funded.

Next Steps and Project Scheduling:

- Project Newsletter forthcoming.
- Project Web Site (Current) – Link from City's Web Page.
- Develop a detailed Funding Strategy for Implementation.
- Second Public Meeting – on PER, Grant Applications, and EA.
- Grant Applications are due in May.

QUESTIONS?

Robert Peccia & Associates

MEETING MINUTES
CITY OF EAST HELENA
FIREMAN'S RECREATION HALL – 2 EAST PACIFIC STREET
WASTEWATER SYSTEM MASTER PLAN PUBLIC MEETING: 7:00 PM
DATE: THURSDAY, MARCH 5, 2020

MEETING CALLED TO ORDER: Mayor Schell called the meeting to order at 7:01 PM.

CITY OFFICIALS & STAFF PRESENT: Brad Koenig, Trish Bodlovic, Councilmember Joy Bowen, Councilmember Kelly Harris, Councilmember Judy Leland, Councilmember Don Dahl, Mayor James Schell, City Attorney Pete Elverum, Clerk/Treasurer Amy Thorngren, Maintenance Worker Kevin Ore, Maintenance Worker Shane Pursley, and Public Works Director Scott St. Clair

PUBLIC PRESENT: Paul Jensen, Dave Jensen, and Steve Strong

PUBLIC COMMENTS: There was no public comment on non-agenda items.

PRESENTATION: Brad Koenig and Trish Bodlovic of Robert Peccia & Associates presented "City of East Helena Wastewater Master Plan: Overview and Discussion on Preliminary Findings." A paper copy of the presentation was handed out.

Brad Koenig began by discussing the 20-year planning period for wastewater projects. Trish Bodlovic discussed infiltration into the current wastewater collection system. Both responded to questions and comments from Paul Jensen and Dave Jensen about how and where the system was being infiltrated.

There was discussion on capacity of the wastewater system and moving the Montana Avenue lift station. City staff responded to Paul Jensen and Dave Jensen's concerns about the reject pumps that require frequent repair, sealing manholes to keep out precipitation, whether the city had an asset management plan, and Red Fox Meadows subdivision's impact on capacity.

Trish Bodlovic explained the grant and loan opportunities available. Brad Koenig said that a full draft of the wastewater master plan would be ready in the coming weeks.

MEETING SCHEDULE:

1. East Helena Council Meeting & Public Hearing, Tuesday, March 17, 2020, 7PM, City Hall Room 110
   {Public Hearing – Zoning Ordinance Text Amendments for Temporary Signs}
2. East Helena Council Meeting, Tuesday, April 7, 2020, 7PM, City Hall Room 110
3. East Helena Council Meeting, Tuesday, April 21, 2020, 7PM, City Hall Room 110

ADJOURNMENT: Mayor Schell adjourned the meeting at 8:13 PM.

ATTEST:

_______________________________ _______________________________
Clerk Mayor

APPENDIX C

SEWER MAIN VIDEOS

APPENDIX D

MPDES PERMIT

RECEIVED
OCT 07 2019
CITY OF
EAST HELENA, MT

Minor POTW
Permit No.: MT0022560

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

AUTHORIZATION TO DISCHARGE UNDER THE
MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with Montana Water Quality Act, Title 75, Chapter 5, Montana Code Annotated (MCA) and the Federal Water Pollution Control Act (the "Clean Water Act"), 33 U.S.C. § 1251 *et seq.*,

City of East Helena

is authorized to discharge from its **domestic wastewater treatment plant**

located at **3330 Plant Road,**

to receiving waters named **Prickly Pear Creek**

in accordance with discharge point(s), effluent limitations, monitoring requirements and other conditions set forth herein. Authorization for discharge is limited to those outfalls specifically listed in the permit.

This permit shall become effective **December 1, 2019**.

This permit and the authorization to discharge shall expire at midnight, **November 30, 2024**.

FOR THE MONTANA DEPARTMENT OF
ENVIRONMENTAL QUALITY

Jon Kenning, Chief
Water Protection Bureau
Water Quality Division

Issuance Date: October 4, 2019

TABLE OF CONTENTS

I. EFFLUENT LIMITATIONS, MONITORING REQUIREMENTS & OTHER CONDITIONS

A. Description of Discharge Points and Mixing Zone

The authorization to discharge provided under this permit is limited to those outfalls specially designated below as discharge locations. Discharges at any location not authorized under an MPDES permit is a violation of the Montana Water Quality Act and could subject the person(s) responsible for such discharge to penalties under the Act. Knowingly discharging from an unauthorized location or failing to report an unauthorized discharge within a reasonable time from first learning of an unauthorized discharge could subject such person to criminal penalties as provided under Section 75-5-632 of the Montana Water Quality Act.

Outfall	Description
001	Location: At the end of the pipe, discharging into Prickly Pear Creek, located at approximately 46°36'38" N latitude, 111°56'15" W longitude. Mixing Zone: 8.2 mgd for nutrients 1.35 mgd for copper, chronic aquatic life 0.14 mgd for copper, acute aquatic life Treatment Works: Minor, mechanical plant with metals removal UV disinfection, and aerobic sludge storage. Average daily design flow 0.44 million gallons per day.

B. Effluent Limitations

Outfall 001

Final Limitations

Beginning on the effective date of the permit and lasting through the term of the permit, the quality of effluent discharged by the facility shall, as a minimum, meet the limitations as set forth below:

Parameter	Units	Average Monthly Limitation (1)	Average Weekly Limitation (1)	Maximum Daily Limitation (1)
5-day Biochemical Oxygen Demand (BOD_5)	mg/L	30	45	--
	lb/day	109	163	--
	% removal	85 (2)	--	--
Total Suspended Solids (TSS)	mg/L	30	45	--
	lb/day	109	163	--
	% removal	85 (2)	--	--
pH	S.U.	In the range of 6.0 – 9.0		
E. coli Bacteria, summer (3)	Number of organisms /100 mL	126	252	--
E. coli Bacteria, winter (4)	Number of organisms /100 mL	630	1,260	--
Total Nitrogen Load (5) (6)	lb/day	53.3	--	--
Total Phosphorus as P Load (7)	lb/day	11.2	--	--
Total Phosphorus as P Load (8)	lb/day	5.5	--	--
Copper, Total Recoverable	µg/L	11.7	--	17.5

Footnotes:
(1) See Definition section at end of permit for explanation of terms.
(2) Average monthly minimum.
(3) This limit applies during the period April 1 through October 31.
(4) This limit applies during the period November 1 through March 31.
(5) Calculated from the sum of Nitrate + Nitrite as N and Total Kjeldahl Nitrogen (TKN) concentrations.
(6) This limit applies year round
(7) This limit applies October – June
(8) This limit applies July - September

There shall be no discharge of floating solids or visible foam in other than trace amounts.

There shall be no discharge which causes visible oil sheen in the receiving stream.

C. Monitoring Requirements

As a minimum, upon the effective date of this permit through the term of the permit, the following constituents shall be monitored at the frequency and with the type of measurement indicated.

The permittee must monitor the discharge from Outfall 001 at the last point of control following treatment (post metals treatment).

Samples shall be collected, preserved and analyzed in accordance with approved procedures listed in 40 CFR 136. Influent sample collection and flow monitoring must occur prior to the equalization basin or any recycle flow returns. Effluent flow monitoring must account for all draw-off and returns flows. Metals shall be analyzed as total recoverable.

If no discharge occurs during the entire monitoring period, it shall be stated on the Discharge Monitoring Report (DMR) Form that no discharge or overflow occurred.

The Required Reporting Value (RRV) is the detection level that must be achieved in reporting surface water monitoring or compliance data to the Department. The RRV is the Department's best determination of a level of analysis that can be achieved by the majority of the commercial, university, or governmental laboratories using EPA-approved methods or methods approved by the Department.

Outfall 001 Self-Monitoring Requirements

Parameter	Unit	Sample Location	Sample Frequency	Sample Type [(1)]	Reporting Requirements	Reporting Frequency	RRV
Flow	mgd	Effluent	Continuous	[(2)]	Average Monthly/Daily Maximum	Monthly	--
5-Day Biological Oxygen Demand (BOD_5)	mg/L	Influent	3/Week	Composite	Average Monthly/ Maximum Weekly	Monthly	2
	mg/L	Effluent	3/Week	Composite			2
	lb/day	Effluent	1/Month	Calculated			--
	% Removal [(3)]	Effluent	1/Month	Calculated	Average Monthly		--
Total Suspended Solids (TSS)	mg/L	Influent	3/Week	Composite	Average Monthly/ Maximum Weekly		10
	mg/L	Effluent	3/Week	Composite			10
	lb/day	Effluent	1/Month	Calculated			--
	% Removal [(3)]	Effluent	1/Month	Calculated	Average Monthly		--
pH	s.u.	Effluent	Daily	Instantaneous	Minimum and Maximum		0.1
E. coli Bacteria [(4)]	Number of organisms/100 mL	Effluent	3/Week	Grab	Monthly/ Weekly Geo Mean		1
Total Ammonia as N	mg/L	Effluent	1/Month	Composite	Report		0.1
Nitrate + Nitrite as N	mg/L	Effluent	1/Week	Composite	Average Monthly		0.05
Total Kjeldahl Nitrogen	mg/L	Effluent	1/Week	Composite			0.1
Total Nitrogen [(5)]	mg/L	Effluent	1/Month	Calculated			--
	lb/day	Effluent	1/Month	Calculated			--
Total Phosphorus as P	mg/L	Effluent	1/Week	Composite			--
	lb/day	Effluent	1/Month	Calculated			--
Oil and Grease	mg/L	Effluent	1/Quarter	Grab	Report	Quarterly	1
Arsenic, Total Recoverable [(2)]	μg/L	Effluent	1/Month	Composite	Average Monthly / Daily Maximum	Monthly	3
Copper, Total	μg/L	Effluent	1/Month	Composite			1
Lead, Total Recoverable	μg/L	Effluent	1/Quarter	Composite	Report	Quarterly	0.5
Zinc, Total Recoverable	μg/L	Effluent	1/Quarter	Composite			10

Footnotes:
(1) See Definition section at end of permit for explanation of terms.
(2) Requires recording device or totalizer; permittee shall report daily maximum and daily average flow on DMR.
(3) Percent (%) Removal shall be calculated using the monthly average values.
(4) Report Geometric Mean if more than one sample is collected during reporting period.
(5) Calculated as the sum of Nitrate + Nitrite as N and Total Kjeldahl Nitrogen (TKN) concentrations.

2. Reporting Requirements

Load Calculations

In addition to reporting the concentration values, the monthly loads expressed in pounds per day (lb/day) must be calculated and reported for BOD_5, TSS, total phosphorus as P and total nitrogen. The monthly loads must be calculated using the average daily flow rate and daily average parameter concentration as shown in the following equations:

Load (lb/day)
Parameter concentration (mg/L) x Effluent Flow Rate (mgd) x (8.34)

Percent (%) Removal
The percent removal shall be calculated using the following formula:

$$\% \text{ Removal} = \frac{(\textit{Influent Concentration}) - (\textit{Effluent Concentration})}{(\textit{Influent Concentration})} \times 100$$

Where:
Influent Concentration = Corresponding 30-day average influent concentration based on the analytical results of the reporting period.

Effluent Concentration = Corresponding 30-day average effluent concentration based on the analytical results of the reporting period.

Average Monthly Limit (AML)

The AML or 30-day average is the Arithmetic Average or mean (except for *E. coli* bacteria) of all of the Daily Discharge samples collected during a calendar month, as defined in Part V of the permit. If only one sample is collected, then it is considered to be the 30-day average and reported on the DMR.

Average Weekly Limit (AWL)

The AWL or 7-day average is the Arithmetic Average or mean (except for *E. coli* bacteria) of all of the Daily Discharge samples collected during a calendar week, as defined in Part V of the permit. If only one sample is collected during the calendar week it is considered the 7-day average. The highest 7-day average of the monitoring period shall be reported on the 7-day average blank on the DMR. In cases where only one sample is collected during the entire monitoring period, that sample shall be reported as both the 30-day and 7-day averages.

D. Special Conditions

1. Sewage Sludge:

The use or disposal of sewage sludge must be in conformance with the Environmental Protection Agency (EPA) requirements at 40 CFR 503.

The permittee shall not dispose of sewage sludge such that any portion thereof enters any state water, including ground water. The permittee shall notify the Department in writing 45 days prior to any change in sludge management at the facility.

2. Instream Monitoring

The permittee shall monitor Prickly Pear Creek at the previously established CRK-A sample point, upstream of Outfall 001 and not under the influence of the discharge, for the parameters listed.

Ambient Water Quality Prickly Pear Creek Monitoring Requirements					
Parameter	Units	Sample Location	Sample Frequency	Sample Type (1)	RRV
pH	s.u.	Instream	1/Quarter	Instantaneous	0.1
Temperature	°C	Instream	1/Quarter	Instantaneous	--
Total Ammonia as N	mg/L	Instream	1/Quarter	Grab	0.1
Total Hardness as $CaCO_3$	mg/L	Instream	1/Quarter	Grab	10
Arsenic, Total Recoverable	µg/L	Instream	1/Quarter	Grab	3
Copper, Total Recoverable	µg/L	Instream	1/Quarter	Grab	1
Lead, Total Recoverable	µg/L	Instream	1/Quarter	Grab	0.5
Zinc, Total Recoverable	µg/L	Instream	1/Quarter	Grab	10

Footnotes:
(1) See Definition section at end of permit for explanation of terms

3. East Helena's Pollutant Minimization Program (PMP)

A pollutant minimization program (PMP) is a structured set of activities designed to improve processes and pollutant controls that will prevent and reduce pollutant loadings. East Helena has met highest attainable condition for total nitrogen and total phosphorus and will adopt and implement a PMP reflecting the greatest pollutant reduction achievable. East Helena needs and is eligible for a General Variance from the Montana Base Numeric Nutrient Standards found in DEQ-12B.

East Helena is required to conduct the following PMP activities:

Action Item 1: Continue Current Advanced Operational Strategies throughout the Term of the Permit

a. Continue cycling aeration on and off in the bioreactor to create periodic anoxic conditions for denitrification.

b. Continue to operate and maintain the tertiary filtration process.

c. Throughout the permit term and in the operation and maintenance manual, continue to maintain in progress documentation of following operational strategies effective toward reducing nutrients, as applicable:

- identification of aerators and mixers used or taken offline
- aeration cycle times
- oxygen reduction potential (ORP) target points
- variable frequency drive set points
- target mixed liquor suspended solids (MLSS) concentration for summer and winter
- return and wasting strategies
- seasonal adjustments

Action Item 2: Evaluate Nutrient Reduction Measures

a. Submit annual reports addressing the following:

- Identify nutrient reduction measures implemented that year.
- Evaluate the effectiveness of each implemented nutrient reduction measure.
- Propose nutrient reduction measures for the upcoming year.

The annual reports will be due January 28th of each year, beginning January 28, 2020.

E. Pretreatment Requirements

1. The Permittee shall not allow any user to introduce into a POTW any pollutants which cause Pass Through or Interference. These general prohibitions, and the specific prohibitions in Part I.E.2 of this rule, apply to all non-domestic sources introducing pollutants into a POTW whether or not the source is subject to other national pretreatment standards or any national, state or local pretreatment requirements.

2. In addition, the following pollutants may not be introduced into a POTW:

   a. Pollutants which create a fire or explosion hazard in the POTW, including waste streams with a closed cup flashpoint of less than 60 degrees Celsius (140 degrees Fahrenheit) using the test methods specified in 40 CFR 261.21;

   b. Pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.0, unless the works is specifically designed to accommodate such discharges;

   c. Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW resulting in interference;

d. Any pollutant, including oxygen-demanding pollutants (BOD_5, etc.), released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the POTW;

e. Heat in amounts which will inhibit biological activity in the POTW resulting in interference, but in no case heat in such quantities that the temperature at the POTW treatment plant exceeds 40 degrees Celsius (104 degrees Fahrenheit) unless the department, upon request of the POTW, approves alternative temperature limits;

f. Petroleum oil, non-biodegradable cutting oil, or products of mineral oil origin in amounts that will cause Interference or Pass Through;

g. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems; and

h. Any trucked or hauled pollutants, except at discharge points designated by the POTW.

3. Publicly-Owned Treatment Works. All POTWs must provide adequate notice to the Department of the following:

   a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to federal effluent guidelines and standards (40 CFR Subchapter N) if it were directly discharging those pollutants;

   b. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit; and

   c. For the purposes of this paragraph, adequate notice shall include information on:

      (1) The quality and quantity of effluent introduced into the POTW, and

      (2) Any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

II. MONITORING, RECORDING AND REPORTING REQUIREMENTS

A. Representative Sampling

Samples taken in compliance with the monitoring requirements established under Part I shall be collected from the effluent stream prior to discharge into the receiving waters. Samples and measurements shall be representative of the volume and nature of the monitored discharge. Sludge samples shall be collected at a location representative of the quality of sludge immediately prior to use-disposal practice.

B. Monitoring Procedures

Monitoring must be conducted according to test procedures approved under Part 136, Title 40 of the Code of Federal Regulations, unless other test procedures have been specified in this permit. See Part I.C. for any applicable sludge monitoring procedures. All flow-measuring and flow-recording devices used in obtaining data submitted in self-monitoring reports must indicate values within 10 percent of the actual flow being measured.

C. Penalties for Tampering

The Montana Water Quality Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $25,000, or by imprisonment for not more than six months, or by both.

D. Reporting of Monitoring Results

Effluent monitoring results obtained during the previous month(s) shall be summarized for each month and reported on a Discharge Monitoring Report Form (EPA No. 3320-1), postmarked no later than the 28th day of the month following the completed reporting period. If no discharge occurs during the reporting period, "no discharge" shall be reported. Legible copies of these, and all other reports required herein, shall be signed and certified in accordance with the "Signatory Requirements" (see Part IV.G of this permit), and submitted to the Department at the following address:

Montana Department of Environmental Quality
Water Protection Bureau
PO Box 200901
Helena, Montana 59620- 0901

E. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any Compliance Schedule of this permit shall be submitted no later than 14 days following each schedule date.

F. Additional Monitoring by the Permittee

If the permittee monitors any pollutant more frequently than required by this permit, using approved analytical methods as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the Discharge Monitoring Report. Such increased frequency shall also be indicated.

G. Records Contents

Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements;

2. The initials or name(s) of the individual(s) who performed the sampling or measurements;

3. The date(s) analyses were performed;

4. The time analyses were initiated;

5. The initials or name(s) of individual(s) who performed the analyses;

6. References and written procedures, when available, for the analytical techniques or methods used; and

7. The results of such analyses, including the bench sheets, instrument readouts, computer disks or tapes, etc., used to determine these results.

H. Retention of Records

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of the Department at any time. Data collected on site, copies of Discharge Monitoring Reports, and a copy of this MPDES permit must be maintained on site during the duration of activity at the permitted location.

I. Twenty-Four Hour Notice of Noncompliance Reporting

1. The permittee shall report any serious incident of noncompliance affecting the environment as soon as possible, but no later than twenty-four (24) hours from the time the permittee first became aware of the circumstances. The report shall be made to the Water Quality Division at (406) 444-5546 or the Office of Disaster and Emergency Services at (406) 841-3911. The following examples are considered serious incidents:

   a. Any noncompliance which may seriously endanger health or the environment;

b. Any unanticipated bypass which exceeds any effluent limitation in the permit (See Part III.G of this permit, "Bypass of Treatment Facilities"); or

c. Any upset which exceeds any effluent limitation in the permit (See Part III.H of this permit, "Upset Conditions").

2. A written submission shall also be provided within five days of the time that the permittee becomes aware of the circumstances. The written submission shall contain:

   a. A description of the noncompliance and its cause;

   b. The period of noncompliance, including exact dates and times;

   c. The estimated time noncompliance is expected to continue if it has not been corrected; and

   d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

3. The Department may waive the written report on a case-by-case basis if the oral report has been received within 24 hours by the Water Protection Bureau, by phone, (406) 444-5546.

4. Reports shall be submitted to the addresses in Part II.D of this permit, "Reporting of Monitoring Results".

J. Other Noncompliance Reporting

Instances of noncompliance not required to be reported within 24 hours shall be reported at the time that monitoring reports for Part II.D of this permit are submitted. The reports shall contain the information listed in Part II.I.2 of this permit.

K. Inspection and Entry

The permittee shall allow the head of the Department or the Regional Administrator, or an authorized representative upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

4. Sample or monitor at reasonable times, for the purpose of assuring permit compliance, any substances or parameters at any location.

III. COMPLIANCE RESPONSIBILITIES

A. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. The permittee shall give the Department advance notice of any planned changes at the permitted facility or of an activity which may result in permit noncompliance.

B. Penalties for Violations of Permit Conditions

The Montana Water Quality Act provides that any person who violates a permit condition of the Act is subject to civil or criminal penalties not to exceed $25,000 per day or one year in prison, or both, for the first conviction, and $50,000 per day of violation or by imprisonment for not more than two years, or both, for subsequent convictions. MCA 75-5-611(a) also provides for administrative penalties not to exceed $10,000 for each day of violation and up to a maximum not to exceed $100,000 for any related series of violations. Except as provided in permit conditions on Part III.G of this permit, "Bypass of Treatment Facilities" and Part III.H of this permit, "Upset Conditions", nothing in this permit shall be construed to relieve the permittee of the civil or criminal penalties for noncompliance.

C. Need to Halt or Reduce Activity not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

D. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

E. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit. However, the permittee shall operate, as a minimum, one complete set of each main line unit treatment process whether or not this process is needed to achieve permit effluent compliance.

F. Removed Substances

1. Collected screenings, grit, solids, sludges, or other pollutants removed in the course of treatment shall be disposed of in such a manner so as to prevent any pollutant from entering any waters of the state or creating a health hazard. Sludge shall not be directly blended with or enter either the final plant discharge and/or waters of the United States.

2. Any sludges removed from the facility shall be disposed of in accordance with 40 CFR 503, 258 or other applicable rule. EPA and MDEQ shall be notified at least 180 days prior to such disposal taking place.

3. The permittee shall provide certification that all applicable provisions of 40 CFR Parts 503 and 258 have been met for the land application or landfill disposal of sewage sludge. Certification shall be submitted annually with the sludge reporting form and must contain the following statement:

   "I certify under penalty of law, that all of the applicable provisions of 40 CFR Part (503/258) have been met when municipal sewage sludge is (beneficially used/disposed of at a landfill). This determination has been made under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate the information used to determine that 40 CFR Part (503/258) have been met. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment."

G. Bypass of Treatment Facilities

1. Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Parts III.G.2 and III.G.3 of this permit.

2. Notice:

   a. Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten (10) days before the date of the bypass.

   b. Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required under Part II.I of this permit, "Twenty-Four Hour Reporting".

3. Prohibition of bypass:

   a. Bypass is prohibited, and the Department may take enforcement action against a permittee for a bypass, unless:

      (1) The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

      (2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

      (3) The permittee submitted notices as required under Part III.G.2 of this permit.

   b. The Department may approve an anticipated bypass, after considering its adverse effects, if the Department determines that it will meet the three conditions listed above in Part III.G.3.a of this permit.

H. Upset Conditions

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with technology based permit effluent limitations if the requirements of Part III.H.2 of this permit are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review (i.e. Permittees will have the opportunity for a judicial determination on any claim of upset only in an enforcement action brought for noncompliance with technology-based permit effluent limitations).

2. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

   a. An upset occurred, and that the permittee can identify the cause(s) of the upset;

   b. The permitted facility was at the time being properly operated;

   c. The permittee submitted notice of the upset as required under Part II.I of this permit, "Twenty-Four Hour Notice of Noncompliance Reporting"; and

d. The permittee complied with any remedial measures required under Part III.D of this permit, "Duty to Mitigate".

3. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

IV. GENERAL REQUIREMENTS

A. Planned Changes

The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

1. The alteration or addition could significantly change the nature or increase the quantity of pollutant discharged. This notification applies to pollutants which are not subject to effluent limitations in the permit; or

2. There are any planned substantial changes to the existing sewage sludge management practices of storage and disposal. The permittee shall give the Department notice of any planned changes at least 180 days prior to their implementation.

B. Anticipated Noncompliance

The permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

C. Permit Actions

This permit may be revoked, modified and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

D. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. The application must be submitted at least 180 days before the expiration date of this permit.

E. Duty to Provide Information

The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine whether cause exists for revoking, modifying and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Department, upon request, copies of records required to be kept by this permit.

F. Other Information

When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or any report to the Department, it shall promptly submit such facts or information with a narrative explanation of the circumstances of the omission or incorrect submittal and why they weren't supplied earlier.

G. Signatory Requirements

All applications, reports or information submitted to the Department shall be signed and certified.

1. All permit applications shall be signed by either a principal executive officer or ranking elected official.

2. All reports required by the permit and other information requested by the Department shall be signed by a person described above or by a duly authorized representative of that person. A person is considered a duly authorized representative only if:

   a. The authorization is made in writing by a person described above and submitted to the Department; and

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. (A duly authorized representative may thus be either a named individual or an individual occupying a named position.)

3. Changes to authorization. If an authorization under Part IV.G.2 of this permit is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Part IV.G.2 of this permit must be submitted to the Department prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Certification. Any person signing a document under this section shall make the following certification:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

H. Penalties for Falsification of Reports

The Montana Water Quality Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction be punished by a fine of not more that $25,000 per violation, or by imprisonment for not more than six months per violation, or by both.

I. Availability of Reports

Except for data determined to be confidential under 40 CFR Part 2, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Department. As required by the Clean Water Act, permit applications, permits and effluent data shall not be considered confidential.

J. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Clean Water Act.

K. Property Rights

This permit does not convey any property rights of any sort, or any exclusive privilege.

L. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

M. Transfers

This permit may be automatically transferred to a new permittee if:

1. The current permittee notifies the Department at least 30 days in advance of the proposed transfer date;

2. The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them;

3. The Department does not notify the existing permittee and the proposed new permittee of an intent to revoke or modify and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in Part IV.M.2 of this permit; and

4. Required annual and application fees have been paid.

N. Fees

The permittee is required to submit payment of an annual fee as set forth in ARM 17.30.201. If the permittee fails to pay the annual fee within 90 days after the due date for the payment, the Department may:

1. Impose an additional assessment consisting of 15% of the fee plus interest on the required fee computed at the rate established under 15-31-510(3), MCA, or

2. Suspend the processing of the application for a permit or authorization or, if the nonpayment involves an annual permit fee, suspend the permit, certificate or authorization for which the fee is required. The Department may lift suspension at any time up to one year after the suspension occurs if the holder has paid all outstanding fees, including all penalties, assessments and interest imposed under this sub-section. Suspensions are limited to one year, after which the permit will be terminated.

O. Reopener Provisions

This permit may be reopened and modified (following proper administrative procedures) to include the appropriate effluent limitations (and compliance schedule, if necessary), or other appropriate requirements if one or more of the following events occurs:

1. Water Quality Standards: The water quality standards of the receiving water(s) to which the permittee discharges are modified in such a manner as to require different effluent limits than contained in this permit.

2. Water Quality Standards are Exceeded: If it is found that water quality standards or trigger values in the receiving stream are exceeded either for parameters included in the permit or others, the department may modify the effluent limits or water management plan.

3. TMDL or Wasteload Allocation: TMDL requirements or a wasteload allocation is developed and approved by the Department and/or EPA for incorporation in this permit.

4. Water Quality Management Plan: A revision to the current water quality management plan is approved and adopted which calls for different effluent limitations than contained in this permit.

5. Sewage Sludge: There have been substantial changes (or such changes are planned) in sludge use or disposal practices; applicable management practices or numerical limitations for pollutants in sludge have been promulgated which are more stringent than the requirements in this permit; and/or it has been determined that the permittee's sludge use or disposal practices do not comply with existing applicable state or federal regulations.

V. DEFINITIONS

1. **"Act"** means the Montana Water Quality Act, Title 75, chapter 5, MCA.

2. **"Administrator"** means the administrator of the United States Environmental Protection Agency.

3. **"Acute Toxicity"** occurs when 50 percent or more mortality is observed for either species (See Part I.C of this permit) at any effluent concentration. Mortality in the control must simultaneously be 10 percent or less for the effluent results to be considered valid.

4. **"Annual Average Load"** means the arithmetic mean of all 30-day or monthly average loads reported during the calendar year for a monitored parameter.

5. **"Arithmetic Mean" or "Arithmetic Average"** for any set of related values means the summation of the individual values divided by the number of individual values.

6. **"Average Monthly Limitation"** means the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

7. **"Average Weekly Limitation"** means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

8. **"BOD_5"** means the five-day measure of pollutant parameter biochemical oxygen demand.

9. **"Bypass"** means the intentional diversion of waste streams from any portion of a treatment facility.

10. **"$CBOD_5$"** means the five-day measure of pollutant parameter carbonaceous biochemical oxygen demand.

11. **"Composite Samples"** shall be flow proportioned. The composite sample shall, as a minimum, contain at least four (4) samples collected over the compositing period. Unless otherwise specified, the time between the collection of the first sample and the last sample shall not be less than six (6) hours nor more than 24 hours. Acceptable methods for preparation of composite samples are as follows:

    a. Constant time interval between samples, sample volume proportional to flow rate at time of sampling;

b. Constant time interval between samples, sample volume proportional to total flow (volume) since last sample. For the first sample, the flow rate at the time the sample was collected may be used;

c. Constant sample volume, time interval between samples proportional to flow (i.e. sample taken every "X" gallons of flow); and,

d. Continuous collection of sample, with sample collection rate proportional to flow rate.

12. **"Daily Discharge"** means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonable represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the average measurement of the pollutant over the day.

13. **"Daily Maximum Limit"** means the maximum allowable discharge of a pollutant during a calendar day. Expressed as units of mass, the daily discharge is cumulative mass discharged over the course of the day. Expressed as a concentration, it is the arithmetic average of all measurements taken that day.

14. **"Department"** means the Montana Department of Environmental Quality (MDEQ) established by 2-15-3501, MCA.

15. **"Director"** means the Director of the Montana Department of Environmental Quality.

16. **"EPA"** means the United States Environmental Protection Agency.

17. **"Federal Clean Water Act"** means the federal legislation at 33 USC 1251, *et seq.*

18. **"Geometric Mean"** means the value obtained by taking the N^{th} root of the product of the measured values.

19. **"Grab Sample"** means a sample which is taken from a waste stream on a one-time basis without consideration of flow rate of the effluent or without consideration for time.

20. **"Indirect Discharge"** means the introduction of pollutants into a POTW from any non-domestic source regulated under Section 307(b), (c) or (d) of the Federal Clean Water Act.

21. **"Industrial User"** means a source of Indirect Discharge.

22. **"Instantaneous Maximum Limit"** means the maximum allowable concentration of a pollutant determined from the analysis of any discrete or composite sample collected, independent of the flow rate and the duration of the sampling event.

23. **"Instantaneous Measurement"**, for monitoring requirements, means a single reading, observation, or measurement.

24. **"Interference"** means a discharge which, alone or in conjunction with other contributing discharges

    a. Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and

    b. Therefore causes a violation of any requirement of the POTW's MPDES permit (including an increase in the magnitude or duration of a violation) or causes the prevention of sewage sludge use or disposal in compliance with the following statutes and regulations: Section 405 of the Clean Water Act; 40 CFR Part 503 - Standards for the Use and Disposal of Sewage Sludge; Resource Conservation and Recovery Act (RCRA); 40 CFR Part 258 - Criteria for Municipal Solid Waste Landfills; and/or any State regulations regarding the disposal of sewage sludge.

24. **"Maximum Daily Discharge Limitation"** means the highest allowable daily discharge.

25. **"Mixing Zone"** means a limited area of a surface water body or aquifer where initial dilution of a discharge takes place and where certain water quality standards may be exceeded.

26. **"Nondegradation"** means the prevention of a significant change in water quality that lowers the quality of high-quality water for one or more parameters. Also, the prohibition of any increase in discharge that exceeds the limits established under or determined from a permit or approval issued by the Department prior to April 29, 1993.

27. **"Pass Through"** means a discharge which exits the POTW into waters of the State of Montana in quantities or concentrations which, alone or in conjunction with other discharges, is a cause of a violation of any requirement of the POTW's MPDES permit (including an increase in the magnitude or duration of a violation).

28. **"POTW"** means a publicly owned treatment works.

29. **"Regional Administrator"** means the administrator of Region VIII of EPA, which has jurisdiction over federal water pollution control activities in the state of Montana.

30. **"Severe Property Damage"** means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

31. **"Sewage Sludge"** means any solid, semi-solid or liquid residue generated during the treatment of domestic sewage and/or a combination of domestic sewage and industrial waste of a liquid nature in a treatment works. Sewage sludge includes, but is not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the incineration of sewage sludge or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works.

32. **"TIE"** means a toxicity identification evaluation.

33. **"TMDL"** means the total maximum daily load limitation of a parameter, representing the estimated assimilative capacity for a water body before other designated uses are adversely affected. Mathematically, it is the sum of wasteload allocations for point sources, load allocations for non-point and natural background sources, and a margin of safety.

34. **"TRE"** means a toxicity reduction evaluation.

35. **"TSS"** means the pollutant parameter total suspended solids.

36. **"Upset"** means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

Response to Comments
City of East Helena
MPDES Permit MT0022560

On October 19, 2018, the Montana Department of Environmental Quality (DEQ) issued Public Notice MT-18-23, stating DEQ's intent to issue a Montana Pollutant Discharge Elimination System (MPDES) permit to the City of East Helena for discharges to surface water from the city's wastewater treatment plant. The public notice required that all substantive comments be received or postmarked by November 23, 2018, in order to be considered in formulation of the final determination and issuance of the permit.

This Response to Comments document includes a summary of all significant comments on the draft permit and fact sheet received during the public comment period and DEQ's responses to those comments. The Response to Comments document is an addendum to and supersedes relevant portions of the Fact Sheet to the extent changes are outlined herein.

The table below identifies those individuals who submitted comments.

Persons Submitting Significant Comments on the Fact Sheet and Draft MPDES Permit MT0022560	
Number	**Commenter**
1	Scott St. Clair, Director of Public Works, City of East Helena
2	Guy Alsentzer, Upper Missouri Waterkeeper

Responses to Comments on the Fact Sheet and Draft MPDES Permit MT0022560

Commenter 1. Scott St. Clair, City of East Helena

Comment 1: Fact Sheet Facility Description references Operation and Maintenance Manuals by RPA from 1986 and HDR in 2002. The process which was in-place in 1986 has long been abandoned, and HDR was not involved in the 2002 O&M Manuals. RPA provided the 2002 O&M Manuals. Any information from 1986 would not be applicable.

Response: DEQ agrees with the comment. References to a 1986 manual and HDR Engineering were carried forward from the previous fact sheet and are incorrect. The only reference to an O & M manual should be "Robert Peccia and Associates, 2002".

No change is made to the permit in response to this comment.

Comment 2: Fact Sheet Facility Description indicates that the irrigation water and non-potable water are drawn off after effluent flow monitoring. This is not correct. These draw-offs are located in the Metals Removal Building and are upstream of the effluent flow meter. The drawing included as Attachment A is also incorrect.

Response: Both the facility description and Attachment A were based on a pre-permitting site visit conducted by DEQ staff because the line drawing included in the permit application did not include the metals removal building and indicated that the irrigation draw off occurred at the UV disinfection building.

DEQ acknowledges that the description of the irrigation draw off point and Attachment A might not accurately reflect site conditions.

No change is made to the permit in response to this comment.

Comment 3: Fact Sheet Page 3, Table 1. Effluent Flow Primary Device is not a V-notch weir and staff gage. The primary effluent flow meter is a magnetic flow meter located within the Metals Filtration Building. The secondary device listed does not exist.

Response: DEQ acknowledges that the City uses the magnetic flow meter in the metals removal building as the main source for reporting effluent flow and that there is no longer a weir for measuring effluent flow. The WPB was unaware of this change in the facility design from the previous permit. The City remains responsible for demonstrating that reported flows are accurate to within guidelines established by compliance inspectors, generally plus or minus 10 percent of actual flow.

No change is made to the permit in response to this comment.

Comment 4: The fact sheet indicates that East Helena does not have a Pre-Treatment Program. As a matter of clarification, the City does have a Pre-Treatment Requirement included in the City Code (Title 7, Chapter 3). There are no current customers which are required to perform any pre-treatment at this time.

Response: The fact sheet refers to an EPA-required and approved pre-treatment program, which the City has not implemented.

No change is made to the draft permit in response to this comment.

Comment 5: The fact sheet indicates that biosolids are land applied to agricultural fields. Biosolids are not land applied. Biosolids are disposed of in a landfill.

Response: Thank you for the clarification.

No change is made to the permit in response to this comment.

Comment 6: Fact Sheet, Page 10, 2nd Paragraph. The City's intent was to apply for a standard mixing zone. This was based on a meeting between MDEQ and City representatives on November 27, 2017. It was our understanding at that time that many of the preliminary decisions regarding a standard mixing zone had been determined and that the Draft Permit was nearly complete. It was also the City's understanding that a source specific mixing zone request could be made subsequently, (although with additional fees) once the implications of a standard mixing zone as presented in the Draft Permit were known and could be reviewed. If there was some question regarding the City's submittal for a mixing zone, this could have easily been resolved with minimal communication. The City has not heard any communication regarding its mixing zone application since its submittal on February 26, 2018.

Response: The February 26, 2018, mixing zone request was submitted by Robert Peccia and Associates on behalf of the City. DEQ reviewed the request and provided a mixing zone. The fact sheet describes DEQ's review and decisions made regarding standard and source specific mixing zones based on this request, see pages 9 through 11 for more information regarding which pollutants received a standard mixing zone and which received a source specific mixing zone.

No change is made to the permit in response to this comment.

Comment 7: Fact Sheet, Page 10, 4th Full Paragraph. The paragraph describes that an acute mixing zone should "be no more than 10 percent of the mixing zone for chronic criteria". The paragraph as written states that 10 percent of the available chronic dilution flow at the discharge location is 0.54 MGD. We believe that the "0.54" should be 0.14 MGD (0.10 x 1.35 mgd). This would match the statement below the paragraph.

Response: The comment points out a typographical error. The correct value was used in the fact sheet calculations.

No change is made to the permit in response to this comment.

Comment 8: Fact Sheet, Page 18, Discussion on Copper Limit Determination. We understand the logic presented, however the City adamantly disagrees that any copper limit is positively impacting the water quality of PPC. As outlined in the *2006 Framework Water Quality Restoration Plan and Total Maximum Daily Loads (TMDL's) for Lake Helena Watershed Planning Area,* the City of East Helena is not an influential contributor to the overall copper concentrations in PPC. Upstream loads are overwhelmingly the largest contributor. Our plant, as designed, has the ability to remove 9 pounds of copper annually. Based on the 2006 TMDL documents, the copper load to PPC is greater than 6000 pounds per year with abandoned mines contributing a little under 5000 pounds. The total load from NPDES permits (Helena and East Helena) is less than 100 pounds. Of the NPDES fraction, East Helena is surely a significantly lower division of that total. No other entity (including the City of Helena) has a copper limit. Removing the 9 pounds of copper costs the taxpayers of East Helena over $200,000 annually in loan payments and $100,000 per year in operational costs. Given the fact that the City of Helena does not have a limit, it seems like an unfair burden has been placed on our citizens. Common sense would dictate that the 9 pounds of copper being removed by our facility has an insignificant impact on the health of PPC. We respectfully request that the copper limit be removed from our permit.

Response: Total Maximum Daily Loads or TMDLs are planning documents used to identify reductions of pollutants within a watershed. TMDLs are not regulatory documents. MPDES permits regulate point sources discharge of pollutants to state surface waters to ensure beneficial uses are protected. One way to protect beneficial uses is to ensure point sources are not causing or contributing to an exceedance of any water quality standard in the immediate receiving water outside of any appropriate mixing zone. When reasonable potential is demonstrated for a parameter, DEQ must implement water quality-based effluent limits in the permit. Copper is present in the East Helena discharge and has reasonable potential to exceed the water quality standard after allowing for available dilution. The TMDL does not provide a specific WLA to the East Helena point source. The TMDL assumes that permitted point sources will comply with the requirements of their MPDES permits. DEQ has balanced the requirements of the MPDES rules and the TMDL process by allowing a minimal amount of dilution in the receiving water. DEQ believes this is reasonable because recent data indicates there is now some assimilative capacity in Prickly Pear Creek, and recent changes in water management have resulted in receiving water flow where previously there was none.

No change is made to the permit in response to this comment.

Comment 9: Fact Sheet, Page 23, Subpart VII A, pt Paragraph. The last sentence states "East Helena needs and is eligible for a General Variance from the Montana Base Numeric Nutrient Standards found in DEQ-12B". This statement is confusing. The second paragraph of page 15 states that the City requested this variance on February 26, 2018 and Page 16 (4th full paragraph) indicates that the Variance is being approved and incorporated into this permit. Is there another variance required?

Response: No other variance is required for Total Nitrogen and Total Phosphorus.

No change is made to the permit in response to this comment.

Comment 10: Fact Sheet, Page 26, Attachment A. This figure shows flow going through the Equalization Basin prior to the Aeration Basin. While this could occur, the normal flow path bypasses the Equalization Basin and flows directly from the Headworks to the Aeration Basin. The draw off for irrigation and non-potable water are located within the Metals Removal Building and are upstream of the effluent flow meter which is also located in the Metals Removal Building.

Response: See the response to Comment 2.

Comment 11: Draft Permit, Page 4, Final Limitations Table, Copper. As stated previously the City opposes this limit based on the difficulty and expense it requires relative to the benefit to PPC. Additionally, the limit as presented in the draft permit is 11.7 µg/1. The RRV (detection level) for copper in the Fact Sheet (page 22) and the Monitoring Requirement Table on Page 6 of the Permit is "1". We have spoken with Energy Laboratories in Helena. According to Energy Labs it would be very unusual to report µg/1 in anything less than a whole number. Based on the RRV value in the table, and our conversation with Energy Labs, we respectfully request that the copper limit be rounded to a whole number **(12 µg/1}.**

Response: DEQ routinely receives metals results reported as µg/L in values less than whole numbers. Copper limits in other permits issued by DEQ are expressed to the tenth of a microgram per liter. See also the response to Comment 8.

No change is made to the permit in response to this comment.

Comment 12: Draft Permit, Page 7, Whole Effluent Toxicity (WET) Testing. This discussion on Page 7 we believe is in error. The Fact Sheet indicates in several places that this testing is no longer required.

Response: DEQ agrees with the comment.

WET testing requirements are removed in the Final Permit.

Commenter 2; Guy Alsentzer, Upper Missouri Waterkeeper

Comment 13: The draft permit would remove ammonia limits, total residual chlorine limits, lead and zinc limits, effluent and instream monitoring for several metals, requirements to monitor dissolved oxygen, temperature and hardness in the effluent, requirement to conduct WET testing, and would weaken the copper limit. Doing so contravenes the Clean Water Act's cornerstone prohibition on discharges of pollutants from a point source without a permit and its anti- backsliding provisions. The Clean Water Act forbids weakening of effluent limitations contained in a previous permit. 42 U.S.C. § 1342(o). While an exception can be made where there have been "material and substantial alterations or additions" to a facility, this exception only applies where the alterations or additions are those "which justify the application of a less stringent effluent limitation." *Id.* § 1342)o)(2)(A).

The Draft Permit's removal of limits and monitoring requirements without requiring the pollution to be abated and in many cases without adequate rationale or evidence showing the requirements are no longer warranted (i.e., the pollutants are no longer present in the waste discharge), threatens the health and environment and violates the MWQA and CWA.

Response: The comment references the Montana Water Quality Act and the Clean Water Act prohibition on discharges of pollutants from a point source without a permit. There is no requirement however that all pollutants in a discharge be subject to effluent limitations. DEQ must assess pollutants of concern during permit development and include effluent limitations for those with applicable technology-based effluent limitations and those DEQ finds have reasonable potential to exceed Montana's water quality standards. The draft permit complies with this requirement. The fact sheet discusses the relevant pollutants of concern and provides the rationale and method for determining whether or not a pollutant has reasonable potential to exceed the water quality standard.

The citation in the comment [42 U.S.C. § 1342(o)] is incorrect. DEQ assumes the commenter intended to reference 33 U.S.C. § 1342(o).

The comment misinterprets the Clean Water Act's anti-backsliding provisions. EPA and DEQ have consistently interpreted CWA section 402(o)(1) to allow relaxation of WQBELs and effluent limitations based on state standards if the relaxation is consistent with the provisions of CWA section 303(d)(4) or if one of the exceptions in CWA section 402(o)(2) is met. The two provisions constitute independent exceptions to the prohibition against relaxation of effluent limitations. If either is met, relaxation is permissible.

Where DEQ removed or relaxed effluent limitations it was for one of two (or both) of the following reasons:

(1) The City spent approximately 5 million dollars to significantly upgrade the wastewater treatment system to provide increased treatment for metals and nutrients since the previous permit renewal. This upgrade constitutes "material and substantial alterations or additions to the permitted facility that justify the relaxation" as stated in CWA Section 402(o)(2)(A).

(2) DEQ had new information regarding receiving water flows and ambient concentrations for several pollutants of concern that it did not have during the previous permit renewal. This satisfies the exception that "new information (other than revised regulations, guidance, or test methods) is available that was not available at the time of permit issuance and that would have justified a less stringent effluent limitation" as stated in CWA Section 402(o)(2)(B)(i). Based on this new information some parameters demonstrate no reasonable potential to exceed water quality standards while other parameters have relaxed water quality based effluent limits based on new information.

Individual pollutants are further discussed below.

No change is made to the permit in response to this comment.

Comment 14: The Draft Permit removes permit limits for ammonia, lead and zinc, and even deletes or significantly diminishes requirements for monitoring these pollutants without ensuring that the discharges of these pollutants will cease. Rolling back these limits without adequate justification that such limits are no longer warranted violates the CWA and may serve to threaten the environment; deleting the requirement to even monitor for these pollutants further threatens public safety and the environment by eliminating the only means by which the public can determine whether these discharges are still occurring or not. DEQ should retain all monitoring requirements and limits imposed during the previous term in order to comply with the law and protect the environment and public health from the unmonitored or unlimited releases of pollutants of concern.

Response: There is no requirement in the CWA or the MWQA that the discharge of the pollutants must "cease" before an effluent limit may be removed or relaxed. See responses to individual pollutants below. The fact sheet documents the rationale for finding that ammonia, lead, and zinc do not exhibit reasonable potential to exceed the water quality standards.

The draft permit does not delete monitoring for any of the three pollutants listed. Ammonia monitoring continues at the frequency required in the previous permit. Lead and zinc monitoring were reduced from monthly to quarterly because in both cases the majority of monthly monitoring results were below laboratory detection limits, and the few sample results where lead or zinc was detected were below the water quality standard. More frequent monitoring is unnecessary. See Monitoring Requirements of the final permit.

No change is made to the permit in response to this comment.

Comment 15: *Ammonia* – The permit removes effluent limits and reduces monitoring limits for this pollutant of concern. The fact sheet tries to support this decision by a mathematical algorithm, Fact Sheet at pp.13, but does not reconcile why the 2009 previous permit limits are no longer applicable aside from using its mathematical exercise. Further, the mathematical algorithm is incomplete in that it does not contemplate early life stages of salmonid life or salmonid presence in the acute and chronic conditions, respectively, thereby skewing results, *see* Table 7, Fact Sheet at pp.13. DEQ should presume that as per the standard designation of Prickly Pear Cr as an "I" waterway that salmonids are present in the receiving water, and therefore a conservative, more protective assumption should be made.

Response: As discussed in the fact sheet, reasonable potential to exceed the ammonia water quality standards was assessed using the EPA's *Technical Support Document for Water Quality-based Toxics Control* (TSD). The TSD is a robust, statistically driven approach for assessing reasonable potential and developing water quality-based effluent limits. It accounts for sample size and effluent variability to determine a projected maximum effluent concentration for comparison to the water quality standards. The TSD projected maximum effluent concentration did not exceed the water quality standard for ammonia at the point of discharge without considering dilution in the receiving water.

The reasonable potential assessment considered the presence of salmonids and the presence of fish early life stages in the receiving water. Table 7 in the fact sheet clearly shows that the calculated acute water quality standard is based on the presence of salmonids in Prickly Pear Creek. The calculated chronic standard is based on the presence of fish early life stages.

No change is made to the permit in response to this comment.

Comment 16: ...because ammonia is toxic to aquatic life, DEQ must explain why the particular algorithm and its results, as-applied, are protective of aquatic life in the receiving water. The Fact Sheet does not do this – it only recites abstract model numbers without applying the estimated concentration of ammonia and relative pH in the receiving waterway which, as DEQ should know, is impaired for nutrients and suffers from low flows and de-oxygenation pollution, pollution issues that can interact in a negative, synergistic fashion with ammonia from wastewater. DEQ must explain why its modeling does not create reasonable potential of water quality violations in an impaired receiving water that is less than 10 CFS, when the discharge contains synergistic and toxic pollutants of concern, and when the discharge to the braided side- channel of Prickly Pear – not the mainstem itself – will not result in a de facto dead zone of ammonia that precludes viable aquatic life. Further, DEQ must explain why the actual receiving water – a braided side-channel to Prickly Pear – is not used in terms of modeling ammonia for the purposes of reasonable potential; using a larger volume of water that exists downstream, not at the receiving water, is an error. DEQ's ammonia analysis is flawed and therefore DEQ must at minimum retain the old ammonia effluent limit.

Response: Since the last permit was issued, the facility was significantly upgraded. The upgraded facility produces higher quality effluent and the discharge no longer exhibits reasonable potential to exceed the water quality standard at the end of pipe. No consideration for dilution in the receiving water is needed. The maximum reported ammonia concentration was 1.32 mg/L and the TSD maximum projected effluent concentration is 1.65, which is less than half of the chronic early life stages present aquatic life standard. Since the water quality standards for ammonia are based on toxicity to aquatic life and the maximum effluent concentration is less than the standard, toxicity due to ammonia is not expected.

The fact sheet applies the 75th percentile of actual pH and temperature measurements from Prickly Pear Creek to establish the water quality standards. See the fact sheet discussion beginning on page 12.

The facility discharge was subject to WET testing in the previous permit cycle and passed all toxicity tests. WET tests are used to assess the potential for unintended synergistic effects. Ammonia is not a persistent chemical; it rapidly volatilizes and changes once discharged. The discharge either complies with the water quality standards or has effluent limits in place in circumstances where reasonable potential to exceed a stand has been established.

The comment seems to imply that DEQ granted a mixing zone for ammonia or based its assessment on dilution in the receiving water. This is not the case. The discharge does not exceed the standard at the end of pipe. No mixing zone is necessary for ammonia. When an existing discharge can achieve the water quality standard at the end of pipe, it is not necessary to account for the concentration of that parameter in the receiving water.

No change is made to the permit in response to this comment.

Comment 17: *Nitrate + Nitrite* – The human health criteria for nitrate is 10mg/L, but aquatic life are adversely affected by much lower levels of nitrate (MT waterways typically contain natural concentrations <1 mg/L Nitrate). DEQ does not address the difference in criteria for nitrate for human health consumption in drinking water vs. nitrate effects on aquatic life and water quality.

Response: DEQ assess the reasonable potential for the effluent to cause or contribute to an exceedance of all applicable water quality standards. The most stringent standard for nitrate plus nitrite is the human health standard, which was used in DEQ's reasonable potential analysis.

No change made to the permit in response to this comment.

Comment 18: …previous monitoring indicates nitrate levels as high as 29.4 mg/L, which should reasonably compel the agency to take a hard look at the conspicuously high nitrate levels being discharged to a low-flow receiving water. DEQ's reasonable potential analysis is flawed on the basis of using the incorrect concentration for nitrate and must be re-assessed. This is particularly true for the receiving waterway which suffers from eutrophication and other nutrient pollution-caused issues with which the WWTP's discharges synergistically interact. DEQ must take a hard look at its calculations and data available to the agency and use proper science in determining the applicable WQBEL; removing the nitrate effluent limit as proposed is unlawful and arbitrary and violates anti-backsliding.

Response: DEQ's RP analysis used the maximum effluent concentration of 29.4 mg/L and applied the TSD method to assess reasonable potential. The TSD has been in use for nearly 30 years and is an established statistical method for assessing RP and developing permit limits. It includes conservative assumptions to ensure the receiving water body and its beneficial uses are protected. For example, the TSD approach assumes the pollutants are conserved meaning no decay or attenuation.

The background concentration of nitrate plus nitrite was 0.22 mg/L. Please refer to the fact sheet page 13 and Attachment B.

DEQ did not remove a nitrate plus nitrite limit. The previous permit did not have a limit. Anti-backsliding considerations does not apply.

No change is made to the permit in response to this comment.

Comment 19: *Oil & Grease* – There is no record evidence indicating the WWTP is no longer discharging this pollutant of concern; rather, there is evidence that the WWTP is discharging less than the previous effluent limit, which was only taken once-per-month. Once-per-month is not a representative sample of the character of the discharge by any statistical accounting method (1/30 days is not representative). It is error for DEQ to rely on a small dataset without confirming with representative data that oil and grease are no longer being discharged and are abated, and this flawed conclusion is not one of the regulatory exceptions removal of this effluent limit under antibacksliding rules. DEQ must retain the permit's oil & grease effluent limit.

Response: Please refer to the fact sheet, page 12. Monitoring requirements for oil and grease demonstrate effluent concentrations below the previous permit limit and oil and grease was not detected in any sample analyzed over the period of record.

Regarding anti-backsliding, please refer to the response to Comment 13. The facility completed a significant upgrade since the issuance of the previous permit. The discharge furthermore does not exhibit RP to exceed the water quality standard. The permit continues to require effluent monitoring.

No change is made to the permit in response to this comment.

Comment 20: Nutrients - The draft permit fails to incorporate the applicable WLA for the WWTP during the non-seasonal period and incorrectly applies an effluent limit per the NNC variance during the growing season, violating antibacksliding and failing to ensure the WWTP's discharges do not cause or contribute to violations of water quality standards, *see* 40 CFR 122.44.

The Lake Helena TMDL contemplates a WLA of 1.23 mg/L TN, and .03 mg/L TP for the WWTP, or 4.4 lb/day TN and .1 lb/day TP. The record indicates representative concentrations of nutrients from the WWTP are 21 mg/L TN and 1.5 mg/L TP, annually. In the summer season concentrations average 12 mg/L and 1.4 mg/L respectively. All of these concentrations are above the variance limits in Circular 12-A of 10 mg/L TN and 1 mg/L TP. DEQ uses its coefficient of variation in determining Highest

Attainable Condition, resulting in concentrations of 15.5 mg/L TN and 1.5 mg/L TP as monthly average values. The permit then calculates mass based loads using these HAC monthly averages.

The proposed nutrient loads are unlawful and incorrect because the HAC values violates the prohibition against antibacksliding. In supporting documents for application of 12-A values and the 12-B variance, as well as EPA's most recent approval letter for Montana NNC, it is clear that the calculation of HAC values may not result in sanctioning WWTP effluent limits less than previously maintained pollutant concentrations. Here, the record shows the WWTP has actually achieved seasonal concentrations of nutrients less than the alleged HAC; therefore those previously attained limits are the proverbial ceiling, and an HAC that purports to allow more pollutant discharges is unlawful under federal and state law.

Further, aside from the seasonally applicable NNC-based effluent limits theoretically covered by a variance, the Permit incorrectly applies TN and TP limits that do not reflect the assumptions of WLAs. The Fact Sheet indicates that the 2009 effluent limits for TN and TP are far above the WLAs for these pollutants of concern, and for good reason: both the receiving water and downstream Lake Helena are seriously impaired for nutrient pollution and consistent fail to provide for aquatic life beneficial uses. DEQ has not adequately explained or supported why far less stringent nutrient effluent limits are allowable for the non-summer season under the draft permit when the Lake Helena TMDL estimates dramatic reductions in point-source nutrient pollution is required from the WWTP (e.g., the permit contemplates load-based volumes of nutrient discharges based on 15.5 mg/L TN and 1.5 mg/L TP whereas the WLAs contemplate 1.23 mg/L TN and .03 mg/L TP).

DEQ's NNC variance theoretically allows the seasonal exceedence of the assumptions of the WLAs, but that does not relieve DEQ of the obligation to explain why the WLA assumptions do not apply in the rest of the year when less-stringent variance limits do not apply. On the whole Waterkeeper disagrees with DEQ's assertion in the Fact Sheet that the proposed nutrient effluent limits comport with the assumptions of WLAs and phased nutrient reductions under the Lake Helena TMDL. As point of fact, they do not jibe.

Rather, DEQ's permit would sanction more – not less – nutrient pollution than contemplated under numeric expressions of WLAs, and the proposed Pollutant Minimization Plan factually contains no substantive requirements to further reduce nutrient pollution beyond existing levels (which have been maintained for a decade, and which the TMDL contemplates dramatic reductions). The alleged "adaptive management strategy" of this approach to nutrient reductions offers zero surety of any future pollutant reductions as contemplated by the TMDLs because there is no guarantee the driver of the HAC values – economic factors – will change, thus in effect sanctioning for at minimum the 15 year balance of the NNC variance nutrient pollution above and beyond that level deemed necessary by science to improving impaired water quality in the Lake Helena watershed and Prickly Pear Cr.

The fact that variances are reviewed every three years offers no guarantee that actual effluent limits will, as contemplated under applicable TMDLs, result in progressively more stringent effluent limits for the WWTP. In fact, before the NNC variance the same supposition was in effect, yet DEQ did not ratchet down effluent limits for nutrients, and now proposes weaker effluent limits than those previously achieved. Doing so violates the prohibition against antibacksliding, is not consistent with assumptions underlying applicable TMDLs, and fails to ensure the discharges will not cause or contribute to violations of water quality standards.

Response: The fact sheet develops waste load allocations and water quality based effluent limits based on the numeric nutrient criteria found in Circular DEQ-12A to demonstrate the applicability of a variance for total nitrogen and total phosphorus. The water quality based effluent limits based on the WLA developed in the fact sheet are used illustrate that the facility cannot achieve WQBELs based on the numeric nutrient criteria and that East Helena is eligible for a nutrient variance.

DEQ's Circular-12B specifically allows discharges with an approved TMDL WLA to receive a variance as stated on page 2 of DEQ Circular-12B. "In a permitted discharge, the interim limits provided for under a variance apply, even if such limits differ from those that might otherwise apply based on a wasteload allocation derived in a Total Maximum Daily Load (TMDL). The interim limits apply during the time period over which the variance is applicable".

Similarly, the anti-backsliding provisions do not apply to a discharge that has effluent quality better than an existing permit's limits. Anti-backsliding is only considered when comparing proposed effluent limitations to effluent limitations in the previous permit. The draft permit does not relax any existing effluent limitations on total nitrogen (TN) or total phosphorus (TP) from the previous permit. Thus, anti-backsliding does not apply to the TN and TP limits in the draft permit and there is no violation of the anti-backsliding provisions of the CWA.

DEQ adopted, and EPA approved, a general variance for TN and TP numeric nutrient criteria. A water quality standard variance serves as the applicable water quality standard for implementing NPDES permitting requirements pursuant to 40 CFR 122.44(d) for the term of the variance. DEQ developed effluent limits in the draft permit in accordance with the approved general variance. As such the draft permit does not fail to ensure that the discharge does not cause or contribute to an exceedance of a water quality standard.

The permit issued to East Helena requires the DEQ Circular-12B Table 12B-1 values to be met immediately. The Table 12B-1 values represent the current variance standard and are based upon the recognized substantial and widespread economic impact that would occur should East Helena be required to install technology beyond that which is required to meet the Table 12B-1 values. The Table 12B-1 values are an interim step, as technology, treatment capabilities, and economics improve the Table 12B-1 values will become more stringent.

For TN, as described on pages 15 and 16 of the fact sheet, DEQ developed load based on the Table 12B-1 values and compared these to the year-round limits in the 2009-permit based on the TMDL WLA. DEQ found the TN limit based on the TMDL WLA to be more stringent and found East Helena able to achieve this load and will continue to apply this limit to East Helena's discharge year-round.

For TP, as described on page 16 of the fact sheet, DEQ developed effluent limits based on the Table 12B-1 values and compared these to the year-round limits in the 2009-permit based on the TMDL WLA. DEQ found the TP limit based on the Table 12B-1 values to be more stringent than the TMDL WLA and applies the Table 12B-1 limit during the months that the numeric nutrient standard applies and retained the TMDL-based effluent limit during the rest of the year (October through June).

No change is made to the permit in response to this comment.

Comment 21: Chlorine – Unlike other removals of effluent limits under the draft permit, the removal of TRC does not violate antibacksliding because there is proof that chlorine is not used by the dischargers nor present in its waste streams, and therefore is not necessary and may be removed under antibacksliding regulations.

Response: No change is made to the permit in response to this comment.

Comment 22: Arsenic – DEQ only analyzes arsenic with regard to MCLs for humans, and fails to consider effects on aquatic life. Readily available science indicates that consistent arsenic exposure of freshwater aquatic organisms leads to bioaccumulation, notably in liver and kidneys. This impact manifests as hyperglycemia, depletion of enzyme activities, and various acute and chronic toxicity, and immune system dysfunction. Furthermore, DEQ's 2006 Lake Helena TMDLs – which address arsenic pollution in part – recognize that bottom-feeders in the aquatic life cycle are more susceptible to arsenic pollution than other organisms in the food chain, and therefore fish are particularly at-risk from the introduction or reintroduction of arsenic. DEQ fails to identify the threat that discharges of arsenic from the WWTP may cause or contribute to as regards aquatic life in receiving waters and their downstream stretches. This is legal error and arbitrary and capricious as DEQ must address all the discharge's effects on beneficial uses, not just human health criteria.

Response: DEQ performed the RP analysis for arsenic using the lowest applicable water quality standard; which for arsenic is the human health standard of 10 μg/L. Water quality standards cannot be changed through permit actions. The highest arsenic concentration reported in the facility effluent (before discharge to the receiving water) was 19 μg/L and the TSD projected maximum effluent concentration is 28 μg/L. The acute aquatic life water quality criteria for arsenic is 340 μg/L and the chronic criteria is 150 μg/L. The aquatic life criteria account for the tendency of arsenic (and other parameters) to bioaccumulate. Reasonable potential to exceed any of the arsenic water quality standards does not exist (human health, acute or chronic). Therefore, the permit does not include a water quality-based effluent limit.

No change is made to the permit in response to this comment.

Comment 23: *Copper* – DEQ proposes to weaken copper effluent limits for the POTW because (a) there is allegedly a larger dilution capacity in the receiving water than previous permit terms, and (b) the POTW has implemented new technology that has reduced metals discharges.

First, and as discussed below, we disagree with DEQ's characterization of Prickly Pear Cr as possessing substantially different flows than previously. To begin, flows in the waterway vary dramatically based on seasonality; DEQ only shows data indicated that summer low-flows related to irrigation withdraws have been modified to retain more than zero flow during that season. For the rest of the year there are still low flows in Prickly pear necessitating conservative assumptions in all modeling.

Furthermore, the creek is impaired for copper, meaning a mixing zone should not be contemplated, particularly because copper is a bioacumulative toxin where it is not the discharge per day but the consistent exposure to the pollutant which increases harm to aquatic life, and because the expected discharge concentrations could be as high as 18.5 micrograms per liter, which exceeds the acute and chronic limits for arsenic in code. Even though metals POTW technology has been installed lessening discharges of those POCs, these pollutant discharges are not abated, and in fact continue and can exceed WQS criteria. The antibacksliding exception (o)(2)(A) does not apply here because while facility changes occurred, the resultant pollutant discharges are not at levels below action levels, and therefore the POTW still possesses reasonable potential to cause or contribute to copper WQS violations in Prickly Pear Cr.

Response: As stated in the fact sheet, the re-watering project on Prickly Pear Creek has been ongoing since 2008. DEQ reviewed years of flow data collected during this project and compared it to historical flow records from an upstream USGS gaging station. The fact that the re-watering project has resulted in additional flow during the irrigation season, which was the historic low flow period for the affected stream reach, is well documented. The fact that the stream now flows when previously it went dry means Prickly Pear Creek possesses substantially different flows than previously. This previous dewatered condition was the basis for the previous permits effluent limitations. The new low flow condition therefore represents new information not available when the previous limits were developed and satisfies one of the CWA section 402(o)(2) anti-backsliding exceptions.

Also, as stated in the fact sheet, the facility underwent significant upgrade to improve metals treatment since the previous permit was issued. This upgrade satisfies a second CWA section 402(o)(2) exception.

The permit limits in the fact sheet were developed using the new information regarding the facility's effluent quality and new information regarding the receiving water conditions. DEQ agrees with the comment in that the facility still exhibits reasonable potential to exceed the acute water quality standard for copper and effluent limits are necessary. The limits were developed following the TSD approach with conservative and protective assumptions, which is standard procedure in MPDES permits. The new limits in the permit are justifiably relaxed from the previous permit and will comply with the water quality standards after allowable mixing.

See also the response to Comment 22.

No change is made to the permit in response to this comment.

Comment 24: *Lead & Zinc* – Similar to copper and arsenic discussed above, the fact that a facility is discharging less of a POC and discharge concentrations are not expected to exceed any water quality criteria does not mean that the effluent limit for such pollutant should be removed from the permit. Rather, a facility discharging a pollutant at levels less than a water quality criterion can still cumulatively and indirectly contribute to violations of water quality standards downstream for such POC. When a receiving water way is impaired for such POC – such as Prickly Pear Cr - the sensitivity to the potential to indirectly contribute to ongoing impairment should be of concern to regulators and the permittee.

Here, DEQ does not address this scientific reality in its Fact Sheet or Permit, and in fact makes a conclusory statement that, for example, lead discharges from the facility are not contributing to waterway impairment (even though 4 of apparently 35 samples exhibited lead approaching action levels) and therefore the decision to remove the limit is not supported by the record and is unreasonable. The same rationale supports the retention of effluent limits for zinc under the permit; available evidence shows the POTW is still discharging zinc, although not at levels exceeding the applicable criteria. There exists reasonable potential for this discharge, in conjunction with other inputs downstream, to cause or contribute to violations of water quality standards because of the bioaccumulative nature of metal pollutants where impacts are measured over otherwise long distances of time and geography. *See* CWA Section 402(o)(3); 40 CFR 122.44(l)(2)(i)

With toxics and carcinogenic pollutants the precautionary approach should prevail, and effluent limits should remain in permits (and lead and zinc should retain effluent limits for the E Helena POTW) in order to ensure point sources do their fair share to in fact reduce pollution; this was the very point of the prohibition against antibacksliding in the Clean Water Act.

Response: Please refer to the response to Comments 13, 22, and 23. Lead and zinc did not exhibit reasonable potential to exceed the water quality criteria at the point of discharge without consideration of dilution in the receiving water. There is no requirement in the CWA or MWQA that DEQ must impose a water quality-based effluent limit for a parameter that does not have RP. DEQ's RP analysis used the TSD method to assess reasonable potential. The TSD has been in use for nearly 30 years and is an established statistical method for assessing RP and developing permit limits. It includes conservative assumptions to ensure the receiving water body and its beneficial uses are protected. For example, the

TSD approach assumes the pollutants are conserved meaning no decay or attenuation. Effluent monitoring is retained in the permit.

No change is made to the permit in response to this comment.

Comment 25: *WET Testing* – the POTW still discharges metals, just not the same volumes or concentrations of metals as before facility upgrades. Therefore there is still a reason to require the permittee to test for metals and toxicity; i.e., to ensure the permittee upgrades continue to work, and to have scientific datapoints to validate the effluent limits for the permittee.

Response: Please refer to the fact sheet discussion. East Helena is a smaller volume discharger (Minor POTW) without an EPA required pretreatment program and no significant industrial contributors and therefore, discharges domestic waste water. Quarterly tests over the life of the previous permit resulted in no WET test failures. The discharge does not exhibit reasonable potential for WET. WET tests are not necessary here.

No change is made to the permit in response to this comment.

Comment 26: In summary, the Fact Sheet and Permit fail to reflect a hard look at the pollutants of concern proposed to be dropped from effluent limits for the POTW. DEQ must, at a minimum, support its decisions to remove effluent limits by performing the hard look at antibacksliding requirements and nondegradation requirements mandated under the Clean Water Act. For the Department's edification we attach here EPA's suggested review matrix, taken from the NPDES Permit Writers' Manual (2010). Tellingly, DEQ's draft permit did not undertake the necessary analyses, or support the necessary findings, as EPA has instructed for antibacksliding and antidegradation, and therefore DEQ should revise the E Helena POTW permit to retain all previous effluent limits, including monitoring limits.

Response: The comment, as well as several previous comments, misinterprets and/or misapplies the anti-backsliding provisions of the CWA. DEQ considered anti-backsliding in each case where an effluent limitation was removed or relaxed from the previous permit. See responses to previous comments regarding anti-backsliding. The "EPA suggested review matrix" submitted in the comment, when considered along with the rest of section 7.2 in the EPA NPDES Permit Writers' Manual, demonstrates that where an effluent limit is based on a state standard and where any 402(o)(2) exception applies, and where the revised limit complies with the water quality standards, as is the case in this permit, the revised limit is allowed.

No change is made to the permit in response to this comment.

Comment 27: The draft permit proposes the use of mixing zones for nearly every single pollutant discharged by the POTW. Waterkeeper opposes the use of mixing zones for any pollutant that is bioaccumulative and/or toxic, carcinogenic (all metals in the permit plus nutrients), and likewise opposes the use of mixing zones for any pollutant for which the receiving waterway is already impaired (copper, lead, zinc, arsenic, TP, TN, nitrate, and ammonia). Indeed, in a 303(d) listed waterbody, the diluting water is itself impaired, so dilution will not accomplish much, if anything. Further, for the 303(d) listed pollutants that are bioaccumulative, even denying dilution is not sufficient, since the mass, not the concentration, of these chemicals is the primary concern.

DEQ has not adequately explained why mixing zones are proper for the POTW given the pollutants at issue and the impairment status of the receiving waterway, and the lack of progress since the implementation of applicable TMDLS over a decade prior. This lack of comprehensive review or probing analysis renders the reliance on mixing zones arbitrary and unsupported by the record.

Response: The fact sheet considers mixing zones for arsenic, copper, lead, zinc, nutrients, and nitrate plus nitrite. During the fact sheet analysis, it was shown that lead and zinc do not require dilution to achieve all water quality criteria so no mixing zone was granted for those pollutants. Arsenic and nitrate plus nitrite did not exhibit RP and WQBELs were not necessary so a mixing zone was not included in the draft permit for these parameters. The draft permit grants mixing zones for copper and nutrients. The draft permit does not grant mixing zones or dilution for oil and grease, *E. coli*, ammonia, aluminum, antimony, cadmium, lead, and zinc because the discharge achieves the water quality criteria at the end of pipe. In addition, no mixing zone is granted for 5-day biochemical oxygen demand, total suspended solids, or pH, as these pollutants of concern are subject to technology-based effluent limits, which must be met without dilution.

The use of mixing zones is allowed as specified in the Administrative Rules of Montana (ARM) 17.30.501 – 518. The permittee submitted a mixing zone request and satisfied the requirements of ARM 17.30.506. All mixing zones in the draft permit were granted as required by the rules. Recent data collected over the previous permit cycle shows that the stream has assimilative capacity for many parameters, which allows the granting of mixing zones when the other 17.30.506 requirements are met.

No change is made to the permit in response to this comment.

Comment 28: As a point of administrative law, we also note that DEQ is without authority to process the City of E. Helena's request for mixing zones because, under DEQ's own regulations, the onus lies on the applicant to provide data supporting the grant of a mixing zone. Further, we take issue with not only DEQ's grant of mixing zones for nearly all pollutants of concern under the permit, but also that DEQ contemplates granting a standard or source specific mixing zone to allegedly account for acute or chronic aquatic life criteria without supporting its conclusory statements that such mixing zones are "appropriate and will not threaten or impair beneficial uses." Not only does the record reflect little to no evidence supporting these conclusions, but available evidence actually shows continued 303d impairment of receiving waterways for the very pollutants being discharged, and that the discharge occurs to only a portion of Prickly Pear Cr (with less than half the dilution of the mainstem Cr), meaning if anything there is no dilution capacity for mixing zones.

DEQ fails to take any of these nuances into account and instead simply adopts the largest possible mixing zone for each pollutant; these actions do not pass the "laugh" test, are not based on the record, and violate DEQ's own rules for when it may grant a mixing zone and therefore the permit may not include mixing zones.

Response: As noted in the previous response, the City of East Helena did submit a mixing zone request and provided the information required by ARM 17.30.506. The mixing zone request was submitted on February 26, 2018, and is in the administrative file.

The comment continues the erroneous assertion that DEQ granted a mixing zone for "nearly all pollutants of concern." See the previous response and note that DEQ provided a mixing zone for a limited number of the pollutants analyzed during permit development.

The data DEQ considered in the permit development shows there is assimilative capacity for the pollutants granted a mixing zone.

DEQ policy requires that MPDES permits apply the receiving water's entire available dilution flow irrespective of the randomly shifting nature of the stream channel.

No change is made to the permit in response to this comment.

Comment 29: The permit proposes a PMP and optimization strategy that, rather than setting up the POTW for future pollutant reductions, in fact maintains the status quo.

Specifically, the permit only requires (1) continued aeration cycling for denitrification (to reduce TN); (2) continue existing tertiary treatment process; document existing management strategies "as applicable" (list of potential activities given, but no requirement to do any/all, reliance on best professional judgment); and to submit a one-page summary of annual treatment activities, evaluation of those activities in reducing nutrient pollution, and propose next year's nutrient controls.

We fail to understand how continuing the same operational strategies as prior permit terms, without explicit requirements to try new/novel techniques or to impose goal-posts for ideal performance on permittees, satisfies the intent behind 131.3(p)'s PMP program; "in the context of 131.14, [a PMP] is a structured set of activities to improve processes and pollutant controls that will prevent and reduce pollutant loadings." When this unambiguous language is contrasted with the draft permit terms noted above, the discrepancy between the mandatory reduction in pollutant loadings envisioned under 131.3(p) and the lack of progress mandated by the draft permit is stark.

For example, a legally sufficient PMP should require, among other items: (1) the identification of best strategies capable of reducing pollutant loading with existing infrastructure and mechanicals; (2) the methodological use of various strategies and treatments, in a documented fashion, and recording of results in pollutant reduction efficacy; (3) consistent monitoring of results. Further, the plain language of the PMP in requiring just a one-page summary of annual activities, reflection, and plans for the following year demonstrates that DEQ views the PMP as an empty gesture towards actually making progress in achieving any type of pollutant reductions via the PMP, contrary to the plain language of EPA's PMP regulations. The draft permit's PMP should be substantially revised to contemplate both the identification of best practices, a methodological approach to trying alternative treatment techniques, iterative monitoring and mid-year management/adjustment to account for progress or the lack thereof, and goal posts for pollutant reduction to guide such efforts. The PMP's failure to follow the plain language of applicable EPA regulations renders it unlawful.

Response: A Pollutant Minimization Plan (PMP) is a structured set of activities to improve processes and pollutant controls that will prevent and reduce pollutant loadings. DEQ disagrees that the status quo is maintained. DEQ further disagrees that a PMP is an empty gesture. The comment misunderstand the purpose of a PMP. A PMP must be implemented after a recognition that no additional feasible pollutant control technology can be identified. A PMP does not require the development or installation of new treatment technologies. A facility must implement a PMP by improving the efficiency of the pollutant control technologies installed at the time the state adopts the variance standard.

The City of East Helena spent approximately 5 million dollars to upgrade the facility since the issuance of the previous MPDES permit. The technology selected for the upgrade was primarily for improved metals treatment. However, a strong secondary consideration was improved nutrient treatment. The city, DEQ, and a private wastewater treatment/optimization consultant worked together in 2017 to identify treatment strategies for reducing nutrient concentrations in the facility discharge. These strategies have been in use by the city, on a voluntary basis, since that time. The draft permit makes their continued implementation an enforceable permit condition.

The comment's numbered points for a "legally sufficient PMP" are addressed in the PMP language of the draft permit. (1) the PMP language requires the city annually to identify nutrient control measures implemented, evaluate their effectiveness, and propose new nutrient reduction measures for the upcoming year. (2) the PMP language requires the city to continue to maintain documentation of a variety of operational strategies identified in 2017 that are effective toward reducing nutrient concentrations. The city is required to document implementation of these strategies in the facility operation and maintenance manual. (3) the permit requires nutrient monitoring and requires East Helena to perform the operational strategies identified in the permit.

The language requiring the submission of a one page annual summary is in addition to on site documentations the city must maintain. DEQ will revise the permit to remove the requirement that the annual report be limited to no more than one page.

Rather than an "empty gesture" DEQ's PMP requirements make it an enforceable permit requirement that the city continue implementing the improvements identified to date.

DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY DIVISION
MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM (MPDES)

Fact Sheet

PERMITTEE:	City of East Helena
PERMIT NUMBER:	MT0022560
RECEIVING WATER:	Prickly Pear Creek
FACILITY INFORMATION:	
Name:	City of East Helena Wastewater Treatment Plant
Location:	3330 Plant Drive East Helena, MT 59635
Contact:	Steve Leitzke, Wastewater Superintendent P.O. Box 1170 East Helena, MT 59635
FEE INFORMATION:	
Number of Outfalls:	1 (for fee determination purposes)
Type of Outfall:	001 – Minor, Publicly-Owned Treatment Works (POTW), aerated, activated sludge mechanical with UV disinfection, metals treatment and continuous discharge to surface water.

Summary of changes from the 2009 permit proposed in this Fact Sheet:

- Ammonia limits are removed
- Total residual chlorine limits are removed
- The limits for lead and zinc are removed
- Effluent and instream monitoring for several metals are removed
- Requirements to monitor dissolved oxygen, temperature and hardness in the effluent are removed
- The requirement to conduct whole effluent toxicity (WET) testing is removed
- The copper limit is relaxed
- Limits on total nitrogen and total phosphorus are revised to reflect nutrient variance regulations and to incorporate the requirement to implement a Pollutant Minimization Plan

I. Permit Status

The current Montana Pollutant Discharge Elimination System (MPDES) permit for the City of East Helena Wastewater Treatment Plant (WWTP) became effective on October 1, 2009. It expired September 30, 2014. The Montana Department of Environmental Quality (DEQ) received an application and fees for renewal of MT0022560 on June 25, 2014. DEQ deemed the application complete, and the 2009-issued permit was administratively extended in a letter dated June 25, 2014.

II. Facility Information

A. Facility Description

The East Helena WWTP serves the residents and businesses of the City of East Helena and surrounding area with service to an estimated population of 2,085 (2014 renewal application). The WWTP is an aerated, activated sludge, Biolac treatment system, with metals removal and seasonal UV disinfection. The facility discharges to Prickly Pear Creek via Outfall 001. The present facility design flow is 0.44 million gallons per day (mgd). Minimum detention time is 16.2 hours (Robert Peccia & Associates 1986 and HDR Engineering, Inc. 2002 Operation and Maintenance Manuals). The effluent is disinfected seasonally (April through October) using ultra-violet (UV) light.

Effluent flow monitoring occurs prior to the UV disinfection system (See Attachment A). Water for irrigation of facility grounds and plant non-potable water use are drawn off after the final effluent flow monitoring point. Table 1 is a summary of the East Helena WWTP design criteria from the Robert Peccia & Associates 1986 and HDR Engineering, Inc. 2002 Operation and Maintenance Manuals.

Table 1. Current Design Criteria Summary – East Helena WWTP	
Facility Description: Continuous discharge, mechanical, Bio-Lac activated sludge treatment system with, metals removal, UV disinfection and aerobic sludge storage.	
Construction Date: 2002. Metals removal completed in 2014.	Modification Date: NA
Design Year: 2021	
Design Population: 3,578	Population Served: ~2,000
Design Flow, Average Daily (mgd): 0.44	Design Flow, Peak Daily (mgd): 1.48
Minimum Detention Time (Activated Sludge System): 16.2 hours	
Design BOD Removal (%): 94	Design Load (lb/day): 576 lb/day
Design TSS Removal (%): 91	Design Load (lb/day): 608 lb/day (192 mg/L)
Collection System: Combined [ ] Separate [X]	
SSO Events (Y/N): yes	Number: one
Bypass Events: none reported	Number: NA
Inflow and Infiltration contribution (mgd): 0.010	Source: Inflow from curbs and gutters during run-off events

Disinfection: Yes	Type: UV
Discharge Method: Continuous	
Effluent Flow Primary Device: v-notch weir and staff gauge installed prior to plant non-potable water and irrigation draw off points.	
Effluent Secondary Flow Device: TN Tech Ultrasonic meter	
Sludge Storage: aerobic digester/stabilization	

The City of East Helena does not have a pretreatment program.

Inflow and Infiltration (I/I) is estimated at 0.3 mgd during run-off events and when Prickly Pear Creek is frozen. The City continues to try to locate the source(s) of I/I, but has not found them (2014 renewal application).

Biosolids are land applied on agricultural fields.

B. Effluent Characteristics

DEQ used June 2014 through August 2017 as the Period of Record (POR) for effluent characterization. This time frame is selected because the City of East Helena added a metals removal facility and brought it online in June 2014. Effluent data prior to that date is no longer representative of the facility's effluent quality. Data from the facility Discharge Monitoring Reports (DMR) for the POR are summarized in Table 2.

Table 2. DMR Effluent Characteristics for POR June 2014 through August 2017.

Parameter	Location	Units	Previous Permit Limit	Minimum Value	Maximum Value	Average Value	Number of Samples
Flow, Daily Average	Effluent	mgd	(1)	0.13	0.78	0.25	39
Biochemical Oxygen Demand (BOD_5)	Influent	mg/L	(1)	50.6	334	168	39
	Effluent	mg/L	45/30 (2)	2.5	65	5.1	39
	Effluent	% removal	85	94	99	97	39
	Effluent	lb/day	163/109 (2)	3.1	33	9.9	39
Total Suspended Solids (TSS)	Influent	mg/L	(1)	56	821	163	39
	Effluent	mg/L	45/30 (2)	4.0	104	5.6	39
	Effluent	% removal	85	89	99	96	39
	Effluent	lb/day	163/109 (2)	4.1	45	11	39
E. coli Bacteria (5)	Effluent	#/100 mL	252/126 (7)	1	16.5	3.7	23
E. coli Bacteria (6)	Effluent	#/100 mL	1260/630 (7)	1.1	53	4.3	15
pH	Effluent	s.u.	6.5-9.0	6.5	8.9	8.0	39
Temperature	Effluent	°C	(1)	2.6	22	11.2	39
Total Ammonia as N	Effluent	mg/L	1.72 (4)	<0.05	0.13	1.32	39
Total Kjeldahl Nitrogen	Effluent	mg/L	(1)	0.4	2.8	1.0	39
Nitrate + Nitrite as N	Effluent	mg/L	(1)	5.5	29.4	13.0	39
Total Nitrogen (TN) (9)	Effluent	mg/L	(1)	4.5	45.1	13.5	39
		lb/day	75.8/53.3 (2)	10.4	62.6	26.2	39
Total Phosphorus as P (TP)	Effluent	mg/L	(1)	0.09	1.75	0.69	39
		lb/day	16.5/11.2 (2)	0.35	4.4	1.5	39
Dissolved Oxygen (10)	Effluent	mg/L	(1)	0.8	8.7	4.2	39
Aluminum, Dissolved	Effluent	mg/L	(1)	<0.03	<0.03	<0.03	13
Antimony, Total Recoverable	Effluent	mg/L	(1)	<0.001	<0.003	<0.025	13
Arsenic, Total Recoverable	Effluent	mg/L	(1)	0.004	0.019	0.0097	13
Cadmium, Total Recoverable	Effluent	mg/L	(1)	<0.00008	<0.001	<0.0001	13
Copper, Total Recoverable	Effluent	mg/L	0.014/0.009 (3)	<0.001	0.017	0.008	35
Lead, Total Recoverable	Effluent	mg/L	0.078/0.003 (3)	<0.0005	0.003	0.0006	35
Zinc, Total Recoverable	Effluent	mg/L	0.12/0.12(3)	0.01	0.04	0.02	35
Oil and Grease	Effluent	mg/L	10 (4)	<1	<1	<1	39
Hardness (as $CaCO_3$)	Effluent	mg/L	(1)	34	126	111	39

Footnotes:
(1) No effluent limit in previous permit, monitoring requirement only.
(2) Weekly Average/Monthly Average Value.
(3) Daily Maximum/Monthly Average Value.
(4) Daily Maximum
(5) Sample period is April 1 through October 31.
(6) Sample period is November 1 through March 31.
(7) Weekly Geometric Mean Value/Monthly Geometric Mean Value.
(8) Instantaneous/Daily Maximum Value.
(9) Calculated as the sum of Nitrate + Nitrite as N and Total Kjeldahl Nitrogen (TKN) concentrations.
(10) Daily Minimum

C. Compliance History

The City of East Helena was cited for multiple violations of effluent limitations and permit conditions from the 2009 permit issuance until mid-2011. Water Protection Bureau compliance staff referred the City to the DEQ Enforcement Division for enforcement in July 2011. On January 22, 2013 DEQ and the City entered into an Administrative Order on Consent (Consent Order). The City implemented corrective actions to return to compliance. DEQ determined the City had satisfied the terms of the Consent Order and terminated it on February 26, 2016.

The City was cited for failing to collect an effluent sample in March 2017. Except for this minor violation, the City has remained in compliance with the permit since the termination of the 2013 Consent Order.

III. Proposed Technology-based Effluent Limits (TBELs)

A. Applicability

The Board of Environmental Review has adopted by reference 40 CFR 133 which set minimum treatment requirements for secondary treatment or equivalent for POTW (ARM 17.30.1209).

Secondary treatment is defined in terms of effluent quality as measured by BOD_5, TSS, percent removal of BOD_5 and TSS, and pH [National Secondary Standards (NSS)]. NSS secondary treatment requirements are described in 40 CFR 133 and incorporated into all municipal permits. The 2009 permit includes NSS limitations for BOD_5, BOD_5 percent removal, TSS, TSS percent removal and pH. These limits are maintained in this permit renewal.

ARM 17.30.1345(8) requires that all effluent limitations be expressed in terms of mass except for pollutants which cannot be appropriately expressed in terms of mass.

The following equation was used to calculate mass-based loading limits in pounds per day (lb/day) using NSS limitations at the facility design flow of 0.434 mgd.

$$\text{Load (lb/day)} = \text{Design Flow} \times \text{Concentration Limit (mg/L)} \times 8.34\ (\text{lb}\cdot\text{L})/(\text{mg}\cdot\text{gal})$$

<u>BOD_5 and TSS Mass-based Load Limitations:</u>

30-day average load (lb/day) = (0.434 mgd)(30 mg/L)(8.34) = 109 lb/day
7-day average load (lb/day) = (0.434 mgd)(45 mg/L)(8.34) = 163 lb/day

Loading limits for technology-based parameters of concern (BOD_5 and TSS) will apply to the effluent and will be maintained at the more stringent of the nondegradation allocations or mass-based loading limits calculated in this Fact Sheet.

B. Nondegradation Load Allocations

The provisions of ARM 17.30.701 - 718 (Nondegradation of Water Quality) apply to new or increased sources of pollution [ARM 17.30.702(18)]. Sources that are in compliance with the conditions of their permit and do not exceed the limitations established in the permit or determined from a permit previously issued by the Department are not considered new or increased sources.

Nondegradation threshold values for the East Helena WWTP were calculated for BOD_5 and TSS as part of the permit issuance in 1997 for the previous lagoon facility (design flow of 0.635 mgd). These nondegradation load allocations are maintained to determine if the facility is a new or increased source. The actual average loads discharged from the facility for the POR are presented below in Table 3. Actual loads for BOD_5 and TSS indicate that the facility did not exceed the nondegradation load values and the facility is not a new or increased source.

Table 3. Nondegradation and Actual Loads for POR

		Nondegradation Allocated Load	Actual 30-Day Annual Average Load				
Parameter	Units	30-Day Annual Average Load	2012	2013	2014	2015	2016
BOD_5	lb/day	158	8.7	7.7	13.7	11.9	5.8
TSS	lb/day	526	15.8	12.6	17.0	11.1	6.4

C. Proposed TBELS

Table 4. Outfall 001 Proposed TBELS

Parameter	Concentration (mg/L)		Load (lb/day)	
	Weekly Average (1)	Monthly Average (1)	Weekly Average (1)	Monthly Average (1)
BOD_5	45	30	163	109
TSS	45	30	163	109
pH, s.u	Within the range of 6.0 to 9.0 (instantaneous)			
BOD_5 Percent Removal [1] (%)	85 %			
TSS Percent Removal [1] (%)	85 %			
Footnote: (1) See Definition section at end of permit for explanation of terms				

IV. Water Quality-based Effluent Limits (WQBELs)

A. Scope and Authority

The Montana Water Quality Act (Act) states that a permit may only be issued if the Department finds that the issuance or continuance of the permit will not result in pollution of any state waters. Montana water quality standards require that no wastes may be discharged such that the waste either alone or in combination with other wastes will violate or can reasonably be expected to violate any standard. MPDES permits must include limits on all pollutants which will cause, or have a reasonable potential to cause an excursion of any water quality standard, including narrative standards. The purpose of this section is to provide a basis and rationale for establishing effluent limits, based on Montana water quality standards, that will protect designated uses of the receiving stream.

B. Receiving Water

The East Helena WWTP discharges to Prickly Pear Creek (PPC) approximately 500 meters downstream of the crossing at Wylie Drive. PPC is in the Upper Missouri River watershed as identified by USGS Hydrologic Unit Code 10030101, and Montana stream segment MT41I006_030, PPC Highway 433 (Wylie Drive) Crossing to Helena WWTP Discharge.

PPC is classified "I". The goal of the state of Montana is for class I waters to fully support: drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supplies [ARM 17.30.628(1)].

The 2016 303(d) list shows this segment of the creek as not fully supporting aquatic life, primary contact recreation, drinking water, and agricultural uses. Probable causes of impairment are identified as metals (arsenic, cadmium, copper, lead, and zinc), un-ionized ammonia, temperature, sedimentation/siltation, low flow alterations, physical substrate habitat alterations, total nitrogen, total phosphorus, and alteration in stream-side or littoral vegetative covers. The probable sources of these impairments include grazing in riparian or shoreline zones, irrigated crop production, on-site treatment systems (septic and similar decentralized systems), acid mine drainage, contaminated sediments, industrial point source discharge, habitat modification (other than hydromodification), and impacts from abandoned mine lands (inactive).

In August 2006, DEQ completed the *Framework Water Quality Restoration Plan and Total Maximum Daily Loads (TMDLs) for the Lake Helena Watershed Planning Area: Volume II – Final Report* (TMDL). The TMDL established wasteload allocations (WLA) for point sources and where applicable, incorporated a phased approach and adaptive management strategy for achieving those WLA. Specifics of the TMDL, with respect to the East Helena WWTF discharge, are provided in subsequent sections of this fact sheet.

PPC, in the area of discharge, historically experienced severely depleted stream flows in summer. The 2009-issued permit established the 7-day, 10-year low flow condition (7Q10) as zero (0) cfs for the purposes of discharge limit development. In 2008 a re-watering agreement was put into effect that reduced irrigation diversions during low flow periods in this portion of the stream. This agreement has continued to the present and the Lewis and Clark Water Quality Protection District has collected flow data at the Wylie Drive bridge crossing for over ten years. DEQ used this data and compared it to the upstream USGS gage 06061500 (Prickly Pear Creek near Clancy MT) to develop 7Q10 and 14Q5 flows at the location of the East Helena WWTF discharge. For development of permit limits in this renewal, the 7Q10 is 8.34 cfs and the 14Q5 is 12.7 cfs.

Fish species present in PPC include the longnose and white suckers, rainbow and brown trout, mottled sculpin and longnose dace. Early life stages of these species can be present year-round (*Spawning Times of Montana Fishes* D.Skaar, MFWP, March 2001).

The permittee conducted permit-required upstream monitoring in PPC at a road crossing in East Helena. Data were reported on the facility DMRs.

Ambient water quality data for nutrients in PPC upstream of the WWTP discharge are minimal. The few data available were collected either at the Highway 12 or Wylie Drive road crossings. TN and TP data were obtained between 2012 and 2014.

Instream monitoring data is summarized in Table 5 below.

Table 5. Prickly Pear Creek Upstream of Outfall 001

Parameter	Units	Number of Samples	Minimum	Maximum	75^{th} Percentile
Total Nitrogen	mg/L	1	0.25	0.25	0.25
Total Phosphorus as P	mg/L	5	0.019	0.049	0.038
pH	s.u.	22	6.25	8.59	7.5
Temperature	°C	22	1	21	12
Total Ammonia as N	mg/L	22	<0.003	0.15	0.05
Total Hardness, as $CaCO_3$	mg/L	22	60	142	102 [1]
Aluminum, Dissolved	mg/L	22	0.03	0.25	0.05
Antimony, Total Recoverable	mg/L	22	0.001	0.003	0.003
Arsenic, Total Recoverable	mg/L	22	0.003	0.01	0.007
Cadmium, Total Recoverable	mg/L	22	0.00012	0.00083	0.0003
Copper, Total Recoverable	mg/L	22	0.001	0.011	0.0038
Lead, Total Recoverable	mg/L	22	0.001	0.03	0.0051
Zinc, Total Recoverable	mg/L	22	0.004	0.11	0.06

Footnotes:
(1) 25^{th} Percentile

C. Applicable Water Quality Standards

Discharges to "I" class waters may not violate the specific water quality standards listed under ARM 17.30.628(2)(a through k). In addition, discharges are subject to ARM 17.30.635 through 637, 641, 645, and 646.

D. Mixing Zone

A mixing zone is an area where the effluent mixes with the receiving water and certain water quality standards may be exceeded. The Department must determine the applicability of currently granted or proposed mixing zones. Pollutant concentrations in the effluent must meet the applicable water quality standards at the end of pipe unless a mixing zone is recognized by the Department for that specific parameter in the permit.

Acute water quality standards for aquatic life may not be exceeded in any portion of the mixing zone unless the Department finds that allowing minimal initial dilution will not threaten or impair existing uses. The discharge must also be free from substances which will:

a. settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines;

b. create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter) or globules of grease or other floating materials;

c. produce odors, colors or other conditions as to which create a nuisance or render undesirable tastes to fish flesh or make fish inedible;

d. create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life; and

e. create conditions which produce undesirable aquatic life.

Although certain standards may be exceeded in a mixing zone, an effluent in its mixing zone may not block passage of aquatic organisms nor may it cause acutely toxic conditions. No mixing zone will be granted that will impair beneficial uses. Aquatic life-chronic, aquatic life-acute and human health standards may not be exceeded outside of a designated mixing zone.

A standard mixing zone may be granted for facilities which discharge less than 1 mgd or when mixing is nearly instantaneous. Nearly instantaneous mixing is assumed if the discharge is through an effluent diffuser, when the mean daily flow exceeds the 7-day, 10-year low flow (dilution ratio <1) or when the permittee demonstrates through a DEQ approved study plan that the discharge is nearly instantaneous. A nearly instantaneous mixing zone may not extend downstream more than two (2) stream widths.

Effluent discharges which do not qualify for a standard mixing zone must apply for a source specific mixing zone and must be the smallest practicable size; have minimal effects on uses; and, have definable boundaries. A person applying for a mixing zone must indicate the type of mixing zone and provide sufficient detail for DEQ to make a determination regarding the authorization of the mixing zone under the rules of Subchapter 5.

The City of East Helena requested a mixing zone but did not specify whether the request was for a standard mixing zone or source specific. The request did not include the level of analysis DEQ typically requires for a source specific mixing zone, especially with respect to the aquatic life standards. The East Helena discharge is to a braided segment of Prickly Pear Creek. Based on observations during a site visit in autumn 2017, the immediate area of the discharge is to a channel that contains less than half of the flow of Prickly Pear Creek. This channel merges with the rest of the stream flow approximately 280 feet downstream of the discharge location.

DEQ proposes to grant a standard mixing zone for chronic aquatic life criteria and nutrients. DEQ finds that source specific mixing zones for acute aquatic life copper criteria and human health criteria are appropriate and will protect beneficial uses of Prickly Pear Creek.

Because the receiving water flow to discharge flow dilution ratio is less than 100:1 (approximately 16:1) a standard mixing zone allows dilution with 25% of the 7Q10 flow chronic aquatic life water quality criteria. A standard mixing zone for nutrients allows dilution with the entire 14Q5 flow of the receiving water. The standard mixing zone dilution flows used for reasonable potential assessment and limit development are:

> 25% of 7Q10 flow = 1.35 mgd (2.1 cfs); for chronic aquatic life criteria.
> 14Q5 flow = 8.2 mgd (12.7 cfs); for total nitrogen and total phosphorus.

A standard mixing zone does not provide a dilution allowance for acute aquatic life criteria. DEQ may allow minimal initial dilution for acute criteria only after determining that doing so will not threaten or impair beneficial uses. DEQ and EPA mixing zone guidance recommend that any mixing zone for acute criteria be no more than 10 percent of the mixing zone for chronic criteria. This 10 percent value is considered "minimal initial dilution." Ten percent of the available chronic dilution flow at the East Helena discharge location is 0.54 mgd. Because the discharge from the East Helena WWTF is so small, and the minimal initial dilution is so slight, DEQ finds that granting a source specific mixing zone for acute aquatic life criteria is appropriate and will not threaten or impair beneficial uses.

> The dilution flow for acute criteria is 0.14 mgd (0.22 cfs).

A source specific mixing zone for human health criteria is granted based on DEQ's determination that there is not a drinking water intake on Prickly Pear Creek downstream of the East Helena discharge. Allowing dilution with 100% of the 7Q10 will not impair the drinking water beneficial use. The dilution flow for human health criteria is:

> 100% of the 7Q10 flow = 5.4 mgd (8.34 cfs)

The standard and source specific mixing zones described above result in the following dilution allowances for reasonable potential assessments and WQBEL development, where necessary:

25% of 7Q10 for chronic aquatic life standards for total recoverable copper, lead, zinc.

2.5% of 7Q10 for acute aquatic life standards for total recoverable copper, lead, and zinc.

100% of 14Q5 for total nitrogen and total phosphorus.

100% of 7Q10 for nitrate plus nitrite and total recoverable arsenic

E. Basis and Proposed WQBELs

DEQ develops WQBELs for any pollutant of concern (POC) for which there is reasonable potential (RP) to cause or contribute to exceedances of instream numeric or narrative water quality standards. Pollutants and parameters are identified as POC for one or more of the following reasons:

- they have listed TBELs;
- they were identified as needing limits in the previous permit;
- they are identified as present in the effluent through monitoring or otherwise expected present in the discharge; or
- they are pollutants associated with impairment which may or may not have a WLA in a TMDL.

For the East Helena WWTF, DEQ evaluated the POC in **Table 6**.

Table 6. Identification of POC and Need for RP Analysis

Parameter	Basis for POC Identification	RP Analysis
5-day biochemical oxygen demand	TBELs, previous permit	RP not required – no standard
Total Suspended Solids	TBELs, previous permit	RP not required – no standard
pH	TBELs, previous permit	RP not required – TBEL sufficient
Oil & Grease	Previous permit	Narrative RP – ARM 17.30.637(1)
E.coli bacteria	Previous permit, known present	ARM 17.30.623-629
Total Residual Chlorine	Previous permit	Circular DEQ-7
Ammonia, as N	Known present, impairments	Circular DEQ-7, TMDL
Nitrate+Nitrite, as N	Known present	Circular DEQ-7
Total Nitrogen, Total Phosphorus	Known present, impairments	Circular DEQ-12A, TMDL
Arsenic, Total Recoverable	Known present, impairments	Circular DEQ-7, TMDL
Cadmium, Total Recoverable	Known present, impairments	Circular DEQ-7, TMDL
Copper, Total Recoverable	Known present, impairments	Circular DEQ-7, TMDL
Lead, Total Recoverable	Known present, impairments	Circular DEQ-7, TMDL
Zinc, Total Recoverable	Known present, impairments	Circular DEQ-7, TMDL

WQBELs must be developed for any pollutant for which there is reasonable potential (RP) for discharges to cause or contribute to exceedances of instream numeric or narrative water quality standards. RP calculations utilize the receiving water concentration, the maximum projected effluent concentration, the design flow of the wastewater treatment facility, and the applicable receiving water flow.

DEQ uses a mass balance equation to determine RP (*Equation 1*).

$$C_{RP} = \frac{C_d Q_d + C_s Q_s}{Q_d + Q_s} \qquad \textit{Eq. 1}$$

Where:

C_{RP} =	receiving water concentration (RWC) after mixing, mg/L
C_d =	maximum projected effluent concentration, mg/L
C_r =	RWC upstream of discharge, mg/L
Q_r =	applicable receiving water flow, mgd
Q_d =	facility design flow rate, mgd

1. Conventional Pollutants

TSS and BOD_5: The facility provides a significant reduction in biological material and solids through secondary treatment (Section III). No additional WQBELs will be required for these parameters.

Oil and Grease (O&G): The 2009-issued permit limit for O&G is an instantaneous maximum limit of 10 mg/L, with a once per month monitoring requirement. All effluent sample results over the POR were less than the laboratory detection limit of 1 mg/L. Therefore, there is no RP for this parameter. The limit is removed from the renewed permit, and monitoring is reduced to quarterly.

***Escherichia coli* Bacteria:** The 2009 permit incorporates limits based on the Montana state standards for *E. coli* bacteria at the end of the discharge pipe. The Department is not granting a mixing zone for *E. coli* based on the requirement that state waters must be free from substances that are harmful or toxic to humans. The existing permit limits and monitoring requirements are maintained in this renewal.

2. Nonconventional Pollutants

Total Ammonia as N: Total ammonia as N limits are developed based on standards that account for a combination of pH and temperature of the receiving stream, the presence or absence of salmonid species, and the presence or absence of fish in early life stages. DEQ uses the 75^{th} percentile of ambient pH and temperature data to establish the ammonia criteria for discharge permits.

Table 7, presents the total ammonia as N water quality standards for PPC using the ambient water quality data in Table 5.

Table 7. Total Ammonia as N Water Quality Standards for PPC						
Condition	Period	Salmonids Present	Early Life Stages Present	Ambient Condition		Water Quality Standard (mg/L)
				pH	Temperature °C	
Acute	Annual	Yes	NA	7.5	NA	13.3
Chronic	Annual	NA	Yes		12 (4)	4.36

The maximum reported total ammonia as N value is 1.32 mg/L. The projected maximum effluent concentration for total ammonia as N was found following the method recommended by the EPA *Technical Support Document for Water Quality-based Toxics Control* (TSD, 1991). A multiplier of 1.25 was determined using Table 3-2 in the TSD (given a coefficient of variation of 1.60 and a sample size of 39 at the 95% confidence interval.) The projected maximum effluent concentration, the multiplier times the maximum reported concentration (1.25 * 1.32 mg/L), is 1.65 mg/L. The projected effluent concentration does not exceed either the acute or chronic water quality standard. RP does not exist for this parameter. The ammonia limits in the 2009 permit are removed in this permit renewal. Because the permittee must continue to operate the treatment system to ensure that an acceptable level of treatment is maintained, monthly ammonia monitoring is continued. Instream monitoring of pH, temperature and ammonia is reduced to quarterly.

Nitrate plus Nitrite – The maximum reported nitrate plus nitrite value is 29.4 mg/L. The water quality standard for nitrate is 10 mg/L. RP calculations are shown in Attachment B. The resulting instream concentration for nitrate plus nitrite after available dilution is 2.4 mg/L, which is less than the water quality standard. WQBELs for nitrate plus nitrite are not necessary. Monthly monitoring is required.

Nutrients (TN and TP): The 2009 permit incorporated nutrient limitations required by Phase I of the 2006 *Framework Water Quality Restoration Plan and Total Maximum Daily Loads (TMDLs) for the Lake Helena Watershed Planning Area* (TMDL). The limits, shown in Table 2, are expressed as average monthly and average weekly loads based on plant performance at that time.

In 2014 DEQ adopted numeric nutrient criteria (circular DEQ-12A) and a nutrient variance process (circular DEQ-12B) for wadeable streams in Montana. DEQ-12B was updated in 2017. In this permit renewal DEQ evaluated the East Helena discharge's reasonable potential to exceed the numeric nutrient criteria, developed WQBELs, and followed the process for a general variance described in DEQ-12B. The effluent limitations and conditions developed following these new regulations were compared to the current TMDL-based effluent limits and requirements as discussed below.

Reasonable Potential and WQBEL Analysis

The East Helena WWTF is located in the Middle Rockies (17) ecoregion. The numeric criteria for total nitrogen and total phosphorus are 0.3 mg/L and 0.03 mg/L respectively. Ambient concentrations of TN and TP upstream of the discharge, shown in Table 5, are 0.25 mg/L and 0.038 mg/L respectively. The facility seasonal DMR data (June, July, August) includes maximum reported effluent concentrations of 24.8 mg/L TN and 2.82 mg/L TP. Applying the TSD yields critical effluent concentrations of 31 mg/L TN (CV = 0.38; n = 18), and 4.4 mg/L TP (CV = 0.81; n = 18).

Using *Equation 1,* the 14Q5, facility design flow, and the above values, the resulting instream concentration for TN is 1.82 mg/L. This value is greater than the water quality criteria. The facility exhibits reasonable potential to exceed the water quality criteria and WQBELs for TN are necessary. RP calculations are shown in Attachment B.

For TP, the average, median, and 75th percentile concentrations in PPC are all greater than or equal to the water quality criteria, so there is no assimilative capacity or available dilution instream. Reasonable potential for an exceedance of the TP criteria exists because the critical effluent concentration is greater than the water quality criteria. WQBELs for TP are necessary. RP calculations are shown in Attachment B.

DEQ uses *Equation 1*, rearranged to solve for the maximum effluent concentration (C_d), also called the wasteload allocation (WLA), the facility may discharge without exceeding the instream water quality criteria.

$$C_d = WLA = \frac{Q_r C_r - Q_s C_s}{Q_d} \qquad \textit{Equation 2}$$

Where:

WLA = Maximum effluent concentration; mg/L
C_r = Water quality criteria; 0.30 mg/L TN, 0.030 mg/L TP
Q_r = Receiving water flow downstream of the discharge; 8.6 mgd
Q_s = Critical upstream receiving water flow; 8.2 mgd
C_s = Receiving water concentration upstream of discharge; 0.25 mg/L TN, 0.038 mg/L TP
Q_d = WWTF design flow; 0.44 mgd

The resulting WLA for TN is 1.23 mg/L. The stream concentration for TP is greater than the water quality criteria, so the WLA for TP is set equal to the criteria, 0.030 mg/L.

From the WLA, long term average concentrations and WQBELs are calculated using the methods described in DEQ-12A and Chapter 5 of the TSD. For nutrients, DEQ calculates an average monthly limit (AML) only. The AML (concentration) is multiplied by the facility design flow and a conversion factor to develop an average monthly load limit. WQBELs for nutrients are expressed as both concentration and load limits. The WQBELs in Table 8 are applicable June, July, and August, each year.

Table 8. Nutrient WQBELs

Parameter	Average Monthly Limit, mg/L	Average Monthly Limit, lb/day
Total Nitrogen (1)	1.2	4.4
Total Phosphorus as P	0.03	0.1

Footnotes:
(1) Calculated from the sum of Nitrate + Nitrite as N and Total Kjeldahl Nitrogen (TKN) concentrations.

General Nutrient Standards Variance

In 2014 DEQ adopted a general variance for nutrients that permittees may request if required to comply with the base numeric nutrient standards. The variances are effective for up to 20 years from the date of adoption, at which time the effluent limits based on the water quality standard are effective.

As can be seen from the WWTF's TN and TP effluent concentrations shown in Table 2, the East Helena WWTF is unable to comply with the limits above. On February 26, 2018, the city requested a general variance for both nitrogen and phosphorus. The appropriate general variances that may apply to a facility are determined by the facility average design flow rate and are described in Department Circular DEQ-12B (2017). The East Helena WWTF is a mechanical treatment plant and the design flow is less than 1.0 mgd, which means the facility may be considered for the 10 mg/L TN and 1.0 mg/L TP variances.

The first step in determining the appropriate permit conditions based on DEQ-12B is to calculate the 95th percentile of the facility's representative effluent data prior to July 1, 2017. In 2014 East Helena completed a significant upgrade to add a metals removal treatment process to the WWTF. This process also significantly improved the removal of total phosphorus from the wastewater. Therefore, to evaluate the WWTF's nutrient treatment, DEQ calculated the 95th percentile of TN and TP concentrations between June 2014 and July 2017. Those values are 21 mg/L TN and 1.5 mg/L TP. DEQ also evaluated the facility's seasonal data (July - September) over the same timeframe; which results in 95th percentile concentrations of 12 mg/L TN and 1.4 mg/L TP. Since the 95th percentile in all cases is above the highest attainable condition treatment requirements (HAC) in DEQ-12B, effluent limits are based on the DEQ-12B, Table 12B-1 values of 10 mg/L TN and 1 mg/L TP.

Effluent limits are developed from the HAC values above, which are treated as long term average (LTA) concentrations (DEQ, *First Triennial Review of Base Numeric Nutrient Standards and Variances, April 2017*). DEQ uses the TSD to develop concentration-based effluent limits from the HAC values (LTA concentrations) using a default coefficient of variation (CV) of 0.6 and the appropriate LTA multiplier from TSD Table 5-2. This yields concentrations of 15.5 mg/L TN and 1.5 mg/L TP as average monthly values. DEQ-12B requires variance limits be expressed as loads only. So, the average monthly concentration values are multiplied by the facility design flow and a conversion factor to arrive at the average monthly load limits for the permit. The calculations are represented in the following equation:

(Table 12B-1 value)*(TSD Table 5-2 multiplier)*(Design flow)*(8.34 conversion) = load (lb/day)

The resulting load limits are 56.9 lb/day TN and 5.5 lb/day TP.

Comparing the HAC load limits to the existing permit limits shows that the existing load limit for TN (53.3 lb/day) is less than the HAC load limit above. East Helena has not exceeded this permit limit since January 2012. The existing TN limit is maintained in this permit renewal. This limit will continue to apply ~~year round~~year-round to maintain protection of Lake Helena.

The HAC limit for TP is less than half the existing load limit. However, given that the maximum reported TP load since June 2014 is 4.3 lb/day, it is apparent the facility is achieving the HAC load limit. DEQ proposes applying the 5.5 lb/day limit for TP during the growing season (July – September). To maintain protection of Lake Helena, the existing load limit of 11.2 lb/day will apply the rest of the year (October – June).

The City of East Helena WWTF discharge is achieving the HAC limits for both TN and TP. DEQ 12-B requires facilities achieving HAC-based effluent limits, but not achieving WQBELs, to develop a Pollutant Minimization Program (PMP), which must be incorporated into the permit. PMP requirements are discussed in Part VII of this Fact Sheet.

Lake Helena TMDL

The 2009 permit implemented Phase I of the TMDL, which required "no increase" in nutrient concentrations. Phase II of the TMDL requires optimization of the facility infrastructure as it currently exists. The goal of Phase III is to implement the necessary actions to reach the level of treatment to meet the TP and TN targets for Prickly Pear Creek (numeric criteria).

With this renewal, DEQ is incorporating the approved general variance for both TN and TP. The interim limits provided for under the variance apply, even if such limits differ from those that might otherwise apply based on a wasteload allocation derived in a TMDL (DEQ-12B, 2017).

Even though the variance requirements differ from Phase II of the TMDL, the overall approach and outcomes are similar. The variance establishes a reduced seasonal limit for TP and maintains the existing limit for TN, which is more stringent than the variance limit. These limits represent the "best attainable concentrations", as required by the TMDL. The variance also requires the Pollutant Minimization Plan, which aligns with the TMDL Phase II "Optimization" requirements.

Phase III of the TMDL is intended to implement WQBELs based on the numeric water quality criteria. These WQBELs are shown above in Table 7 and represent the target limits that would apply to the facility at the end of the variance term.

The approach taken above is consistent with the TMDL's Phase II requirements. The variance differs from the limits that would apply under the TMDL Phase III. However, the DEQ-12B HAC values are subject to review every three years. The HAC review process, together with the PMP requirement, provides a path toward establishing adaptive management strategies for implementing TMDL Phase III at the end of the variance term.

Total Residual Chlorine (TRC): The permittee utilizes UV disinfection rather than chlorination. The 2009-issued permit included WQBEL for TRC, in the event chlorination is employed at the facility. The facility has not used chlorine for disinfection during the current permit cycle and has no plans to do so. Chlorine is not stored on the site. The TRC limitations and monitoring are removed in this permit renewal.

pH: Pursuant to ARM 17.30.628(2)(c), the induced variation of hydrogen ion concentration within the range of 6.5 to 9.5 must be less than 0.5 pH units. Natural pH outside this range must be maintained without change. Natural pH above 7.0 must be maintained above 7.0. The 2009 permit limit for pH requires effluent pH to be maintained between 6.5 and 9.0 s.u. This limit and the daily monitoring requirement are maintained in this renewal.

3. Toxic Pollutants

Concentrations of carcinogenic, bio-concentrating, toxic, or harmful parameters which would remain in the water after conventional treatment may not exceed the applicable standards specified in Circular DEQ-7.

Metals - All metals discussions refer to the metals in their "total recoverable" fraction with the exception of aluminum which is regulated and monitored in the dissolved form.

For metals, the 2009 permit includes WQBELs and required monitoring for copper, lead, and zinc. Additional effluent monitoring is required for aluminum, antimony, arsenic, and cadmium. The permit also requires monitoring in PPC for aluminum, antimony, arsenic, cadmium, copper, lead, zinc, and hardness. These monitoring results are summarized in Tables 2 and 5.

Applicable surface water standards for aquatic life and human health for the ~~above mentioned~~above-mentioned metals are summarized in Table 9 for PPC. These standards are calculated using the 25th percentile value for the upstream total hardness data set obtained from the permittee's DMR forms. The 25th percentile, low hardness condition is used to be protective of the receiving water year-round.

Table 9. PPC Metals Surface Water Standards (Circular DEQ-7)

Parameter	Units	Required Reporting Value (RRV)	Human Health Standard	Aquatic Life Standard (1)	
				Acute	Chronic
Aluminum (Dissolved)	µg/L	30	--	750	87
Antimony, Total Recoverable	µg/L	3	5.6	--	--
Arsenic, Total Recoverable	µg/L	3	10	340	150
Cadmium, Total Recoverable	µg/L	0.08	5	2	0.3
Copper, Total Recoverable	µg/L	1	1,300	14.3	9.5
Lead, Total Recoverable	µg/L	0.5	15	84	3.3
Zinc, Total Recoverable	µg/L	10	2,000	120	120

Footnotes:
(1) Applicable metals standards calculated using the 25th percentile upstream total hardness value of 102.25 mg/L as $CaCO_3$

Aluminum – All analytical results for aluminum were below detection at the required reporting value (RRV). RP does not exist for this parameter. No limit is proposed and monitoring is not required in the renewed permit.

Antimony – All analytical results were below detection at the RRV. RP does not exist for this parameter. No limit is proposed and monitoring is not required in the renewed permit.

Cadmium – All analytical results were below detection. The RRV was achieved in 6 of the 13 samples. RP does not exist for this parameter. No limit is proposed and monitoring is not required in the renewed permit.

Arsenic – Arsenic was detected in all samples. Results ranged from 4 µg/L to 19 µg/L. DEQ used the TSD approach, as described previously, and *Equation 1* to assess RP to exceed the human health standard, where:

C_d = maximum projected effluent concentration; 27.7 µg/L (19 µg/L * TSD multiplier)
C_r = RWC upstream of discharge; 7 µg/L (75th percentile)
Q_r = applicable receiving water flow; 5.4 mgd (100% of 7Q10)
Q_d = facility design flow rate; 0.44 mgd

RP calculations are shown in Attachment B. The resulting concentration in PPC after available dilution is 9 µg/L, which is less than the human health standard for arsenic. RP does not exist and WQBELs are not necessary. Due to the presence of arsenic in the discharge, monthly monitoring is required.

Copper – Copper was detected in all but one sample over the POR. The results above detection ranged from 5 µg/L to 17 µg/L. As with arsenic, DEQ used *Equation 1* to assess RP to exceed the water quality standards, where:

C_d = maximum projected effluent concentration; 18.5 µg/L (17 µg/L * TSD multiplier)
C_r = RWC upstream of discharge; 4 µg/L (75th percentile)
Q_{rc} = receiving water flow for chronic; 1.35 mgd (25% of 7Q10)
Q_{ra} = receiving water flow for acute; 0.14 mgd (2.5% of 7Q10)
Q_d = facility design flow rate; 0.44 mgd

RP calculations are shown in Attachment B. The resulting concentrations in PPC are 7 µg/L for chronic copper, and 15 µg/L for acute. The acute concentration exceeds the 14.3 µg/L acute standard. RP exists for copper and WQBELs are necessary.

DEQ used *Equation 2* to establish a WLA for copper, where:

WLA = maximum concentration that may be discharged without exceeding the standard; µg/L
C_r = Aquatic life water quality criteria; 9.5 µg/L chronic, 14.3 µg/L acute
Q_r = Receiving water flow downstream of the discharge; 1.79 mgd chronic, 0.58 mgd acute
Q_s = Critical upstream receiving water flow; 1.35 mgd chronic, 0.14 mgd acute
C_s = Receiving water concentration upstream of discharge; 4 µg/L
Q_d = facility design flow; 0.44 mgd

Where there are both acute and chronic water quality standards, two WLA are calculated. The resulting WLA are 17.5 µg/L for acute and 27 µg/L for chronic. Long term average (LTA) concentrations that the facility should meet to ensure compliance with each WLA are calculated following the TSD. The minimum LTA is selected to calculate the WQBELs. In this case the chronic LTA is 19.3 µg/L and the acute is 9.2 µg/L. Limits are calculated from the acute LTA by applying the TSD Table 5-2 multiplier. The average monthly limit is 11.7 μg/L and the maximum daily limit is 17.5 μg/L. All calculations are summarized in Attachment C.

The limits above are less stringent than the limits in the 2009 permit. Relaxation (or "backsliding") of existing limits is only allowed under certain conditions, as described in the anti-backsliding provisions in the federal Clean Water Act and the Code of Federal Regulations. In this case, the new limits reflect changing conditions in the receiving water (available dilution) and significant new wastewater treatment technology installed by the permittee, both of which were not available at the time the 2009 permit was issued. These new conditions meet the requirements to allow the relaxation of effluent limits.

Lead – During the POR 31 lead analyses of the effluent were less than the detection limit of 0.5 μg/L. Lead was detected in four samples. Those four samples ranged from 0.8 μg/L to 3 μg/L, none of which are above the chronic aquatic life standard. The 75th percentile concentration of lead in PPC is 5 μg/L, which is above the chronic standard. After assessing RP, DEQ determined that the lead concentrations in the effluent, being lower than that in the receiving water, actually improve lead concentrations in PPC at critical conditions. Since the discharge is neither causing nor contributing to an exceedance of water quality standards, RP does not exist for lead. However, this outcome could change if lead concentrations in PPC improve. DEQ proposes to remove the WQBELs for lead from the permit, but continue to require quarterly monitoring.

Zinc – Zinc concentrations ranged from less than the detection limit of 10 μg/L up to 40 μg/L. The acute and chronic aquatic life standards for zinc are both 120 μg/L. RP to exceed the standard does not exist. The zinc limit is removed from the permit. Quarterly monitoring is required.

Table 10. Outfall 001 Final Effluent Metals Limitations				
Parameter	Units	RRV	Limitations	
			Maximum Daily (1)	Average Monthly (1)
Copper, Total Recoverable	μg/L	1	17.5	11.7
Footnotes: (1) See Definition section at end of permit for explanation of terms.				

Monitoring of PPC upstream of Outfall 001 for arsenic, copper, lead, and zinc, will continue.

Monitoring of PPC for dissolved aluminum, antimony, and cadmium is discontinued.

Whole Effluent Toxicity (WET) Testing – The 2009 permit requires WET monitoring of the effluent by means of quarterly acute WET testing on two species. DMR data indicates the permittee reported two failed WET tests over the POR. A review of the WET laboratory reports indicates these two reported failures were the result of data entry errors. The facility has not failed any WET tests over the POR.

The East Helena WWTF does not have significant industrial contributors and no EPA required pretreatment program. WET monitoring was required in the past to screen for potential metals toxicity in the effluent. The facility passed all quarterly WET tests over the POR, and installed significant metals treatment. RP for metals and appropriate limits are incorporated into the permit. The requirement to conduct WET tests is no longer necessary, and is removed in this renewal.

V. Effluent Limitations

The proposed final effluent limits are a combination of the more stringent of the technology-based and water quality-based effluent limits as developed in Sections III and IV.

Final Limitations

The following final effluent limitations will be applied to the discharge at Outfall 001 beginning on the permit effective date and will remain in effect through the duration of the permit.

Table 11. Outfall 001 Final Limitations

Parameter	Units	Average Monthly Limit (1)	Average Weekly Limit (1)	Maximum Daily Limit (1)
BOD_5	mg/L	30	45	--
	lb/day	109	163	--
TSS	mg/L	30	45	--
	lb/day	109	163	--
pH	S.U.	In the range of 6.0 – 9.0		
E. coli Bacteria (2)	Number of organisms/100 mL	126	252	--
E. coli Bacteria (3)	Number of organisms/100 mL	630	1,260	--
Total Nitrogen Load (4, 5)	lb/day	53.3	--	--
Total Phosphorus as P Load (6)	lb/day	11.2	--	--
Total Phosphorus as P Load (7)	lb/day	5.5	--	--
Copper, Total Recoverable	µg/L	11.7	--	17.5

Footnotes:
(1) See Definition section at end of permit for explanation of terms.
(2) This limit applies during the period April 1 through October 31.
(3) This limit applies during the period November 1 through March 31.
(4) Calculated as the sum of Total Kjeldahl Nitrogen (TKN) and nitrate plus nitrite as N concentrations.
(5) This limit applies year round
(6) This limit applies October – June
(7) This limit applies July - September

85 Percent (%) Removal Requirement for TSS and BOD_5: The arithmetic mean of the BOD_5 and TSS and for effluent samples collected in a period of 30 consecutive days shall not exceed 15% of the arithmetic mean of the values for influent samples collected at approximately the same times during the same period (85% removal). This is in addition to the concentration limitations on BOD_5 and TSS.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

There shall be no discharge which causes visible oil sheen in the receiving stream.

VI. Self-Monitoring Requirements

A. Effluent Monitoring

The permittee shall monitor the discharge from Outfall 001 at the last point of control following treatment (post metals treatment).

Samples shall be collected, preserved and analyzed in accordance with approved procedures listed in 40 CFR 136. In order to be representative of the nature and volume of the flow being monitored, influent sample collection and flow monitoring must occur prior to the equalization basin or any recycle flow returns. Effluent flow measuring must account for all draw-off and return flows. Metals shall be analyzed as total recoverable, use EPA Method (Section) 4.1.4 [EPA 600/4-79-020, March 1983] or equivalent.

The RRV is the detection level that must be achieved in reporting surface water monitoring or compliance data to the Department (Circular DEQ-7). The RRV is the Department's best determination of a level of analysis that can be achieved by the majority of the commercial, university, or governmental laboratories using EPA-approved methods or methods approved by the Department.

Table 14. Outfall 001 Self-Monitoring Requirements

Parameter	Unit	Sample Location	Sample Frequency	Sample Type (1)	Reporting ~~Requirments~~Requirements	Reporting Frequency	RRV
Flow	mgd	Effluent	Continuous	(2)	Average Monthly/Daily Maximum	Monthly	--
5-Day Biological Oxygen Demand (BOD_5)	mg/L	Influent	3/Week	Composite	Average Monthly/ Maximum Weekly		2
	mg/L	Effluent	3/Week	Composite			2
	lb/day	Effluent	1/Month	Calculated			--
	% Removal (3)	Effluent	1/Month	Calculated	Average Monthly		--
Total Suspended Solids (TSS)	mg/L	Influent	3/Week	Composite	Average Monthly/ Maximum Weekly		10
	mg/L	Effluent	3/Week	Composite			10
	lb/day	Effluent	1/Month	Calculated			--
	% Removal (3)	Effluent	1/Month	Calculated	Average Monthly		--
pH	s.u.	Effluent	Daily	Instantaneous	Minimum and Maximum		0.1
E. coli Bacteria (4)	Number of organisms/100 mL	Effluent	3/Week	Grab	Monthly/ Weekly Geo Mean		1
Total Ammonia as N	mg/L	Effluent	1/Month	Composite	Report		0.1
Nitrate + Nitrite as N	mg/L	Effluent	1/Week	Composite	Average Monthly		0.05
Total Kjeldahl Nitrogen	mg/L	Effluent	1/Week	Composite			0.1
Total Nitrogen (5)	mg/L	Effluent	1/Month	Calculated			--
	lb/day	Effluent	1/Month	Calculated			--
Total Phosphorus as P	mg/L	Effluent	1/Week	Composite			--
	lb/day	Effluent	1/Month	Calculated			--
Oil and Grease	mg/L	Effluent	1/Quarter	Grab	Report	Quarterly	1
Arsenic, Total Recoverable (2)	µg/L	Effluent	1/Month	Composite	Average Monthly / Daily Maximum	Monthly	3
Copper, Total	µg/L	Effluent	1/Month	Composite			1
Lead, Total Recoverable	µg/L	Effluent	1/Quarter	Composite	Report	Quarterly	0.5
Zinc, Total Recoverable	µg/L	Effluent	1/Quarter	Composite			10

Footnotes:
(1) See Definition section at end of permit for explanation of terms.
(2) Requires recording device or totalizer; permittee shall report daily maximum and daily average flow on DMR.
(3) Percent (%) Removal shall be calculated using the monthly average values.
(4) Report Geometric Mean if more than one sample is collected during reporting period.
(5) Calculated as the sum of Nitrate + Nitrite as N and Total Kjeldahl Nitrogen (TKN) concentrations.

B. Instream Monitoring

The permittee is required to continue monitoring PPC upstream of the outfall at the previously established CRK-A sample point for the parameters listed in Table 16, below.

Table 16. Ambient Water Quality PPC Monitoring Requirements

Parameter	Units	Sample Location	Sample Frequency	Sample Type (1)	RRV
pH	s.u.	Instream	1/Quarter	Instantaneous	0.1
Temperature	°C	Instream	1/Quarter	Instantaneous	--
Total Ammonia as N	mg/L	Instream	1/Quarter	Grab	0.1
Total Hardness as $CaCO_3$	mg/L	Instream	1/Quarter	Grab	10
Arsenic, Total Recoverable	µg/L	Instream	1/Quarter	Grab	3
Copper, Total Recoverable	µg/L	Instream	1/Quarter	Grab	1
Lead, Total Recoverable	µg/L	Instream	1/Quarter	Grab	0.5
Zinc, Total Recoverable	µg/L	Instream	1/Quarter	Grab	10

Footnotes:
(1) See Definition section at end of permit for explanation of terms

VII. Special Conditions

A. East Helena's Pollutant Minimization Program (PMP)

A pollutant minimization program (PMP) is a structured set of activities designed to improve processes and pollutant controls that will prevent and reduce pollutant loadings. East Helena has met highest attainable condition for total nitrogen and total phosphorus and will adopt and implement a PMP reflecting the greatest pollutant reduction achievable. East Helena needs and is eligible for a General Variance from the Montana Base Numeric Nutrient Standards found in DEQ-12B.

East Helena is required to conduct the following PMP activities:

Action Item 1: Continue Current Advanced Operational Strategies throughout the Term of the Permit

1. Continue cycling aeration on and off in the bioreactor to create periodic anoxic conditions for denitrification.

2. Continue to operate and maintain the tertiary filtration process.

3. Throughout the permit term and in the operation and maintenance manual, continue to maintain in progress documentation of following operational strategies effective toward reducing nutrients, as applicable:
    - identification of aerators and mixers used or taken offline
    - aeration cycle times
    - oxygen reduction potential (ORP) target points
    - variable frequency drive set points
    - target mixed liquor suspended solids (MLSS) concentration for summer and winter

- return and wasting strategies
- seasonal adjustments

Action Item 2: Evaluate Nutrient Reduction Measures

a. Submit a brief (no more than one-page) annual report addressing the following:
   - Identify nutrient reduction measures implemented that year.
   - Evaluate the effectiveness of each implemented nutrient reduction measure.
   - Propose nutrient reduction measures for the upcoming year.

   The annual reports will be due January 28th of each year, beginning January 28, 2020.

VIII. Information Sources

1. Administrative Rules of Montana Title 17 Chapter 30 - Water Quality
   a. Sub-Chapter 2 - *Water Quality Permit and Application Fees*, 2014.
   b. Sub-Chapter 5 - *Mixing Zones in Surface and Ground Water*, 2014.
   c. Sub-Chapter 6 - *Montana Surface Water Quality Standards and Procedures*, 2014.
   d. Sub-Chapter 7- *Nondegradation of Water Quality*, 2014.
   e. Sub-Chapter 10 - *Montana Ground Water Pollution Control System,* 2014.
   f. Sub-Chapter 12 - *Montana Pollutant Discharge Elimination System (MPDES) Standards*, 2012.
   g. Sub-Chapter 13 - *Montana Pollutant Discharge Elimination System (MPDES) Permits*, 2013.

2. Clean Water Act § 303(d), 33 USC 1313(d) *Montana List of Waterbodies in Need of Total Maximum Daily Load Development*, 2016.

3. Federal Water Pollution Control Act (Clean Water Act), 33 U.S.C. §§ 1251-1387, October 18, 1972, as amended 1973-1983, 1987, 1988, 1990-1992, 1994, 1995 and 1996.

4. Montana Code Annotated Title 75 - Environmental Protection Chapter 5 - Water Quality, October 2011.

5. Montana Department of Fish Wildlife and Parks, *Spawning Times of Montana Fishes*, March 2001.

6. Montana Pollutant Discharge Elimination System (MPDES) Permit Number MT0022560
   a. Administrative Record.
   b. Renewal Application EPA Form 2A, June 2014.

7. US Code of Federal Regulations, 40 CFR Parts 122-125, 130-133, & 136.

8. US EPA *Technical Support Document for Water Quality-Based Toxics Control*, EPA/505/2-30-001, March 1991.

9. USEPA Region VIII *Mixing Zones and Dilution Policy*, September 1995.

10. US EPA NPDES *Permit Writers' Manual*, EPA 833-B-96-003, September 2010.

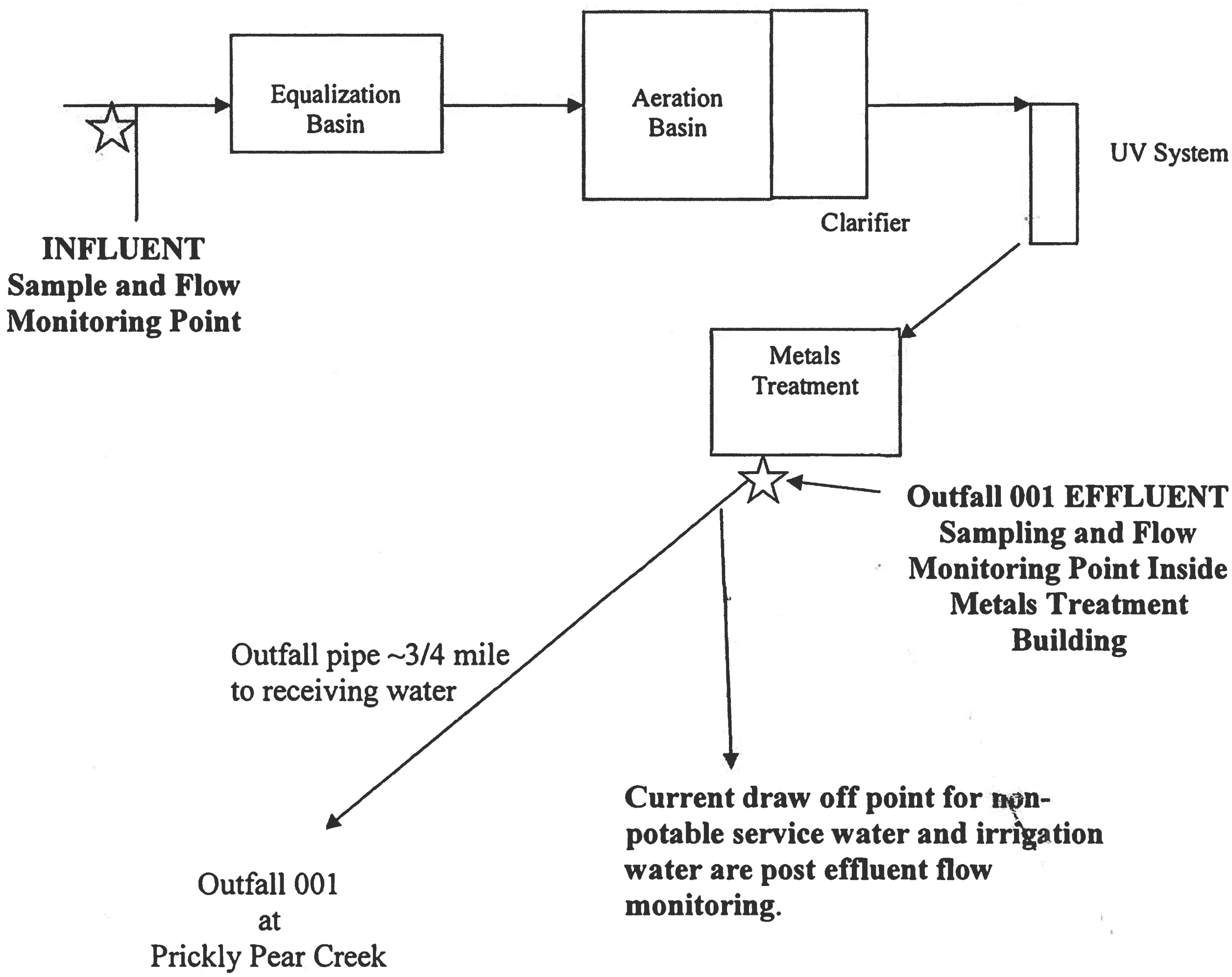
11. US EPA Region VIII NPDES *Whole Effluent Toxics Control Program*, August 1997.

12. US EPA for Montana Department of Environmental Quality *Framework Water Quality Restoration Plan and Total Maximum Daily Loads (TMDLs) for the Lake Helena Watershed Planning Area:*
    a. Volume I – Appendices, December 2004.
    b. Volume II – Final Report, August 2006.

13. US EPA Ref. 8-MO, TMDL Approvals, *Lake Helena Total Maximum Daily Load Planning Area* and Enclosures, September 27, 2006.

Attachment A

Schematic of Helena WWTP with Sample and Flow Monitoring Points



Attachment B: East Helena WWTP Reasonable Potential Analysis (October 2017)

			Ammonia Acute	Ammonia Chronic	N+N	TN	TP	Arsenic HH	Copper Acute	Copper Chronic	Lead Acute	Lead Chronic	Zinc Acute	Zinc Chronic
Flow														
	critical stream flow (7Q10 or seasonal 14Q5)	mgd	5.4	5.4	5.4	8.2	8.2	5.4	5.4	5.4	5.4	5.4	5.4	5.4
	% of 7Q10 being provided (as decimal, e.g. - .10 for 10%)	%	0.0%	25.0%	100.0%	100.0%	100.0%	100.0%	2.5%	25.0%	2.5%	25.0%	2.5%	25.0%
Qs	resulting critical stream flow (7Q10 * % dilution granted)	mgd	0.00	1.35	5.40	8.20	8.20	5.40	0.14	1.35	0.14	1.35	0.14	1.35
Qd	critical effluent flow (ave daily design flow)	mgd	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
Qr	downstream flow (Qs + Qd)	mgd	0.44	1.79	5.84	8.64	8.64	5.84	0.58	1.79	0.58	1.79	0.58	1.79
Concentrations														
Cmax	maximum effluent concentration for POR (from application or DMR data)	mg/L	1.32	1.32	29.4	24.8	1.7	0.0190	0.017	0.017	0.003	0.003	0.04	0.04
n	number of samples in effluent data set		39	39	68	11	11	13	35	35	35	35	64	64
CV	coefficient of variation for effluent data (if n<10, use 0.6)		1.60	1.60	0.31	0.50	0.60	0.48	0.34	0.34	0.68	0.68	0.38	0.38
TSD	calculated TSD multiplier (should be close to Table 3-2 value)		1.250	1.250	0.979	1.554	1.678	1.455	1.087	1.087	1.170	1.170	0.984	0.984
Cd	critical effluent concentration - 95%tile (max. effluent concentration * TSD multiplier)	mg/L	1.650	1.650	28.8	39	2.9	0.0277	0.0185	0.0185	0.0035	0.0035	0.04	0.04
Cs	critical instream concentration (75%tile if n<=30, 95% UCL if n>30)	mg/L	0.050	0.050	0.220	0.250	0.038	0.0070	0.004	0.004	0.005	0.005	0.060	0.060
Cr	resulting or downstream pollutant concentration (term to solve for)	mg/L	1.6	0.4	2.4	2.20	0.184	0.009	0.015	0.007	0.0039	0.0047	0.0442	0.0549
WQS	water quality standard (from DEQ-7 or rule)	mg/L	13.3	4.36	10	0.30	0.030	0.010	0.0143	0.0095	0.084	0.0033	0.1221	0.1221
	RP?		no	no	no	yes	yes	no	yes	no	no	No	no	no

Attachment C: WQBEL Development

			TN		TP			Copper		
								acute	chronic	
	7Q10 (= 491 mgd)	mgd	**8.2**		**8.2**		mgd	**5.4**		mgd
	% of 7Q10 to use for dilution		100		100			2.5	25	%
Qs	instream flow available for dilution	mgd	8.2		8.2		mgd	0.135	1.35	mgd
Qd	design flow (POTW)	mgd	**0.44**		**0.44**		mgd	0.44		mgd
Qr	downstream flow (Qs + Qd)	mgd	8.6		8.6		mgd	0.6	1.8	mgd
Cr	**water quality standard**	mg/L	0.30		0.03		µg/L	14.3	9.5	µg/L
Cs	instream concentration (75th percentile)	mg/L	**0.25**		**0.038**		µg/L	3.8		µg/L
Cd or WLA	effluent concentration or waste load allocation ((Qr*Cr) - (Qs*Cs))/Qd)	mg/L	1.2318		0.030		µg/L	17.5	27.0	µg/L
	* If background > standard, than WLA = standard									
	number of samples per month *(if = 1, enter 4)*		4		4			4		
	CV *(if sample set >= 10, then SD/mean, else 0.6)*		0.6		0.6			0.3		
LTA_a LTA_c	acute and chronic long term average (99 %tile); (95 %tile for nutrients)		0.7935		0.0193			9.2	19.3	
MIN (LTA_a, LTA_c)	most conservative LTA		0.7935		0.0193			9.2		
	maximum daily limit (99 %tile)	mg/L	**2.4713**		**0.0602**		µg/L	**17.5**		**µg/L**
	average monthly limit (95 %tile)	mg/L		**1.2318**		**0.0300**	µg/L		**11.7**	**µg/L**

APPENDIX E

GENERAL VARIANCE APPLICATION

Nutrient Standards General Variance Request Form

Please sign and return the completed form to:

Department of Environmental Quality
Water Protection Bureau
PO Box 200901
Helena, MT 59620-0901

Montana Resources (applicant) requests a **General Nutrient Standards Variance** for their Montana Pollutant Discharge Elimination System (MPDES) permit. This request is intended to supplement any application materials previously submitted by applicant.

Discharger Category[1] (≥ 1.0 mgd; < 1.0 mgd; or Lagoon not designed to actively remove nutrients)	**Parameter**	**Variance Requested** (Yes/No)
< 1 MDG	Total Phosphorus	Yes
	Total Nitrogen	Yes

Footnote:
1. Flow rate, in million gallons per day (mgd), based on facility design flow.

All requests for a General Nutrient Standards Variance must be completed and signed as follows:

- For a corporation, by a principal officer at least the level of vice president;
- For a partnership or sole proprietorship, by a general partner or the proprietor, respectively; or
- For a municipality, state, federal, other public facility, by either a principal executive officer or ranking elected official.

I acknowledge that the applicant will reference Circular DEQ-12A, Circular DEQ-12B, the Base Numeric Nutrient Standards Implementation Guidance, and §75-5-313, Montana Code Annotated for further information regarding General Nutrient Standards Variances. The applicant is responsible for requests for General, Individual, or Alternative Nutrient Standards Variances.

Name and Official Title (Type or Print)	Phone No.
Scott St. Clair, East Helena DPW	**406-410-1125**
Signature	**Date Signed**
Scott St. Clair	2-26-18

APPENDIX F

DMR RESULTS 2015-2019

CITY OF EAST HELENA DMR RESULTS 2015-2019

2015	Permit Limits	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FLOW EFFLUENT AV		0.395	0.175	0.151	0.15	0.268	0.36	0.285	0.217	0.224	0.169	0.141	0.157
BOD EFF MO AVG LB/D	109	11.18	8.37	12.86	10.37	16	22.38	19.51	8.86	10.97	4.83	8.04	9.6
BOD EFF WK AVG LB/D	163	17.35	9.95	18.16	13.88	25.32	27.9	29.1	10.74	24.3	7.04	13.35	25.49
BOD EFF MO AVG MG/L	30	3.08	5.33	10.3	8.4	7.33	7.4	7.9	4.67	6.07	3.38	6.75	14
BOD EFF WK MG/L	45	4.33	6.67	14	10.67	11	9	11	5.6	13	4.67	12	65
% REMVL BOD	85	97	95.96	96.13	97.48	96.16	94.5	95.38	96.78	96.82	97.6	97	94
PH MIN	6	6.62	6.97	6.86	6.93	6.86	6.51	6.6	7.25	6.71	6.99	6.96	6.88
PH MAX	9	7.65	8.24	7.76	8.62	8.42	8.56	8.3	8.69	8.8	8.9	8.9	8.25
TSS EFF MO AVG LB/D	109	19.09	10.33	8.96	7.59	12.2	15.6	13.02	9.92	8.07	6.62	10.58	10.98
TSS EFF WK AVG LB/D	163	25.42	10.99	10.57	10.46	16.5	19.65	15.69	15.81	10.59	7.07	12.73	36.14
TSS EFF MO AVG MG/L	30	5.33	6.67	7.25	6.21	5.5	5.2	5.5	5.2	4.5	4.38	7.58	19.43
TSS EFF WK MG/L	45	6.33	7	8.67	8.3	7.33	6.6	6.67	8	5.33	5.3	9	104
%REMVL TSS	85	93.26	94.38	96.16	97.09	96	95.03	95.81	95.16	98.22	96.5	99	89
NIT TOT MO AV #/DAY	53.3	25.98	27.95	28.55	32.15	40.3	30.86	18.87	11.67	21.73	18.31	22.83	22.21
NIT TOT MO AV MG/L	10	7.02	18.15	23.38	24.9	18.4	10.34	7.67	6.25	12.58	13.37	17.8	16.6
PHOS LBS/DAY MO AV	11.2	2.17	1.2	0.53	1.47	3.1	0.51	4.33	3.13	0.99	2.02	1.17	1.67
PHOS MG/L MO AV	1	0.66	0.82	0.42	1.17	1.39	0.17	1.73	0.43	0.53	1.12	0.87	1.28
E. COLI MO GEOMN	126 / 630	1.25	1.81	1.06	1	1.86	4.44	6.53	4.58	7.73	1.97	4.68	8.94
E. COLI 7DAY GEOMN	252 / 1260	2.46	1.46	1.26	1	3.3	7.23	16.51	8.9	12.16	2.15	15.7	1.66
COPPER	11.7	0.0070	0.0080	0.0110	0.0110	0.0070	0.0050	0.0060	0.0070	0.0090	0.0010	0.0080	0.0080

2016	Permit Limits	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FLOW EFFLUENT AV		0.259	0.163	0.143	0.153	0.209	0.254	0.246	0.15	0.166	0.161	0.127	0.166
BOD EFF MO AVG LB/D	109	10.17	10.2	3.73	4.52	4	7.01	5.66	3.1	7.82	4.73	4.88	3.84
BOD EFF WK AVG LB/D	163	16.58	18.26	4.76	8.44	6.34	11.45	9.77	4.41	16.6	9.78	10.56	5.31
BOD EFF MO AVG MG/L	30	4.4	8	3	3.5	2.41	3.29	3.5	2.47	5.4	3.53	4.47	2.583
BOD EFF WK MG/L	45	5.3	14.3	3.3	4.67	3	4.67	4	4.3	11.3	7.67	8.33	3.66
% REMVL BOD	85	96.8	96.57	98.55	98.42	98.61	98.06	97.66	98.14	95.4	97.96	97.86	98.08
PH MIN	6	6.99	6.82	6.77	6.61	6.54	6.57	6.59	6.56	6.82	6.55	6.59	6.96
PH MAX	9	7.43	8.36	7.43	7.6	7.09	7.27	7.71	8.13	7.31	8.59	8.61	8.78
TSS EFF MO AVG LB/D	109	14.28	5.95	4.99	4.14	6.54	9.27	4.3	5.35	5.67	5.39	4.72	6.46
TSS EFF WK AVG LB/D	163	17	6.64	6	5.86	8.49	12.5	5.3	7.18	6.52	6.06	6	8.14
TSS EFF MO AVG MG/L	30	5.66	4.67	4	4	4	4.2	6.84	4	4	4	4.53	4.41
TSS EFF MO AVG MG/L	45	9	5	4	4	4	5	9.96	4	4	4	6.67	5.33
%REMVL TSS	85	95.9	97.59	97.85	98.11	97.72	97.53	97.23	96.98	96.9	97.56	97.25	96.91
NIT TOT MO AV #/DAY	53.3	24.44	10.38	14.77	19.74	23.3	25.07	14.4	13.99	24.15	26.3	18.86	31.71
NIT TOT MO AV MG/L	10	9.52	8.32	10.32	15.37	14.8	11.25	9.9	10.5	15.65	20.1	17.58	20.4
PHOS LBS/DAY MO AV	11.2	0.35	2.23	0.81	0.76	0.52	0.57	1.4	1.7	0.65	0.24	0.75	0.96
PHOS MG/L MO AV	1	0.27	1.75	0.61	0.44	0.28	0.38	0.72	0.95	0.37	0.18	0.48	0.53
E. COLI MO GEOMN	126 / 630	24.8	10.38	1.54	1.27	1.32	2.7	4.4	3.3	13.35	1.82	1.31	1.38
E. COLI 7DAY GEOMN	252 / 1260	53.08	2.83	2.62	1.81	2.08	9.6	11.3	13.8	6.57	2.62	1.71	1.44
COPPER	11.7	0.0080	0.0090	0.0070	0.0090	0.0080	0.0070	0.0060	0.0070	0.0060	0.0070	0.0090	0.009

CITY OF EAST HELENA DMR RESULTS 2015-2019

2017	Permit Limits	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FLOW EFFLUENT AV		0.219	0.246	0.21	0.236	0.231	0.218	0.194	0.134	0.178	0.196	0.152	0.193
BOD EFF MO AVG LB/D	109	12.54	20.074	10.2	12.25	12.15	6.46	5.09	3.76	5.7	4.81	2.52	3.73
BOD EFF WK AVG LB/D	163	18.03	22.45	14.56	14.2	17.42	7.31	6.55	6.81	6.72	8.48	2.67	5.11
BOD EFF MO AVG MG/L	30	7.08	9.25	6	6.08	5	3.58	4	3.6	4.17	2.58	2	2.5
BOD EFF WK MG/L	45	18.03	12	8	7	6.66	4.33	5	7	5	3.67	2	3
% REMVL BOD	85	96.03	94.72	96.74	97.93	96.1	96.77	96.28	98.5	97.99	98.03	99.07	98.8
PH MIN	6	6.73	6.51	6.51	6.52	6.78	6.51	6.59	6.58	6.6	6.56	6.51	6.54
PH MAX	9	8.8	8.71	7.59	7.69	7.15	7.67	8.09	8.57	8.18	8.51	8.37	7.42
TSS EFF MO AVG LB/D	109	10.27	16.26	8.77	13.19	14.21	9.11	5.34	4.26	5.63	9.97	4.99	5.8
TSS EFF WK AVG LB/D	163	14.46	23.57	10.46	16.81	18.3	16.15	6.03	5.11	7.6	14.17	5.34	7.66
TSS EFF MO AVG MG/L	30	6	7.42	5.27	6.5	5.87	4.83	4	4	4.25	6.08	4	4.08
TSS EFF WK .AVG MG/L	45	8	10.3	6	8	8	8	4	4	4.66	8	4	4.33
%REMVL TSS	85	95.57	94.79	97.11	95.72	93.9	95.31	96.67	98.63	98.36	94.9	97.97	97.77
NIT TOT MO AV #/DAY	53.3	27.05	32.26	31.3	20.02	31.9	26.68	24.67	29.2	31.23	32.85	33.58	33.67
NIT TOT MO AV MG/L	10	16.32	14.9	18.44	10.22	12.76	14.02	18.55	24.84	22.67	19.87	26.18	21.96
PHOS LBS/DAY MO AV	11.2	2.72	1.56	2.2	2.67	0.89	0.79	0.84	0.74	2.42	2.22	1.73	3.12
PHOS MG/L MO AV	1	1.77	1.27	1.3	1.16	0.89	0.83	0.6	0.67	2.49	2.34	1.43	2.35
E. COLI MO GEOMN	126 / 630	1.55	2	1.2	2.96	1.26	3.35	3.37	5.1	9.1	1.59	1.31	1.49
E. COLI 7DAY GEOMN	252 / 1260	2	2	1.26	6	4.6	5.48	5.24	9.25	56.61	3.56	1.59	2.46
COPPER	11.7	0.0130	0.0170	0.0120	0.0080	0.0080	0.0070	0.0120	0.0130	0.0130	0.0100	0.0050	0.008

2018	Permit Limits	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FLOW EFFLUENT AV		0.281	0.201	0.219	0.259	0.54	0.781	0.545	0.313	0.276			0.146
BOD EFF MO AVG LB/D	109	5.98	6.72	9.87	5.16	13.06	30.56	15.45	8.2	16.76			5.7
BOD EFF WK AVG LB/D	163	7.7	8.8	13.35	6.57	20.79	40.14	18.35	9.61	36.6			7.33
BOD EFF MO AVG MG/L	30	2.46	4.08	5.08	3.16	2.93	4.58	3.5	3.26	9.08			4.58
BOD EFF WK MG/L	45	3.33	5	6.33	4.33	3.33	6.33	4.33	4	19.66			5.67
% REMVL BOD	85	98.75	97.4	96.63	98.07	96.75	92.87	97.22	95.66	95.23			97.71
PH MIN	6	6.53	6.52	6.61	6.53	6.57	6.58	6.73	7.07	6.55			6.52
PH MAX	9	7.09	7.17	7.71	7.15	7.15	8.03	7.9	8.51	8.41			8.75
TSS EFF MO AVG LB/D	109	9.41	8.18	10.34	6.86	18.21	30.56	17.47	10.3	8.6			5.26
TSS EFF WK AVG LB/D	163	11.4	10.52	13.3	7.67	24.96	40.14	20.23	12.8	14.74			6.1
TSS EFF MO AVG MG/L	30	4	5.17	5.91	4.33	4.13	4.58	4	4	4			4.25
TSS EFF WK .AVG MG/L	45	4	6.33	7.66	5	4.33	6.33	4	4	4			5
%REMVL TSS	85	97.86	96.57	96.36	97.63	97.58	94.16	97.34	95.32	98.19			97.46
NIT TOT MO AV #/DAY	53.3	45.88	40.07	41.21	43.38	52.59	71.01	38.7	22.28	45.48			39.42
NIT TOT MO AV MG/L	10	18.8	25.25	23.7	24.87	12.75	10.92	7.8	8.61	19.03			30.75
PHOS LBS/DAY MO AV	11.2	3.16	3.4	2.39	5.13	2.9	1.17	0.59	0.49	1.95			1.64
PHOS MG/L MO AV	1	1.35	2.03	1.4	2.38	0.64	0.18	0.13	0.19	0.85			1.34
E. COLI MO GEOMN	126 / 630	1	1.09	1.37	1.43	1.18	1.16	2.03	9.92	8.42			2.8
E. COLI 7DAY GEOMN	252 / 1260	1	1.44	2.8	2.88	1.44	1.81	4.12	12.42	21.78			4.93
COPPER	11.7	0.0080	0.0192	0.0170	0.0161	0.0093	0.0077	0.0068	0.0058	0.0072			

CITY OF EAST HELENA DMR RESULTS 2015-2019

2019	Permit Limits	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FLOW EFFLUENT AV		0.148	0.197	0.275	0.206	0.255	0.406	0.305	0.268	0.289			
BOD EFF MO AVG LB/D	109	6.43	7.58	11.03	13.03	8.44	10.97	10.45	10.14	19.08			
BOD EFF WK AVG LB/D	163	7.7	9.4	13.25	21.4	13.02	12.93	11.18	11.53	31.43			
BOD EFF MO AVG MG/L	30	5.2	4.67	6.33	7.47	4.4	3.25	4.14	4.68	7.41			
BOD EFF WK MG/L	45	6.33	5.67	8.66	11.33	5.67	4	4.663	5.33	9.66			
% REMVL BOD	85	96.69	95.84	96.06	96.13	97.1	97.13	96.58	95.97	93.56			
PH MIN	6	6.51	6.59	6.57	6.53	6.9	6.94	7.49	6.95	6.64			
PH MAX	9	8.16	8.31	8.89	8.25	8.85	8.57	8.49	7.94	8.72			
TSS EFF MO AVG LB/D	109	5.7	6.63	11.08	11.14	8.83	14.41	13.23	9.66	11.12			
TSS EFF WK AVG LB/D	163	7.86	7.23	17.72	15.66	12.75	16.16	13.4	10.86	15.45			
TSS EFF MO AVG MG/L	30	4.6	4	6.08	6.67	4.3	4.16	4.85	4.33	4.42			
TSS EFF WK MG/L	45	6.33	4	8	10.33	5	4.66	5.33	4.66	5			
%REMVL TSS	85	95.86	96.16	95.8	96.84	97.43	97.16	96.38	95.84	95.97			
NIT TOT MO AV #/DAY	53.3	37.07	4.67	40.34	29.42	25.57	22.81	13.99	15.33	21.9			
NIT TOT MO AV MG/L	10	29.90	24.53	22.03	17.85	13.08	6.25	5.13	6.83	8.63			
PHOS LBS/DAY MO AV	11.2	1.24	4.5	2.64	4.73	2.8	0.78	0.4	1.2	1.67			
PHOS MG/L MO AV	1	1.01	2.74	1.52	2.75	1.32	0.23	0.16	0.54	0.78			
E. COLI MO GEOMN	126 / 630	1.66	1.38	9.56	10.9	2.47	1.89	3.63	6.38	4.66			
E. COLI 7DAY GEOMN	252 / 1260	4.76	3.63	22.53	46.9	2.71	4.16	4.76	8.93	2.88			
COPPER	11.7												

APPENDIX G

FLOW DATA 2015-2019

Month	Daily Avg	Daily Max
January	454,078	675,521
February	205,651	259,362
March	178,662	205,268
April	175,245	235,272
May	263,422	491,496
June	395,803	478,344
July	303,910	406,443
August	244,174	268,183
Septembe	233,297	294,241
October	186,147	230,226
November	256,826	232,108
December	206,472	292,175
yearly average	**258,641**	**675,521**

DATE	Influent		
1/1/2015	219473		
1/2/2015	248564		
1/3/2015	287985		
1/4/2015	366605		
1/5/2015	437899		
1/6/2015	455725		
1/7/2015	504056		
1/8/2015	530678		
1/9/2015	571013		
1/10/2015	552064		
1/11/2015	614685		
1/12/2015	675521		
1/13/2015	604935		
1/14/2015	585146		
1/15/2015	562945		
1/16/2015	554508		
1/17/2015	563247		
1/18/2015	553416		
1/19/2015	531912		
1/20/2015	518291		
1/21/2015	460638		
1/22/2015	439143		
1/23/2015	429056		
1/24/2015	435368		
1/25/2015	496814		
1/26/2015	423959		
1/27/2015	332876		
1/28/2015	313018		
1/29/2015	291026		
1/30/2015	268240	Daily Avg	Daily Max
1/31/2015	247610	454078	675521
2/1/2015	245548		
2/2/2015	259362		
2/3/2015	244982		
2/4/2015	226238		
2/5/2015	221201		
2/6/2015	222399		
2/7/2015	216629		
2/8/2015	231437		
2/9/2015	250343		
2/10/2015	215226		
2/11/2015	213182		
2/12/2015	206120		
2/13/2015	214749		

2/14/2015	197585		
2/15/2015	207041		
2/16/2015	212002		
2/17/2015	216882		
2/18/2015	187095		
2/19/2015	193422		
2/20/2015	186660		
2/21/2015	186500		
2/22/2015	189775		
2/23/2015	146491		
2/24/2015	166769		
2/25/2015	182420		
2/26/2015	176668		
2/27/2015	167759	Daily Avg	Daily Max
2/28/2015	173756	205651	259362
3/1/2015	177443		
3/2/2015	191092		
3/3/2015	179647		
3/4/2015	157058		
3/5/2015	171204		
3/6/2015	189805		
3/7/2015	178626		
3/8/2015	162877		
3/9/2015	192787		
3/10/2015	168649		
3/11/2015	164280		
3/12/2015	173750		
3/13/2015	182842		
3/14/2015	162340		
3/15/2015	185658		
3/16/2015	205268		
3/17/2015	186074		
3/18/2015	187035		
3/19/2015	176477		
3/20/2015	173099		
3/21/2015	168935		
3/22/2015	179490		
3/23/2015	186780		
3/24/2015	179749		
3/25/2015	177730		
3/26/2015	175977		
3/27/2015	180509		
3/28/2015	174875		
3/29/2015	195991		
3/30/2015	191953	Daily Avg	Daily Max
3/31/2015	160527	178662	205268
4/1/2015	175204		

4/2/2015	172285		
4/3/2015	173354		
4/4/2015	168129		
4/5/2015	180818		
4/6/2015	196543		
4/7/2015	177021		
4/8/2015	169856		
4/9/2015	174107		
4/10/2015	235272		
4/11/2015	166876		
4/12/2015	179740		
4/13/2015	188919		
4/14/2015	168047		
4/15/2015	177814		
4/16/2015	163629		
4/17/2015	161006		
4/18/2015	155808		
4/19/2015	176738		
4/20/2015	184855		
4/21/2015	155551		
4/22/2015	154647		
4/23/2015	181627		
4/24/2015	168862		
4/25/2015	175591		
4/26/2015	178221		
4/27/2015	208842		
4/28/2015	158835		
4/29/2015	159043	Daily Avg	Daily Max
4/30/2015	170124	175245	235272
5/1/2015	170802		
5/2/2015	163131		
5/3/2015	175373		
5/4/2015	188818		
5/5/2015	175916		
5/6/2015	194263		
5/7/2015	194640		
5/8/2015	198036		
5/9/2015	195312		
5/10/2015	178283		
5/11/2015	193411		
5/12/2015	189759		
5/13/2015	190900		
5/14/2015	181558		
5/15/2015	201569		
5/16/2015	209753		
5/17/2015	314402		
5/18/2015	318366		

5/19/2015	295793		
5/20/2015	292220		
5/21/2015	310258		
5/22/2015	336575		
5/23/2015	290449		
5/24/2015	321465		
5/25/2015	318101		
5/26/2015	332453		
5/27/2015	353636		
5/28/2015	382211		
5/29/2015	402345		
5/30/2015	404791	Daily Avg	Daily Max
5/31/2015	491496	263422	491496
6/1/2015	478344		
6/2/2015	413146		
6/3/2015	425848		
6/4/2015	422285		
6/5/2015	402789		
6/6/2015	413889		
6/7/2015	403649		
6/8/2015	415164		
6/9/2015	403762		
6/10/2015	432328		
6/11/2015	397454		
6/12/2015	395552		
6/13/2015	376413		
6/14/2015	374834		
6/15/2015	393657		
6/16/2015	372782		
6/17/2015	363189		
6/18/2015	370709		
6/19/2015	379239		
6/20/2015	361337		
6/21/2015	359677		
6/22/2015	385795		
6/23/2015	385138		
6/24/2015	377783		
6/25/2015	376437		
6/26/2015	391355		
6/27/2015	364029		
6/28/2015	389444		
6/29/2015	417759	Daily Avg	Daily Max
6/30/2015	430317	395803	478344
7/1/2015	406443		
7/2/2015	359174		
7/3/2015	315420		
7/4/2015	306408		

7/5/2015	310316		
7/6/2015	372935		
7/7/2015	322499		
7/8/2015	323251		
7/9/2015	295899		
7/10/2015	304806		
7/11/2015	318212		
7/12/2015	330819		
7/13/2015	321243		
7/14/2015	307010		
7/15/2015	302838		
7/16/2015	307953		
7/17/2015	307850	added a zero	
7/18/2015	293370		
7/19/2015	257541		
7/20/2015	276046		
7/21/2015	268498		
7/22/2015	273577		
7/23/2015	277157		
7/24/2015	275202		
7/25/2015	259498		
7/26/2015	258664		
7/27/2015	299439		
7/28/2015	344869		
7/29/2015	294864		
7/30/2015	276290	Daily Avg	Daily Max
7/31/2015	253125	303910	406443
8/1/2015	248969		
8/2/2015	258058		
8/3/2015	260782		
8/4/2015	261226		
8/5/2015	263750		
8/6/2015	268183		
8/7/2015	241108		
8/8/2015	241108		
8/9/2015	241108		
8/10/2015	241108		
8/11/2015	241108		
8/12/2015	241108		
8/13/2015	241108		
8/14/2015	240997		
8/15/2015	267272		
8/16/2015	245642		
8/17/2015	256911		
8/18/2015	251229		
8/19/2015	244116		
8/20/2015	236744		

8/21/2015	236015		
8/22/2015	229862		
8/23/2015	229484		
8/24/2015	244780		
8/25/2015	224838		
8/26/2015	217773		
8/27/2015	241108		
8/28/2015	241108		
8/29/2015	226878		
8/30/2015	232985	Daily Avg	Daily Max
8/31/2015	252926	244174	268183
9/1/2015	222767		
9/2/2015	216778		
9/3/2015	219637		
9/4/2015	244165		
9/5/2015	255337		
9/6/2015	280253		
9/7/2015	245700		
9/8/2015	264685		
9/9/2015	231056		
9/10/2015	225533		
9/11/2015	211863		
9/12/2015	204521		
9/13/2015	207836		
9/14/2015	241867		
9/15/2015	239088		
9/16/2015	264527		
9/17/2015	291843		
9/18/2015	294241		
9/19/2015	261392		
9/20/2015	255416		
9/21/2015	248713		
9/22/2015	217102		
9/23/2015	216701		
9/24/2015	215762		
9/25/2015	208634		
9/26/2015	199205		
9/27/2015	210494		
9/28/2015	222444		
9/29/2015	189882	Daily Avg	Daily Max
9/30/2015	191455	233297	294241
10/1/2015	196761		
10/2/2015	230226		
10/3/2015	204710		
10/4/2015	210550		
10/5/2015	210668		
10/6/2015	185024		

10/7/2015	191362		
10/8/2015	207851		
10/9/2015	194435		
10/10/2015	185526		
10/11/2015	178077		
10/12/2015	203855		
10/13/2015	192460		
10/14/2015	187357		
10/15/2015	182562		
10/16/2015	165364		
10/17/2015	166605		
10/18/2015	180452		
10/19/2015	219972		
10/20/2015	192270		
10/21/2015	181476		
10/22/2015	167631		
10/23/2015	167756		
10/24/2015	151822		
10/25/2015	179374		
10/26/2015	206788		
10/27/2015	163775		
10/28/2015	175417		
10/29/2015	159004		
10/30/2015	167425	Daily Avg	Daily Max
10/31/2015	164015	186147	230226
11/1/2016	256826		
11/2/2016	256826		
11/3/2016	256826		
11/4/2016	256826		
11/5/2016	256826		
11/6/2016	256826		
11/7/2016	256826		
11/8/2016	256826		
11/9/2016	256826		
11/10/2016	256826		
11/11/2016	256826		
11/12/2016	256826		
11/13/2016	256826		
11/14/2016	256826		
11/15/2016	256826		
11/16/2016	256826		
11/17/2016	256826		
11/18/2016	256826		
11/19/2016	256826		
11/20/2016	256826		
11/21/2016	256826		
11/22/2016	256826		

11/23/2016	256826		
11/24/2016	256826		
11/25/2016	256826		
11/26/2016	256826		
11/27/2016	256826		
11/28/2016	256826		
11/29/2016	256826	Daily Avg	Daily Max
11/30/2016	256826	256826	256826
12/1/2015	181629		
12/2/2015	208262		
12/3/2015	245848		
12/4/2015	275953		
12/5/2015	280034		
12/6/2015	282299		
12/7/2015	292175		
12/8/2015	254817		
12/9/2015	213355		
12/10/2015	188808		
12/11/2015	187988		
12/12/2015	177865		
12/13/2015	174738		
12/14/2015	193743		
12/15/2015	165947		
12/16/2015	165851		
12/17/2015	184090		
12/18/2015	190955		
12/19/2015	171808		
12/20/2015	181563		
12/21/2015	187927		
12/22/2015	181606		
12/23/2015	178640		
12/24/2015	171298		
12/25/2015	174340		
12/26/2015	167516		
12/27/2015	166785		
12/28/2015	201455		
12/29/2015	225938		
12/30/2015	253271	Daily Avg	Daily Max
12/31/2015	274127	206472	292175

Total	**94536236**
Daily Average	**259,003**
Max. Daily Flow	**675,521**

DATE	**Influent**			
1/1/2016	274127			
1/2/2016	299361			
1/3/2016	327444			
1/4/2016	354293			
1/5/2016	401868			
1/6/2016	386242			
1/7/2016	407539			
1/8/2016	409619			
1/9/2016	408789			
1/10/2016	381893			
1/11/2016	385588			
1/12/2016	396542			
1/13/2016	373979			
1/14/2016	387750			
1/15/2016	411751			
1/16/2016	395931			
1/17/2016	359557			
1/18/2016	348487			
1/19/2016	334972			
1/20/2016	330895			
1/21/2016	297379			
1/22/2016	281251			
1/23/2016	255027			
1/24/2016	233110			
1/25/2016	233062			
1/26/2016	247866			
1/27/2016	214137			
1/28/2016	209740			
1/29/2016	209651			
1/30/2016	209920	Daily Avg	Daily Max	
1/31/2016	212383	325592	411751	(no data for Jan 31st)
2/1/2016	214845			
2/2/2016	190656			
2/3/2016	185241			
2/4/2016	183388			
2/5/2016	193150			
2/6/2016	188614			
2/7/2016	215946			
2/8/2016	218002			
2/9/2016	209163			
2/10/2016	189792			
2/11/2016	192381			
2/12/2016	197222			
2/13/2016	184193			

Month	Daily Avg	Daily Max
January	325,592	411,751
February	191,619	218,002
March	177,446	203,963
April	186,999	231,577
May	250,653	344,235
June	320,747	361,458
July	236,957	369,276
August	368,471	260,080
Septembe	212,383	269,401
October	203,589	249,214
November	188,197	214,627
December	215,824	293,954
yearly average	**239,873**	**411,751**

2/14/2016	187440		
2/15/2016	204487		
2/16/2016	213160		
2/17/2016	193964		
2/18/2016	197823		
2/19/2016	192963		
2/20/2016	178566		
2/21/2016	186268		
2/22/2016	200310		
2/23/2016	181322		
2/24/2016	172002		
2/25/2016	175016		
2/26/2016	163659		
2/27/2016	177491	Daily Avg	Daily Max
2/28/2016	192731	191619	218002
2/29/2016	177155		
3/1/2016	176173		
3/2/2016	173625		
3/3/2016	170398		
3/4/2016	162030		
3/5/2016	178722		
3/6/2016	202827		
3/7/2016	175983		
3/8/2016	182904		
3/9/2016	174687		
3/10/2016	182088		
3/11/2016	178416		
3/12/2016	168322		
3/13/2016	203963		
3/14/2016	184150		
3/15/2016	183086		
3/16/2016	175792		
3/17/2016	185738		
3/18/2016	164381		
3/19/2016	179638		
3/20/2016	189351		
3/21/2016	176817		
3/22/2016	183252		
3/23/2016	176020		
3/24/2016	170689		
3/25/2016	172939		
3/26/2016	176778		
3/27/2016	165830		
3/28/2016	176035		
3/29/2016	170918	Daily Avg	Daily Max
3/30/2016	174840	177446	203963
3/31/2016	164425		

4/1/2016	174840		
4/2/2016	164425		
4/3/2016	176071		
4/4/2016	197537		
4/5/2016	178978		
4/6/2016	186737		
4/7/2016	192020		
4/8/2016	169892		
4/9/2016	165819		
4/10/2016	183498		
4/11/2016	194170		
4/12/2016	163499		
4/13/2016	189532		
4/14/2016	179357		
4/15/2016	222707		
4/16/2016	199132		
4/17/2016	169847		
4/18/2016	191572		
4/19/2016	166632		
4/20/2016	159271		
4/21/2016	169843		
4/22/2016	176132		
4/23/2016	175938		
4/24/2016	197530		
4/25/2016	227892		
4/26/2016	194960		
4/27/2016	203693		
4/28/2016	223003	Daily Avg	Daily Max
4/29/2016	231577	186999	231577
4/30/2016	183866		
5/1/2016	189039		
5/2/2016	171031		
5/3/2016	174440		
5/4/2016	194069		
5/5/2016	186114		
5/6/2016	194069		
5/7/2016	208971		
5/8/2016	195491		
5/9/2016	234376		
5/10/2016	265406		
5/11/2016	249078		
5/12/2016	221470		
5/13/2016	222522		
5/14/2016	219813		
5/15/2016	213991		
5/16/2016	262711		
5/17/2016	215334		

5/18/2016	208960		
5/19/2016	222819		
5/20/2016	255295		
5/21/2016	281378		
5/22/2016	328266		
5/23/2016	339004		
5/24/2016	324155		
5/25/2016	292747		
5/26/2016	300149		
5/27/2016	310470		
5/28/2016	320398		
5/29/2016	310820	Daily Avg	Daily Max
5/30/2016	313614	250653	344235
5/31/2016	344235		
6/1/2016	310180		
6/2/2016	325195		
6/3/2016	349692		
6/4/2016	347642		
6/5/2016	334123		
6/6/2016	356624		
6/7/2016	342620		
6/8/2016	355054		
6/9/2016	306135		
6/10/2016	361458		
6/11/2016	344584		
6/12/2016	338763		
6/13/2016	337014		
6/14/2016	325411		
6/15/2016	334196		
6/16/2016	323824		
6/17/2016	299708		
6/18/2016	311376		
6/19/2016	318096		
6/20/2016	273804		
6/21/2016	293628		
6/22/2016	276365		
6/23/2016	306983		
6/24/2016	312996		
6/25/2016	302448		
6/26/2016	311160		
6/27/2016	308055		
6/28/2016	311274	Daily Avg	Daily Max
6/29/2016	307179	320747	361458
6/30/2016	296819		
7/1/2016	196819		
7/2/2016	267706		
7/3/2016	270004		

7/4/2016	274922		
7/5/2016	286716		
7/6/2016	268436		
7/7/2016	262611		
7/8/2016	242039		
7/9/2016	239639		
7/10/2016	258693		
7/11/2016	299878		
7/12/2016	253697		
7/13/2016	244113		
7/14/2016	227338		
7/15/2016	213042		
7/16/2016	220922		
7/17/2016	220240		
7/18/2016	238843		
7/19/2016	216912		
7/20/2016	269941		
7/21/2016	201786		
7/22/2016	206356		
7/23/2016	208310		
7/24/2016	205539		
7/25/2016	369276		
7/26/2016	203361		
7/27/2016	200906		
7/28/2016	192634		
7/29/2016	186346	Daily Avg	Daily Max
7/30/2016	195583	236957	369276
7/31/2016	203069		
8/1/2016	203069		
8/2/2016	203069		
8/3/2016	206198		
8/4/2016	198054		
8/5/2016	211536		
8/6/2016	193063		
8/7/2016	203784		
8/8/2016	229479		
8/9/2016	260080		
8/10/2016	226448		
8/11/2016	231739		
8/12/2016	234060		
8/13/2016	219277		
8/14/2016	209976		
8/15/2016	198943		
8/16/2016	218062		
8/17/2016	201497		
8/18/2016	206040		
8/19/2016	203859		

8/20/2016	250052		
8/21/2016	227967		
8/22/2016	211345		
8/23/2016	230526		
8/24/2016	221108		
8/25/2016	220564		
8/26/2016	208201		
8/27/2016	208335		
8/28/2016	195286		
8/29/2016	209246	Daily Avg	Daily Max
8/30/2016	227048	368471	260080
8/31/2016	210224		
9/1/2016	210214		
9/2/2016	201939		
9/3/2016	215563		
9/4/2016	239936		
9/5/2016	269401		
9/6/2016	268447		
9/7/2016	252933		
9/8/2016	216427		
9/9/2016	217819		
9/10/2016	212320		
9/11/2016	190331		
9/12/2016	208175		
9/13/2016	242698		
9/14/2016	202680		
9/15/2016	194381		
9/16/2016	200159		
9/17/2016	185798		
9/18/2016	186982		
9/19/2016	205093		
9/20/2016	217528		
9/21/2016	190613		
9/22/2016	208140		
9/23/2016	236181		
9/24/2016	225763		
9/25/2016	212036		
9/26/2016	207285		
9/27/2016	213313		
9/28/2016	189452	Daily Avg	Daily Max
9/29/2016	173271	212383	269401
9/30/2016	176621		
10/1/2016	183575		
10/2/2016	184696		
10/3/2016	202192		
10/4/2016	222435		
10/5/2016	225416		

10/6/2016	236075		
10/7/2016	218840		
10/8/2016	217050		
10/9/2016	207297		
10/10/2016	222011		
10/11/2016	217050		
10/12/2016	200452		
10/13/2016	202606		
10/14/2016	209882		
10/15/2016	201179		
10/16/2016	203824		
10/17/2016	221172		
10/18/2016	194786		
10/19/2016	203238		
10/20/2016	197812		
10/21/2016	197400		
10/22/2016	180239		
10/23/2016	181502		
10/24/2016	201912		
10/25/2016	186940		
10/26/2016	177887		
10/27/2016	197115		
10/28/2016	192653		
10/29/2016	180363	Daily Avg	Daily Max
10/30/2016	194450	203589	249214
10/31/2016	249214		
11/1/2016	195812		
11/2/2016	192184		
11/3/2016	200127		
11/4/2016	185034		
11/5/2016	184627		
11/6/2016	198334		
11/7/2016	213507		
11/8/2016	186726		
11/9/2016	183734		
11/10/2016	186686		
11/11/2016	185743		
11/12/2016	186160		
11/13/2016	193476		
11/14/2016	214627		
11/15/2016	180760		
11/16/2016	183138		
11/17/2016	184490		
11/18/2016	180880		
11/19/2016	169190		
11/20/2016	175336		
11/21/2016	196134		

11/22/2016	186723		
11/23/2016	183779		
11/24/2016	193688		
11/25/2016	178999		
11/26/2016	177516		
11/27/2016	183295		
11/28/2016	202271		
11/29/2016	184651	Daily Avg	Daily Max
11/30/2016	178275	188197	214627
12/1/2016	180760		
12/2/2016	214627		
12/3/2016	193476		
12/4/2016	186160		
12/5/2016	185743		
12/6/2016	173521		
12/7/2016	189115		
12/8/2016	179625		
12/9/2016	187580		
12/10/2016	161613		
12/11/2016	184730		
12/12/2016	213693		
12/13/2016	189677		
12/14/2016	195896		
12/15/2016	211386		
12/16/2016	255912		
12/17/2016	262689		
12/18/2016	275077		
12/19/2016	293954		
12/20/2016	262910		
12/21/2016	229679		
12/22/2016	235919		
12/23/2016	231938		
12/24/2016	235919		
12/25/2016	229679		
12/26/2016	228380		
12/27/2016	231563		
12/28/2016	226261		
12/29/2016	216727	Daily Avg	Daily Max
12/30/2016	214982	215824	293954
12/31/2016	211355		

Total	**83083553**
Daily Average	**204,118**
Max. Daily Flow	**411,751**

Date	Influent		
1/1/2017	**215524**		
1/2/2017	219693		
1/3/2017	220731		
1/4/2017	228705		
1/5/2017	195859		
1/6/2017	206182		
1/7/2017	206976		
1/8/2017	201249		
1/9/2017	229115		
1/10/2017	229074		
1/11/2017	224454		
1/12/2017	245722		
1/13/2017	128266		
1/14/2017	219535		
1/15/2017	222886		
1/16/2017	247028		
1/17/2017	249173		
1/18/2017	245120		
1/19/2017	252504		
1/20/2017	269556		
1/21/2017	283882		
1/22/2017	294938		
1/23/2017	319631		
1/24/2017	302172		
1/25/2017	276240		
1/26/2017	281432		
1/27/2017	271870		
1/28/2017	252150		
1/29/2017	268049		
1/30/2017	292787	Daily Avg	Daily Max
1/31/2017	286898	451095	319631
2/1/2017	278252		
2/2/2017	263143		
2/3/2017	240015		
2/4/2017	239845		
2/5/2017	272292		
2/6/2017	279816		
2/7/2017	260329		
2/8/2017	251844		
2/9/2017	273775		
2/10/2017	318043		
2/11/2017	333542		
2/12/2017	336169		
2/13/2017	320544		
2/14/2017	283728		
2/15/2017	292544		
2/16/2017	363529		
2/17/2017	405284		
2/18/2017	453929		
2/19/2017	451608		
2/20/2017	398583		
2/21/2017	365291		
2/22/2017	332247		
2/23/2017	309797		
2/24/2017	291302		

Month	Daily Avg	Daily Max
January	451,095	319,631
February	310,184	453,929
March	262,968	299,311
April	254,485	279,860
May	299,473	391,936
June	278,901	321,076
July	245,824	274,965
August	218,206	244,452
September	234,919	334,518
October	242,840	287,099
November	203,707	227,977
December	240,445	403,591

2/25/2017	281440		
2/26/2017	283382		
2/27/2017	247594	Daily Avg	Daily Max
2/28/2017	257273	310184	453929
3/1/2017	266771		
3/2/2017	280376		
3/3/2017	266803		
3/4/2017	285502		
3/5/2017	289090		
3/6/2017	276749		
3/7/2017	256246		
3/8/2017	257951		
3/9/2017	234624		
3/10/2017	219051		
3/11/2017	243202		
3/12/2017	276175		
3/13/2017	263623		
3/14/2017	254582		
3/15/2017	268146		
3/16/2017	278892		
3/17/2017	274123		
3/18/2017	269755		
3/19/2017	299311		
3/20/2017	276949		
3/21/2017	265263		
3/22/2017	263937		
3/23/2017	259764		
3/24/2017	257116		
3/25/2017	277185		
3/26/2017	266184		
3/27/2017	242690		
3/28/2017	241844		
3/29/2017	240820		
3/30/2017	253788	Daily Avg	Daily Max
3/31/2017	245492	262968	299311
4/1/2017	261128		
4/2/2017	266182		
4/3/2017	242512		
4/4/2017	221214		
4/5/2017	253021		
4/6/2017	252198		
4/7/2017	257122		
4/8/2017	263649		
4/9/2017	272404		
4/10/2017	253587		
4/11/2017	238234		
4/12/2017	240944		
4/13/2017	247874		
4/14/2017	255569		
4/15/2017	261078		
4/16/2017	252262		
4/17/2017	257879		
4/18/2017	246496		
4/19/2017	246250		
4/20/2017	255019		
4/21/2017	253504		
4/22/2017	250385		
4/23/2017	279860		

4/24/2017	247411		
4/25/2017	246305		
4/26/2017	255372		
4/27/2017	261912		
4/28/2017	255168		
4/29/2017	262247	Daily Avg	Daily Max
4/30/2017	277772	254485	279860
5/1/2017	278932		
5/2/2017	261845		
5/3/2017	259167		
5/4/2017	269689		
5/5/2017	328080		
5/6/2017	378393		
5/7/2017	391936		
5/8/2017	297790		
5/9/2017	304128		
5/10/2017	306205		
5/11/2017	214601		
5/12/2017	317389		
5/13/2017	215465		
5/14/2017	309498		
5/15/2017	287287		
5/16/2017	273558		
5/17/2017	361257		
5/18/2017	319325		
5/19/2017	315070		
5/20/2017	309498		
5/21/2017	319341		
5/22/2017	305226		
5/23/2017	292784		
5/24/2017	333141		
5/25/2017	316844		
5/26/2017	295879		
5/27/2017	281404		
5/28/2017	268105		
5/29/2017	282742		
5/30/2017	301855	Daily Avg	Daily Max
5/31/2017	287233	299473	391936
6/1/2017	279697		
6/2/2017	282567		
6/3/2017	274002		
6/4/2017	310942		
6/5/2017	289121		
6/6/2017	280138		
6/7/2017	278493		
6/8/2017	278559		
6/9/2017	287370		
6/10/2017	282773		
6/11/2017	271827		
6/12/2017	304280		
6/13/2017	321076		
6/14/2017	290924		
6/15/2017	295595		
6/16/2017	317786		
6/17/2017	274274		
6/18/2017	288458		
6/19/2017	266529		
6/20/2017	278901		

6/21/2017	274584		
6/22/2017	272554		
6/23/2017	251310		
6/24/2017	252207		
6/25/2017	266574		
6/26/2017	262590		
6/27/2017	265320		
6/28/2017	252205		
6/29/2017	248431	Daily Avg	Daily Max
6/30/2017	267948	278901	321076
7/1/2017	261532		
7/2/2017	252701		
7/3/2017	251542		
7/4/2017	243843		
7/5/2017	251580		
7/6/2017	248827		
7/7/2017	255732		
7/8/2017	237179		
7/9/2017	270903		
7/10/2017	257932		
7/11/2017	259325		
7/12/2017	259825		
7/13/2017	248846		
7/14/2017	246408		
7/15/2017	274965		
7/16/2017	267238		
7/17/2017	241721		
7/18/2017	236766		
7/19/2017	241903		
7/20/2017	241239		
7/21/2017	235555		
7/22/2017	234391		
7/23/2017	235934		
7/24/2017	234091		
7/25/2017	230938		
7/26/2017	239330		
7/27/2017	229987		
7/28/2017	233253		
7/29/2017	232272		
7/30/2017	233436	Daily Avg	Daily Max
7/31/2017	231353	245824	274965
8/1/2017	238196		
8/2/2017	235802		
8/3/2017	218011		
8/4/2017	244452		
8/5/2017	241534		
8/6/2017	226748		
8/7/2017	222128		
8/8/2017	221514		
8/9/2017	224788		
8/10/2017	217716		
8/11/2017	214526		
8/12/2017	218886		
8/13/2017	235689		
8/14/2017	231613		
8/15/2017	218348		
8/16/2017	215826		
8/17/2017	213077		

8/18/2017	217468		
8/19/2017	212785		
8/20/2017	222530		
8/21/2017	203538		
8/22/2017	205294		
8/23/2017	200390		
8/24/2017	204304		
8/25/2017	201321		
8/26/2017	199733		
8/27/2017	197513		
8/28/2017	200054		
8/29/2017	223887		
8/30/2017	227887	Daily Avg	Daily Max
8/31/2017	208837	218206	244452
9/1/2017	208837		
9/2/2017	213420		
9/3/2017	197311		
9/4/2017	194192		
9/5/2017	231616		
9/6/2017	202891		
9/7/2017	207720		
9/8/2017	197901		
9/9/2017	196173		
9/10/2017	211337		
9/11/2017	193098		
9/12/2017	185789		
9/13/2017	205459		
9/14/2017	235648		
9/15/2017	334518		
9/16/2017	282627		
9/17/2017	277643		
9/18/2017	269945		
9/19/2017	264562		
9/20/2017	254604		
9/21/2017	252580		
9/22/2017	258494		
9/23/2017	260405		
9/24/2017	261439		
9/25/2017	247504		
9/26/2017	228495		
9/27/2017	237314		
9/28/2017	232982		
9/29/2017	237378	Daily Avg	Daily Max
9/30/2017	265697	234919	334518
10/1/2017	275227		
10/2/2017	255083		
10/3/2017	248500		
10/4/2017	255564		
10/5/2017	244538		
10/6/2017	261655		
10/7/2017	273571		
10/8/2017	287099		
10/9/2017	274653		
10/10/2017	260444		
10/11/2017	265491		
10/12/2017	252231		
10/13/2017	246998		
10/14/2017	256490		

10/15/2017	262765		
10/16/2017	243737		
10/17/2017	251241		
10/18/2017	243382		
10/19/2017	241308		
10/20/2017	245657		
10/21/2017	231292		
10/22/2017	240933		
10/23/2017	217013		
10/24/2017	209443		
10/25/2017	218555		
10/26/2017	204492		
10/27/2017	212159		
10/28/2017	204890		
10/29/2017	230450		
10/30/2017	207076	Daily Avg	Daily Max
10/31/2017	206098	242840	287099
11/1/2017	215687		
11/2/2017	202017		
11/3/2017	194060		
11/4/2017	192078		
11/5/2017	227977		
11/6/2017	192007		
11/7/2017	191074		
11/8/2017	190142		
11/9/2017	190196		
11/10/2017	206008		
11/11/2017	205479		
11/12/2017	221957		
11/13/2017	210503		
11/14/2017	204974		
11/15/2017	197538		
11/16/2017	204427		
11/17/2017	202323		
11/18/2017	205338		
11/19/2017	212999		
11/20/2017	203077		
11/21/2017	200872		
11/22/2017	205898		
11/23/2017	213491		
11/24/2017	201028		
11/25/2017	204428		
11/26/2017	214146		
11/27/2017	205329		
11/28/2017	198061		
11/29/2017	196410	Daily Avg	Daily Max
11/30/2017	201676	203707	227977
12/1/2017	197884		
12/2/2017	203057		
12/3/2017	210596		
12/4/2017	190196		
12/5/2017	188033		
12/6/2017	187116		
12/7/2017	192430		
12/8/2017	191283		
12/9/2017	194993		
12/10/2017	207800		
12/11/2017	187007		

12/12/2017	198039		
12/13/2017	195491		
12/14/2017	199868		
12/15/2017	217812		
12/16/2017	254784		
12/17/2017	281374		
12/18/2017	303091		
12/19/2017	282239		
12/20/2017	241617		
12/21/2017	232416		
12/22/2017	222550		
12/23/2017	210575		
12/24/2017	229381		
12/25/2017	236883		
12/26/2017	257043		
12/27/2017	285003		
12/28/2017	311764		
12/29/2017	350068		
12/30/2017	389800	Daily Avg	Daily Max
12/31/2017	403591	240445	403591

Total	**92,019,821**
Daily Average	**252,700**
Max. Daily Flow	**453,929**

Date	Influent		
1/1/2018	410255		
1/2/2018	410255		
1/3/2018	410255		
1/4/2018	410255		
1/5/2018	410255		
1/6/2018	410255		
1/7/2018	410255		
1/8/2018	410255		
1/9/2018	410255		
1/10/2018	410255		
1/11/2018	410255		
1/12/2018	410255		
1/13/2018	410255		
1/14/2018	410255		
1/15/2018	410255		
1/16/2018	410255		
1/17/2018	410255		
1/18/2018	410255		
1/19/2018	410255		
1/20/2018	410255		
1/21/2018	410255		
1/22/2018	410255		
1/23/2018	410255		
1/24/2018	410255		
1/25/2018	410255		
1/26/2018	410255		
1/27/2018	410255		
1/28/2018	410255		
1/29/2018	410255		
1/30/2018	410255	Daily Avg	Daily Max
1/31/2018	410255	410255	
2/1/2018	250423		
2/2/2018	267003		
2/3/2018	255554		
2/4/2018	237540		
2/5/2018	218571		
2/6/2018	209462		
2/7/2018	214920		
2/8/2018	232500		
2/9/2018	215963		
2/10/2018	206096		
2/11/2018	242930		
2/12/2018	228014		
2/13/2018	238760		
2/14/2018	256849		
2/15/2018	253418		
2/16/2018	262838		
2/17/2018	268126		
2/18/2018	276601		
2/19/2018	272369		
2/20/2018	249790		
2/21/2018	260589		
2/22/2018	275064		
2/23/2018	271434		

Month	Daily Avg	Daily Max
January	410255	468,968
February	252024	306,092
March	263214	459,841
April	257670	408,635
May	650417	964,324
June	909790	1,373,663
July	628126	828,664
August	442915	498,275
September	365276	396,447
October	283280	336,136
November	378576	253,720
December	201924	224,642

2/24/2018	283744		
2/25/2018	306092		
2/26/2018	288620		
2/27/2018	255789	Daily Avg	Daily Max
2/28/2018	257600	252024	306092
3/1/2018	259411		
3/2/2018	255090		
3/3/2018	237561		
3/4/2018	260344		
3/5/2018	230493		
3/6/2018	232151		
3/7/2018	229048		
3/8/2018	247313		
3/9/2018	279323		
3/10/2018	274388		
3/11/2018	248456		
3/12/2018	229145		
3/13/2018	235845		
3/14/2018	243545		
3/15/2018	459841		
3/16/2018	306033		
3/17/2018	288011		
3/18/2018	279322		
3/19/2018	276576		
3/20/2018	276355		
3/21/2018	267291		
3/22/2018	267304		
3/23/2018	274243		
3/24/2018	292600		
3/25/2018	280113		
3/26/2018	260620		
3/27/2018	240093		
3/28/2018	231716		
3/29/2018	235406		
3/30/2018	229630	Daily Avg	Daily Max
3/31/2018	232375	263214	459841
4/1/2018	232375		
4/2/2018	237494		
4/3/2018	218619		
4/4/2018	207210		
4/5/2018	216807		
4/6/2018	218216		
4/7/2018	206878		
4/8/2018	226476		
4/9/2018	241560		
4/10/2018	230958		
4/11/2018	227306		
4/12/2018	218353		
4/13/2018	258865		
4/14/2018	240365		
4/15/2018	244856		
4/16/2018	255994		
4/17/2018	263667		
4/18/2018	249599		
4/19/2018	239943		
4/20/2018	237002		
4/21/2018	255984		

4/22/2018	287898		
4/23/2018	290944		
4/24/2018	278227		
4/25/2018	278734		
4/26/2018	271178		
4/27/2018	286636		
4/28/2018	320889		
4/29/2018	378432	Daily Avg	Daily Max
4/30/2018	408635	257670	408635
5/1/2018	412908		
5/2/2018	409600		
5/3/2018	401800		
5/4/2018	400927		
5/5/2018	430189		
5/6/2018	458264		
5/7/2018	485016		
5/8/2018	505016		
5/9/2018	558513		
5/10/2018	594182		
5/11/2018	699500		
5/12/2018	682637		
5/13/2018	671948		
5/14/2018	611588		
5/15/2018	607912		
5/16/2018	613157		
5/17/2018	635204		
5/18/2018	692249		
5/19/2018	718994		
5/20/2018	728832		
5/21/2018	744332		
5/22/2018	759199		
5/23/2018	737245		
5/24/2018	736509		
5/25/2018	734694		
5/26/2018	748937		
5/27/2018	786029		
5/28/2018	860179		
5/29/2018	871180		
5/30/2018	901875	Daily Avg	Daily Max
5/31/2018	964324	650417	964324
6/1/2018	1002789		
6/2/2018	925911		
6/3/2018	884143		
6/4/2018	869251		
6/5/2018	848056		
6/6/2018	810523		
6/7/2018	829373		
6/8/2018	811544		
6/9/2018	806362		
6/10/2018	815132		
6/11/2018	773096		
6/12/2018	731984		
6/13/2018	689795		
6/14/2018	687308		
6/15/2018	669926		
6/16/2018	777787		
6/17/2018	795826		

6/18/2018	837206		
6/19/2018	963396		
6/20/2018	1373663		
6/21/2018	1323006		
6/22/2018	1219933		
6/23/2018	1154913		
6/24/2018	1075107		
6/25/2018	1019288		
6/26/2018	984142		
6/27/2018	921248		
6/28/2018	942331		
6/29/2018	885858	Daily Avg	Daily Max
6/30/2018	864788	909790	1373663
7/1/2018	828664		
7/2/2018	812851		
7/3/2018	792519		
7/4/2018	754550		
7/5/2018	749176		
7/6/2018	720161		
7/7/2018	720959		
7/8/2018	718312		
7/9/2018	708925		
7/10/2018	575846		
7/11/2018	671361		
7/12/2018	660394		
7/13/2018	641028		
7/14/2018	656722		
7/15/2018	641259		
7/16/2018	616884		
7/17/2018	630956		
7/18/2018	617613		
7/19/2018	592204		
7/20/2018	587165		
7/21/2018	574678		
7/22/2018	565392		
7/23/2018	546024		
7/24/2018	532122		
7/25/2018	520190		
7/26/2018	510891		
7/27/2018	519644		
7/28/2018	518996		
7/29/2018	509592		
7/30/2018	489534	Daily Avg	Daily Max
7/31/2018	487299	628126	828664
8/1/2018	485063		
8/2/2018	483145		
8/3/2018	481734		
8/4/2018	479686		
8/5/2018	498275		
8/6/2018	471843		
8/7/2018	466747		
8/8/2018	446389		
8/9/2018	441708		
8/10/2018	434097		
8/11/2018	440033		
8/12/2018	456948		
8/13/2018	441205		

8/14/2018	427094		
8/15/2018	428434		
8/16/2018	426208		
8/17/2018	416084		
8/18/2018	433161		
8/19/2018	441881		
8/20/2018	461239		
8/21/2018	448316		
8/22/2018	440432		
8/23/2018	432381		
8/24/2018	416237		
8/25/2018	410398		
8/26/2018	441934		
8/27/2018	443096		
8/28/2018	419955		
8/29/2018	409702		
8/30/2018	417632	Daily Avg	Daily Max
8/31/2018	389306	442915	498275
9/1/2018	387980		
9/2/2018	375778		
9/3/2018	395693		
9/4/2018	370723		
9/5/2018	376886		
9/6/2018	375818		
9/7/2018	388296		
9/8/2018	395267		
9/9/2018	396447		
9/10/2018	376300		
9/11/2018	373677		
9/12/2018	376520		
9/13/2018	393342		
9/14/2018	385382		
9/15/2018	354263		
9/16/2018	380543		
9/17/2018	381498		
9/18/2018	342051		
9/19/2018	349894		
9/20/2018	376966		
9/21/2018	359544		
9/22/2018	335597		
9/23/2018	339012		
9/24/2018	371534		
9/25/2018	358073		
9/26/2018	325322		
9/27/2018	332416		
9/28/2018	337834		
9/29/2018	320042	Daily Avg	Daily Max
9/30/2018	325576	365276	396447
10/1/2018	336136		
10/2/2018	319190		
10/3/2018	325092		
10/4/2018	298244		
10/5/2018	321940		
10/6/2018	302753		
10/7/2018	306633		
10/8/2018	307423		
10/9/2018	298007		

10/10/2018	311707		
10/11/2018	295077		
10/12/2018	292449		
10/13/2018	291413		
10/14/2018	290902		
10/15/2018	301306		
10/16/2018	280974		
10/17/2018	270119		
10/18/2018	262761		
10/19/2018	255578		
10/20/2018	248766		
10/21/2018	257771		
10/22/2018	285064		
10/23/2018	257934		
10/24/2018	253289		
10/25/2018	259489		
10/26/2018	260449		
10/27/2018	254443		
10/28/2018	257326		
10/29/2018	277696		
10/30/2018	254507	Daily Avg	Daily Max
10/31/2018	247235	283280	336136
11/1/2018	249175		
11/2/2018	251114		
11/3/2018	247845		
11/4/2018	243519		
11/5/2018	253720		
11/6/2018	238184		
11/7/2018	247567		
11/8/2018	237907		
11/9/2018	225748		
11/10/2018	232260		
11/11/2018	236023		
11/12/2018	237523		
11/13/2018	228327		
11/14/2018	214320		
11/15/2018	215952		
11/16/2018	215188		
11/17/2018	207334		
11/18/2018	213794		
11/19/2018	228055		
11/20/2018	209307		
11/21/2018	202878		
11/22/2018	215183		
11/23/2018	213754		
11/24/2018	209689		
11/25/2018	204278		
11/26/2018	218566		
11/27/2018	205294		
11/28/2018	205459		
11/29/2018	205348	Daily Avg	Daily Max
11/30/2018	197696	378576	253720
12/1/2018	194591		
12/2/2018	192672		
12/3/2018	218281		
12/4/2018	199616		
12/5/2018	195315		

12/6/2018	197409		
12/7/2018	191874		
12/8/2018	189485		
12/9/2018	191331		
12/10/2018	210008		
12/11/2018	202536		
12/12/2018	213750		
12/13/2018	216693		
12/14/2018	218352		
12/15/2018	200181		
12/16/2018	212787		
12/17/2018	224642		
12/18/2018	203001		
12/19/2018	204884		
12/20/2018	198011		
12/21/2018	198326		
12/22/2018	199637		
12/23/2018	203588		
12/24/2018	200627		
12/25/2018	204532		
12/26/2018	193174		
12/27/2018	194182		
12/28/2018	201385		
12/29/2018	187769		
12/30/2018	202439	Daily Avg	Daily Max
12/31/2018	198580	201924	224642

Total	**149033814**
Daily Average	**408,312**
Max. Daily Flow	**1,373,663**

Date	Influent		
1/1/2019	195,186		
1/2/2019	209,778		
1/3/2019	199,216		
1/4/2019	194,246		
1/5/2019	200,148		
1/6/2019	194,606		
1/7/2019	217,061		
1/8/2019	208,539		
1/9/2019	198,581		
1/10/2019	204,624		
1/11/2019	204,804		
1/12/2019	196,233		
1/13/2019	198,352		
1/14/2019	207,362		
1/15/2019	196,060		
1/16/2019	207,058		
1/17/2019	198,951		
1/18/2019	193,279		
1/19/2019	198,237		
1/20/2019	223,431		
1/21/2019	234,176		
1/22/2019	234,698		
1/23/2019	221,745		
1/24/2019	203,923		
1/25/2019	193,326		
1/26/2019	189,957		
1/27/2019	205,794		
1/28/2019	222,725		
1/29/2019	186,532		
1/30/2019	186,772	Daily Avg	Daily Max
1/31/2019	186,417	203607	234698
2/1/2019	189,652		
2/2/2019	196,893		
2/3/2019	208,545		
2/4/2019	233,374		
2/5/2019	235,949		
2/6/2019	232,175		
2/7/2019	228,988		
2/8/2019	210,726		
2/9/2019	223,760		
2/10/2019	254,579		
2/11/2019	282,609		
2/12/2019	276,866		
2/13/2019	271,122		
2/14/2019	272,060		
2/15/2019	265,463		
2/16/2019	264,600		
2/17/2019	275,580		
2/18/2019	281,805		
2/19/2019	268,178		
2/20/2019	253,633		
2/21/2019	268,550		
2/22/2019	279,982		

Month	Daily Avg	Daily Max
January	203607	234,698
February	258431	319,809
March	275349	335,484
April	269728	311,107
May	338589	510,641
June	526491	590,306
July	368477	445,568
August	331586	449,406
September	341042	497,424
October	251550	299,432
November	198612	230,180
December	193639	211,101

2/23/2019	284,841		
2/24/2019	300,099		
2/25/2019	319,809		
2/26/2019	294,050		
2/27/2019	288,204	Daily Avg	Daily Max
2/28/2019	273,966	258431	319809
3/1/2019	279,424		
3/2/2019	280,421		
3/3/2019	304,357		
3/4/2019	317,938		
3/5/2019	291,080		
3/6/2019	281,652		
3/7/2019	273,046		
3/8/2019	261,756		
3/9/2019	253,120		
3/10/2019	265,628		
3/11/2019	267,898		
3/12/2019	252,421		
3/13/2019	253,517		
3/14/2019	266,732		
3/15/2019	266,159		
3/16/2019	248,733		
3/17/2019	249,414		
3/18/2019	258,204		
3/19/2019	248,100		
3/20/2019	252,091		
3/21/2019	276,950		
3/22/2019	291,946		
3/23/2019	303,264		
3/24/2019	303,889		
3/25/2019	335,484		
3/26/2019	283,179		
3/27/2019	272,718		
3/28/2019	265,186		
3/29/2019	287,606		
3/30/2019	279,480	Daily Avg	Daily Max
3/31/2019	264,441	275349	335484
4/1/2019	279,353		
4/2/2019	264,653		
4/3/2019	251,988		
4/4/2019	255,117		
4/5/2019	261,333		
4/6/2019	252,582		
4/7/2019	269,496		
4/8/2019	283,372		
4/9/2019	264,048		
4/10/2019	280,180		
4/11/2019	273,981		
4/12/2019	267,373		
4/13/2019	253,919		
4/14/2019	252,669		
4/15/2019	261,652		
4/16/2019	235,306		
4/17/2019	242,446		
4/18/2019	241,931		
4/19/2019	235,640		

4/20/2019	235,089		
4/21/2019	285,012		
4/22/2019	301,435		
4/23/2019	282,599		
4/24/2019	282,384		
4/25/2019	286,803		
4/26/2019	288,831		
4/27/2019	304,304		
4/28/2019	301,572		
4/29/2019	311,107	Daily Avg	Daily Max
4/30/2019	285,666	269728	311107
5/1/2019	276,192		
5/2/2019	265,729		
5/3/2019	260,377		
5/4/2019	244,157		
5/5/2019	248,576		
5/6/2019	268,024		
5/7/2019	241,303		
5/8/2019	242,863		
5/9/2019	247,465		
5/10/2019	235,187		
5/11/2019	248,190		
5/12/2019	234,575		
5/13/2019	260,719		
5/14/2019	289,281		
5/15/2019	294,641		
5/16/2019	327,217		
5/17/2019	369,591		
5/18/2019	412,382		
5/19/2019	414,956		
5/20/2019	426,039		
5/21/2019	395,017		
5/22/2019	390,403		
5/23/2019	400,084		
5/24/2019	373,959		
5/25/2019	365,008		
5/26/2019	371,147		
5/27/2019	423,499		
5/28/2019	494,482		
5/29/2019	484,814		
5/30/2019	479,730	Daily Avg	Daily Max
5/31/2019	510,641	338589	510641
6/1/2019	524,369		
6/2/2019	529,020		
6/3/2019	549,681		
6/4/2019	552,684		
6/5/2019	533,547		
6/6/2019	538,810		
6/7/2019	539,162		
6/8/2019	557,589		
6/9/2019	563,215		
6/10/2019	577,673		
6/11/2019	590,306		
6/12/2019	548,064		
6/13/2019	550,179		
6/14/2019	561,972		

6/15/2019	554,660		
6/16/2019	545,534		
6/17/2019	547,906		
6/18/2019	543,722		
6/19/2019	588,362		
6/20/2019	572,847		
6/21/2019	567,976		
6/22/2019	551,096		
6/23/2019	501,170		
6/24/2019	491,893		
6/25/2019	465,707		
6/26/2019	437,502		
6/27/2019	423,815		
6/28/2019	450,955		
6/29/2019	430,386	Daily Avg	Daily Max
6/30/2019	404,925	526491	590306
7/1/2019	413,782		
7/2/2019	395,094		
7/3/2019	403,240		
7/4/2019	400,478		
7/5/2019	402,791		
7/6/2019	377,735		
7/7/2019	421,824		
7/8/2019	445,568		
7/9/2019	414,679		
7/10/2019	399,151		
7/11/2019	384,412		
7/12/2019	376,343		
7/13/2019	358,491		
7/14/2019	370,595		
7/15/2019	390,339		
7/16/2019	374,536		
7/17/2019	375,068		
7/18/2019	382,805		
7/19/2019	357,349		
7/20/2019	350,157		
7/21/2019	329,998		
7/22/2019	347,350		
7/23/2019	343,287		
7/24/2019	348,788		
7/25/2019	335,454		
7/26/2019	321,486		
7/27/2019	310,175		
7/28/2019	318,200		
7/29/2019	323,864		
7/30/2019	325,087	Daily Avg	Daily Max
7/31/2019	324,658	368477	445568
8/1/2019	307,755		
8/2/2019	312,625		
8/3/2019	322,832		
8/4/2019	315,794		
8/5/2019	330,966		
8/6/2019	322,930		
8/7/2019	314,211		
8/8/2019	309,205		
8/9/2019	299,052		

8/10/2019	320,151		
8/11/2019	353,722		
8/12/2019	449,406		
8/13/2019	389,422		
8/14/2019	339,721		
8/15/2019	337,200		
8/16/2019	340,434		
8/17/2019	340,770		
8/18/2019	347,512		
8/19/2019	330,524		
8/20/2019	314,365		
8/21/2019	304,744		
8/22/2019	308,770		
8/23/2019	345,015		
8/24/2019	325,889		
8/25/2019	343,457		
8/26/2019	358,720		
8/27/2019	331,630		
8/28/2019	312,347		
8/29/2019	317,035		
8/30/2019	323,095	Daily Avg	Daily Max
8/31/2019	309,878	331586	449406
9/1/2019	298,077		
9/2/2019	293,339		
9/3/2019	322,718		
9/4/2019	297,970		
9/5/2019	304,640		
9/6/2019	292,446		
9/7/2019	331,388		
9/8/2019	373,634		
9/9/2019	382,905		
9/10/2019	497,424		
9/11/2019	410,446		
9/12/2019	415,470		
9/13/2019	380,391		
9/14/2019	341,071		
9/15/2019	355,180		
9/16/2019	361,916		
9/17/2019	347,960		
9/18/2019	345,276		
9/19/2019	331,243		
9/20/2019	333,963		
9/21/2019	331,152		
9/22/2019	326,099		
9/23/2019	333,507		
9/24/2019	320,866		
9/25/2019	316,481		
9/26/2019	311,822		
9/27/2019	321,214		
9/28/2019	297,142		
9/29/2019	315,626	Daily Avg	Daily Max
9/30/2019	339,903	341042	497424
10/1/2019	299,432		
10/2/2019	277,732		
10/3/2019	278,569		
10/4/2019	272,714		

10/5/2019	284,980		
10/6/2019	289,048		
10/7/2019	291,808		
10/8/2019	273,446		
10/9/2019	276,813		
10/10/2019	277,423		
10/11/2019	253,935		
10/12/2019	241,151		
10/13/2019	243,976		
10/14/2019	253,033		
10/15/2019	261,679		
10/16/2019	238,659		
10/17/2019	234,811		
10/18/2019	243,180		
10/19/2019	245,119		
10/20/2019	251,092		
10/21/2019	265,076		
10/22/2019	239,724		
10/23/2019	234,438		
10/24/2019	247,942		
10/25/2019	230,621		
10/26/2019	217,588		
10/27/2019	215,212		
10/28/2019	234,346		
10/29/2019	214,868		
10/30/2019	208,709	Daily Avg	Daily Max
10/31/2019	200,940	251550	299432
11/1/2019	200544		
11/2/2019	204593		
11/3/2019	215397		
11/4/2019	230180		
11/5/2019	202473		
11/6/2019	202858		
11/7/2019	197585		
11/8/2019	200806		
11/9/2019	198144		
11/10/2019	200018		
11/11/2019	213333		
11/12/2019	199997		
11/13/2019	191351		
11/14/2019	189553		
11/15/2019	190138		
11/16/2019	198351		
11/17/2019	198249		
11/18/2019	207083		
11/19/2019	199306		
11/20/2019	192977		
11/21/2019	197779		
11/22/2019	188131		
11/23/2019	185881		
11/24/2019	195747		
11/25/2019	202897		
11/26/2019	195699		
11/27/2019	175768		
11/28/2019	192187		
11/29/2019	204904	Daily Avg	Daily Max

11/30/2019	186427	198612	230180
12/1/2019	183106		
12/2/2019	200114		
12/3/2019	187128		
12/4/2019	203606		
12/5/2019	211049		
12/6/2019	202991		
12/7/2019	196782		
12/8/2019	191613		
12/9/2019	203633		
12/10/2019	184197		
12/11/2019	191040		
12/12/2019	200237		
12/13/2019	188838		
12/14/2019	189178		
12/15/2019	195372		
12/16/2019	211101		
12/17/2019	199750		
12/18/2019	187126		
12/19/2019	199000		
12/20/2019	205530		
12/21/2019	189880		
12/22/2019	201307		
12/23/2019	195041		
12/24/2019	190671		
12/25/2019	184309		
12/26/2019	178928		
12/27/2019	184495		
12/28/2019	181128		
12/29/2019	187342		
12/30/2019	194805	Daily Avg	Daily Max
12/31/2019	183505	193639	211101

Total	**108158977**
Daily Average	**296,326**
Max. Daily Flow	**590,306**

APPENDIX H

CITY ORDINANCE NO. 251

ORDINANCE NO. 251

AN ORDINANCE AMENDING EAST HELENA CITY ORDINANCE NOS. 149, 176, 219, 223, AND 246 AND AMENDING TITLE 7, CHAPTER 4, OF THE CITY CODE OF THE CITY OF EAST HELENA REGARDING WASTEWATER SERVICE CHARGES AND REGULATIONS

WHEREAS, under §§ 7-13-4301, *et seq.*, MCA, the City of East Helena has the statutory authority and power to establish a municipal wastewater system and furnish and regulate sewer services;

WHEREAS, under §§ 69-7-101, *et seq.*, MCA, the City of East Helena has the jurisdiction and authority to regulate, establish, and change, as it considers proper the rates, charges, and classifications as may be deemed by the City Council to be reasonable and just for sewer services;

WHEREAS, under § 69-7-201, MCA, each municipal utility is required to adopt, with the concurrence of the municipal governing body, rules for the operation of a municipal wastewater facility including provision for classification of users and the use of flat rate user charges; and

WHEREAS, the City of East Helena completed a Wastewater Facility System Study and in Resolution No. 416 adopted the East Helena Wastewater Facilities Master Plan - 2010, including recommendations for improvements to the municipal wastewater system, and in Resolution Nos. 416, 425, and 447 resolved to proceed with funding for and implementation of those improvements to the wastewater system;

WHEREAS, the City Council of the City of East Helena, Montana, has adopted Resolution 447 to further implementation of the 2010 municipal wastewater system master plan and improvements, which includes wastewater system improvements to meet the metals levels and discharge reduction requirements of the City's October 1, 2009, Montana Department of Environmental Quality Authorization to Discharge Under the Montana Pollutant Discharge

Elimination System (Wastewater Discharge) Permit, issued under Montana's Water Quality Act and the Federal Clean Water Act;

Section 1. Section 7-4-6 of the East Helena city code is hereby amended to read as follows:

7-4-6: RATE SCHEDULE. The Sewer Service Rate Schedule shall be as follows:

SEWER SERVICE RATE SCHEDULE
(MONTHLY)

Customer Class	"Equivalent Residential Customer" Billing Factor*	Rate Structure	Monthly Charge
Residential	1.0	Flat-Rate	~~$46.40~~ $66.40
Commercial	Q/200	Flat-Rate	~~$46.40~~ $66.40 x Billing Factor

Where: Q is the average daily metered water usage (in gallons) for the commercial customer over the consecutive months of December, January, and February; and 200 is the average daily metered water usage (in gallons) for a single residence

**Billing factors for commercial customers shall be calculated to the nearest one-tenth of a whole number, with the minimum allowable billing factor being 1.0*

Section 2. The rate increase specified herein shall be effective beginning with the July 1, 2013, wastewater monthly statement, unless sooner changed, canceled, or extended.

Section 3. All ordinances and resolutions in conflict herewith are hereby repealed to the extent of any inconsistencies.

Section 4. Although this rate increase will not go into effect until July 1, 2013, this Ordinance shall be effective as an ordinance of the City in accordance with state law, i.e. thirty days after adoption and passage, June 28, 2013.

First passed by the Council of the City of East Helena, Montana, and approved by the Mayor, on the 13th day of May, 2013.

Anthony E. Strainer

Anthony E. Strainer, Mayor

ATTEST:

Sandra K Milsten

Sandra K. Milsten, City Clerk

Finally passed by the Council of the City of East Helena, Montana, and approved by the Mayor, this 28th day of May, 2013.

Anthony E. Strainer, Mayor

ATTEST:

Sandra K. Milsten, City Clerk

APPENDIX I

COST ESTIMATES

EAST HELENA WASTEWATER MASTER PLAN - 2020					
COLLECTION SYSTEM ALTERNATIVE 2 - REPLACE EXISTING COLLECTION SYSTEM BY OPEN-DIG					
5/2/2020					
COST ESTIMATE					
ITEM	**QUAN.**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**	
Mobilization, Bonding & Ins.	1	LS	$ 74,870.00	$ 74,870.00	
Traffic Control	1	LS	$ 35,000.00	$ 35,000.00	
8-inch PVC SDR 35	4,450	LF	$ 65.00	$ 289,250.00	
12-inch PVC SDR 35	980	LF	$ 75.00	$ 73,500.00	
18-in PVC PS 46	830	LF	$ 95.00	$ 78,850.00	
21-in PVC PS 46	370	LF	$ 120.00	$ 44,400.00	
Sanitary Sewer Service Connection	109	EA	$ 1,200.00	$ 130,800.00	
Install New 48" Manholes (includes removal & disposal)	27	EA	$ 7,500.00	$ 202,500.00	
Directional Drilling 12-inch HDPE	170	LF	$ 300.00	$ 51,000.00	
Directional Drilling 18-inch HDPE	100	LF	$ 350.00	$ 35,000.00	
Dewatering	1	LS	$ 75,000.00	$ 75,000.00	
Bypass Pumping	1	LS	$ 65,000.00	$ 65,000.00	
Fence Removal and Replacement	20	LF	$ 30.00	$ 600.00	
Vegetation Restoration - Field	1	LS	$ 15,000.00	$ 15,000.00	
Vegetation Restoration - Grass	1	LS	$ 5,000.00	$ 5,000.00	
Gravel Removal and Replacement - 10' wide	2,540	SY	$ 25.00	$ 63,500.00	
Asphalt Removal/Replacement - 10' wide	3,200	SY	$ 115.00	$ 368,000.00	
Sub Total Construction Cost - 2020				**$ 1,607,270.00**	
Number of Years until Construction				2	
Inflation Rate				4.2%	
Sub Total Construction Cost - 2022				**$1,745,100.00**	
Admin @ 5%				$ 87,300.00	
Contingency @ 10%				$ 174,500.00	
Engineering @ 18%				$ 314,100.00	
Total Project Cost				**$ 2,321,000.00**	
ANNUAL OPERATING AND MAINTENANCE COSTS					
ITEM	**QUAN.**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**	
Labor		HRS		$ -	
Materials		LS		$ -	
Annual Cleaning & Jetting		LF		$ -	
Total Annual Cost				**$ -**	
PRESENT WORTH ANALYSIS					
DESCRIPTON				**TOTAL**	
Capital Cost				$2,321,000	
Annual O&M				$0	
Salvage Value in 20 years (estimate)				$ (543,180.00)	
Interest Rate				0.30%	
Number of payments				20	
			TOTAL PRESENT WORTH	**$1,809,410.00**	
Estimate is a Planning Level Estimate Based on Limited Information					

EAST HELENA WASTEWATER MASTER PLAN - 2020						
COLLECTION SYSTEM ALTERNATIVE 3 - REPLACE EXISTING COLLECTION SYSTEM BY CIPP						
3/24/2020						
COST ESTIMATE						
ITEM			**QUAN.**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**
Mobilization, Bonding & Ins.			1	LS	$ 23,650.00	$ 23,650.00
8-inch CIPP Sewer Main			4,210	LF	$ 34.00	$ 143,140.00
12-inch CIPP Sewer Main			740	LF	$ 42.00	$ 31,080.00
18-inch CIPP Sewer Main			750	LF	$ 85.00	$ 63,750.00
21-inch CIPP Sewer Main			320	LF	$ 110.00	$ 35,200.00
Sanitary Sewer Service Connection			18	EA	$ 1,200.00	$ 21,600.00
8-inch PVC SDR 35 (Open-Dig)			240	LF	$ 75.00	$ 18,000.00
12-inch PVC SDR 36 (Open-Dig)			240	LF	$ 90.00	$ 21,600.00
18-inch PVC SDR 35 (Open-Dig)			80	LF	$ 100.00	$ 8,000.00
21-inch PVC SDR 35 (Open-Dig)			50	LF	$ 130.00	$ 6,500.00
Dewatering			1	LS	$ 15,000.00	$ 15,000.00
Bypass Pumping			1	LS	$ 50,000.00	$ 50,000.00
Gravel Removal and Replacement - 10' wide			20	SY	$ 30.00	$ 600.00
Asphalt Removal and Replacement - 10' wide			240	SY	$ 125.00	$ 30,000.00
Install New 48" Manhole (includes removal & disposal)			3	EA	$ 9,500.00	$ 28,500.00
Sub Total Construction Cost - 2020						**$ 496,620.00**
Number of Years until Construction						2
Inflation Rate						4.2%
Sub Total Construction Cost - 2022						**$539,200.00**
Admin @ 5%						$ 27,000.00
Contingency @ 10%						$ 53,900.00
Engineering @ 18%						$ 97,100.00
Total Project Cost						**$ 717,200.00**
ANNUAL OPERATING AND MAINTENANCE COSTS						
ITEM			**QUAN.**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**
Labor				HRS		$ -
Materials				LS		$ -
Annual Cleaning & Jetting				LF		$ -
Total Annual Cost						**$ -**
PRESENT WORTH ANALYSIS						
DESCRIPTON						**TOTAL**
Capital Cost						$717,200
Annual O&M						$0
Salvage Value in 20 years (estimate)						$ (213,462.00)
Interest Rate						0.30%
Number of payments						20
					TOTAL PRESENT WORTH	**$516,150.00**
Estimate is a Planning Level Estimate Based on Limited Information						

EAST HELENA WASTEWATER SYSTEM MASTER PLAN - 2020				
MONTANA AVENUE LIFT STATION REPLACEMENT ALTERNATIVE 2 - W. DUDLEY STREET				
5/2/2020				
COST ESTIMATE				
ITEM	**QUAN.**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**
Mobilization, Bonding & Ins.	1	LS	$ 28,200.00	$ 28,200.00
Traffic Control	1	LS	$ 20,000.00	$ 20,000.00
8-inch PVC SDR 35 (Deep)	265	LF	$ 90.00	$ 23,850.00
8-inch Forcemain Piping	210	LF	$ 75.00	$ 15,750.00
Sanitary Sewer Service Connection	0	EA	$ 800.00	$ -
New 48" Manhole	2	EA	$ 6,500.00	$ 13,000.00
Modify Manhole	2	EA	$ 2,500.00	$ 5,000.00
New Wet Well (Includes Shoring and Installation)	1	LS	$ 60,000.00	$ 60,000.00
Abandonment of Existing Wet Well	1	LS	$ 15,000.00	$ 15,000.00
New Submersible Pump and Controls	2	EA	$ 40,000.00	$ 80,000.00
Pump Installation	2	EA	$ 7,500.00	$ 15,000.00
New Check Valve	2	EA	$ 2,000.00	$ 4,000.00
New Plug Valve	2	EA	$ 3,000.00	$ 6,000.00
New Pressure Gage	1	EA	$ 500.00	$ 500.00
Air Release Valve	1	EA	$ 5,000.00	$ 5,000.00
Flow Meter	1	EA	$ 15,000.00	$ 15,000.00
Valve Vault (Include Piping in Vault)	1	EA	$ 20,000.00	$ 20,000.00
Electrical and Control Wiring	1	LS	$ 35,000.00	$ 35,000.00
New Electrical Service	1	LS	$ 25,000.00	$ 25,000.00
Asphalt Removal and Replacement	650	SY	$ 125.00	$ 81,250.00
Gravel Removal and Replacment	150	SY	$ 25.00	$ 3,750.00
Soils Disposal	720	CY	$ 15.00	$ 10,800.00
Bypass Pumping	1	LS	$ 25,000.00	$ 25,000.00
Dewatering	1	LS	$ 65,000.00	$ 65,000.00
SCADA/Telemetry	1	LS	$ 20,000.00	$ 20,000.00
Sub Total Construction Cost - 2020				**$ 592,100.00**
Number of Years until Construction				2
Inflation Rate				4.25%
Sub Total Construction Cost - 2022				**$643,500.00**
Admin @ 5%				$ 32,200.00
Contingency @ 10%				$ 64,400.00
Engineering @ 18%				$ 115,800.00
Total Project Cost				**$ 855,900.00**
ANNUAL OPERATING AND MAINTENANCE COSTS				
ITEM	**QUAN.**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**
Labor		HRS		$ -
Power		kWhr		$ -
Total Annual Cost				**$ -**
PRESENT WORTH ANALYSIS				
DESCRIPTON				**TOTAL**
Capital Cost				$855,900
Annual O&M				$0
Salvage Value in 20 years (estimate)				$ (71,560.00)
Interest Rate				0.30%
Number of payments				20
			TOTAL PRESENT WORTH	**$788,500.00**
Estimate is a Planning Level Estimate Based on Limited Information				

EAST HELENA WASTEWATER SYSTEM MASTER PLAN - 2020

MONTANA AVENUE LIFT STATION REPLACEMENT ALTERNATIVE 3 - KING STREET ALLEY

5/2/2020

COST ESTIMATE

ITEM	QUAN.	UNIT	UNIT PRICE	TOTAL PRICE
Mobilization, Bonding & Ins.	1	LS	$ 47,930.00	$ 47,930.00
Traffic Control	1	LS	$ 20,000.00	$ 20,000.00
8-inch PVC SDR 35 (Deep)	520	LF	$ 90.00	$ 46,800.00
8-inch Forcemain Piping	490	LF	$ 75.00	$ 36,750.00
Sanitary Sewer Service Connection	2	EA	$ 1,250.00	$ 2,500.00
New 48" Manhole	3	EA	$ 6,500.00	$ 19,500.00
Modify Manhole	2	EA	$ 3,000.00	$ 6,000.00
New Wet Well (Includes Shoring and Installation)	1	LS	$ 60,000.00	$ 60,000.00
Abandonment of Existing Wet Well	1	LS	$ 15,000.00	$ 15,000.00
New Submersible Pump and Controls	2	EA	$ 40,000.00	$ 80,000.00
Pump Installation	2	EA	$ 7,500.00	$ 15,000.00
Land Acquisition	1	LS	$ 50,000.00	$ 50,000.00
New Check Valve	2	EA	$ 2,000.00	$ 4,000.00
New Plug Valve	2	EA	$ 3,000.00	$ 6,000.00
New Pressure Gage	1	EA	$ 500.00	$ 500.00
Interior Building Piping	1	LS	$ 10,000.00	$ 10,000.00
New Lift Station Building	400	SF	$ 200.00	$ 80,000.00
Lift Station Foundation and Slab	16	CY	$ 1,100.00	$ 17,600.00
Air Release Valve	1	EA	$ 5,000.00	$ 5,000.00
Flow Meter	1	EA	$ 15,000.00	$ 15,000.00
Mechanical Jib Crane or Hoist	1	EA	$ 5,000.00	$ 5,000.00
Electrical and Control Wiring	1	LS	$ 50,000.00	$ 50,000.00
Electrical Service	1	LS	$ 25,000.00	$ 25,000.00
HVAC	1	LS	$ 20,000.00	$ 20,000.00
Plumbing	1	LS	$ 6,500.00	$ 6,500.00
Asphalt Removal and Replacement	1,050	SY	$ 125.00	$ 131,300.00
Gravel Removal and Replacment	230	SY	$ 25.00	$ 5,750.00
Fencing	200	LF	$ 30.00	$ 6,000.00
Concrete Pad Around Wet Well	1	LS	$ 5,000.00	$ 5,000.00
Structural Backfill (includes geotextile)	1	LS	$ 35,000.00	$ 35,000.00
Soils Disposal	1,290	CY	$ 15.00	$ 19,350.00
Bypass Pumping	1	LS	$ 25,000.00	$ 25,000.00
Dewatering	1	LS	$ 65,000.00	$ 65,000.00
SCADA/Telemetry	1	LS	$ 20,000.00	$ 20,000.00
New Generator 60 kW	1	LS	$ 50,000.00	$ 50,000.00
Sub Total Construction Cost - 2020				**$ 1,006,480.00**
Number of Years until Construction				2
Inflation Rate				4.25%
Sub Total Construction Cost - 2022				**$1,093,800.00**
Admin @ 5%				$ 54,700.00
Contingency @ 10%				$ 109,400.00
Engineering @ 18%				$ 196,900.00
Total Project Cost				**$ 1,454,800.00**

ANNUAL OPERATING AND MAINTENANCE COSTS

ITEM	QUAN.	UNIT	UNIT PRICE	TOTAL PRICE
Labor		HRS		$ -
Power		kWhr		$ -
Total Annual Cost				**$ -**

PRESENT WORTH ANALYSIS

DESCRIPTON		TOTAL
Capital Cost		$1,454,800
Annual O&M		$0
Salvage Value in 20 years (estimate)		$ (99,497.00)
Interest Rate		0.30%
Number of payments		20
	TOTAL PRESENT WORTH	**$1,361,090.00**

Estimate is a Planning Level Estimate Based on Limited Information

EAST HELENA WASTEWATER SYSTEM MASTER PLAN - 2020					
MONTANA AVENUE LIFT STATION REPLACEMENT ALTERNATIVE 4 - EAST HELENA CEMETARY					
5/2/2020					
COST ESTIMATE					
ITEM		**QUAN.**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**
Mobilization, Bonding & Ins.		1	LS	$ 48,340.00	$ 48,340.00
Traffic Control		1	LS	$ 20,000.00	$ 20,000.00
8-inch PVC SDR 35 (Deep)		620	LF	$ 90.00	$ 55,800.00
8-inch Forcemain Piping		580	LF	$ 75.00	$ 43,500.00
Sanitary Sewer Service Connection		0	EA	$ 800.00	$ -
New 48" Manhole		3	EA	$ 6,500.00	$ 19,500.00
Modify Manhole		1	EA	$ 3,000.00	$ 3,000.00
New Wet Well (Including Shoring and Excavation)		1	LS	$ 60,000.00	$ 60,000.00
Abandonment of Existing Wet Well		1	LS	$ 15,000.00	$ 15,000.00
New Submersible Pump and Controls		2	EA	$ 40,000.00	$ 80,000.00
Pump Installation		2	EA	$ 7,500.00	$ 15,000.00
Land Acquisition		1	LS	$ 20,000.00	$ 20,000.00
New Check Valve		2	EA	$ 2,000.00	$ 4,000.00
New Plug Valve		2	EA	$ 3,000.00	$ 6,000.00
Interior Lift Station Piping		1	LS	$ 10,000.00	$ 10,000.00
New Pressure Gage		1	EA	$ 500.00	$ 500.00
New Lift Station Building		400	SF	$ 200.00	$ 80,000.00
Lift Station Foundation and Slab		16	CY	$ 1,100.00	$ 17,600.00
Air Release Valve		1	EA	$ 5,000.00	$ 5,000.00
Flow Meter		1	EA	$ 15,000.00	$ 15,000.00
Mechanical Jib Crane or Hoist		1	EA	$ 5,000.00	$ 5,000.00
Electrical and Control Wiring		1	LS	$ 50,000.00	$ 50,000.00
Electrical Service		1	LS	$ 25,000.00	$ 25,000.00
HVAC		1	LS	$ 20,000.00	$ 20,000.00
Plumbing		1	LS	$ 6,500.00	$ 6,500.00
Asphalt Removal and Replacement		1,330	SY	$ 125.00	$ 166,250.00
Gravel Removal and Replacment		90	SY	$ 25.00	$ 2,250.00
Fencing		180	LF	$ 30.00	$ 5,400.00
Concrete Pad Around Wet Well		1	LS	$ 5,000.00	$ 5,000.00
Structural Backfill (includes geotextile)		1	LS	$ 30,000.00	$ 30,000.00
Soils Disposal		1,430	CY	$ 15.00	$ 21,450.00
Bypass Pumping		1	LS	$ 25,000.00	$ 25,000.00
Dewatering		1	LS	$ 65,000.00	$ 65,000.00
SCADA/Telemetry		1	LS	$ 20,000.00	$ 20,000.00
New Generator 60 kW		1	LS	$ 50,000.00	$ 50,000.00
Sub Total Construction Cost - 2020					**$ 1,015,090.00**
Number of Years until Construction					2
Inflation Rate					4.25%
Sub Total Construction Cost - 2022					**$1,103,200.00**
Admin @ 5%					$ 55,200.00
Contingency @ 10%					$ 110,300.00
Engineering @ 18%					$ 198,600.00
Total Project Cost					**$ 1,467,300.00**
ANNUAL OPERATING AND MAINTENANCE COSTS					
ITEM		**QUAN.**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**
Labor			HRS		$ -
Power			kWhr		$ -
Total Annual Cost					**$ -**
PRESENT WORTH ANALYSIS					
DESCRIPTON					**TOTAL**
Capital Cost					$1,467,300
Annual O&M					$0
Salvage Value in 20 years (estimate)					$ (108,947.00)
Interest Rate					0.30%
Number of payments					20
				TOTAL PRESENT WORTH	**$1,364,690.00**
Estimate is a Planning Level Estimate Based on Limited Information					

EAST HELENA WASTEWATER SYSTEM MASTER PLAN - 2020					
Screening Alternative 2 - Installation of New Mechanical Bar Screen Including Washer Compactor					
5/2/2020					
COST ESTIMATE					
ITEM		**QUAN.**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**
Mobilization, Bonding & Ins.		1	LS	$ 23,960.00	$ 23,960.00
Sitework		1	LS	$ 15,000.00	$ 15,000.00
Grading		2,000	CUYD	$ 30.00	$ 60,000.00
Duperon® FlexRake Mechanical Bar Screen		1	LS	$ 67,500.00	$ 67,500.00
Duperon® Low Flow Washer Compactor		1	EA	$ 42,000.00	$ 42,000.00
Building Demolition		1	LS	$ 15,000.00	$ 15,000.00
Bar Screen Deadplate Heat Pad		1	EA	$ 1,800.00	$ 1,800.00
Washer Compactor Bagging System		1	EA	$ 3,400.00	$ 3,400.00
Equipment Installation		1	LS	$ 75,000.00	$ 75,000.00
Existing Channel Modification		20	CUYD	$ 1,100.00	$ 22,000.00
Building - Electrical Room Structure		320	SF	$ 220.00	$ 70,400.00
Building - Electrical Room Foundation		12	CUYD	$ 1,000.00	$ 12,000.00
Misceallanous Building Upgrades		1	LS	$ 10,000.00	$ 10,000.00
HVAC Upgrades		1	LS	$ 25,000.00	$ 25,000.00
Painting		1	LS	$ 10,000.00	$ 10,000.00
Electrical		1	LS	$ 50,000.00	$ 50,000.00
Sub Total Construction Cost - 2020					**$ 503,060.00**
Number of Years until Construction					2
Inflation Rate					4.25%
Sub Total Construction Cost - 2022					**$546,700.00**
Admin @ 5%					$ 27,300.00
Contingency @ 10%					$ 54,700.00
Engineering @ 18%					$ 98,400.00
Total Project Cost					**$ 727,100.00**
ANNUAL OPERATING AND MAINTENANCE COSTS					
ITEM		**QUAN.**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**
Equipment Maintenance					$ -
Total Annual Cost					**$ -**
PRESENT WORTH ANALYSIS					
DESCRIPTON					**TOTAL**
Capital Cost					$727,100
Annual O&M					$0
Salvage Value in 20 years (estimate)					$ (35,200.00)
Interest Rate					0.30%
Number of payments					20
				TOTAL PRESENT WORTH	**$693,950.00**
Estimate is a Planning Level Estimate Based on Limited Information					

EAST HELENA WASTEWATER SYSTEM MASTER PLAN - 2020					
Screening Alternative 3 - Installation of New Drum Screen with Washer/Compactor					
5/2/2020					
COST ESTIMATE					
ITEM		**QUAN.**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**
Mobilization, Bonding & Ins.		1	LS	$ 30,000.00	$ 30,000.00
Sitework		1	LS	$ 15,000.00	$ 15,000.00
Grading		2,000	CUYD	$ 30.00	$ 60,000.00
Ovivo® Ozzy Cup Screen		1	LS	$ 220,000.00	$ 220,000.00
Equipment Installation		1	LS	$ 75,000.00	$ 75,000.00
Building Demolition		1	LS	$ 15,000.00	$ 15,000.00
Existing Channel Modification		40	CUYD	$ 1,100.00	$ 44,000.00
Misceallanous Building Upgrades		1	LS	$ 10,000.00	$ 10,000.00
Building - Electrical Room Structure		320	SF	$ 200.00	$ 64,000.00
Building-Electrical Room Foundation and Slab		12	CUYD	$ 1,000.00	$ 12,000.00
HVAC Upgrades		1	LS	$ 25,000.00	$ 25,000.00
Painting		1	LS	$ 10,000.00	$ 10,000.00
Electrical		1	LS	$ 50,000.00	$ 50,000.00
Sub Total Construction Cost - 2020					**$ 630,000.00**
Number of Years until Construction					2
Inflation Rate					4.25%
Sub Total Construction Cost - 2022					**$684,700.00**
Admin @ 5%					$ 34,200.00
Contingency @ 10%					$ 68,500.00
Engineering @ 18%					$ 123,200.00
Total Project Cost					**$ 910,600.00**
ANNUAL OPERATING AND MAINTENANCE COSTS					
ITEM		**QUAN.**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**
Power					$ -
Equipment Maintenance					$ -
Total Annual Cost					**$ -**
PRESENT WORTH ANALYSIS					
DESCRIPTON					**TOTAL**
Capital Cost					$910,600
Annual O&M					$0
Salvage Value in 20 years (estimate)					$ (32,000.00)
Interest Rate					0.30%
Number of payments					20
				TOTAL PRESENT WORTH	**$880,460.00**
Estimate is a Planning Level Estimate Based on Limited Information					

EAST HELENA WASTEWATER SYSTEM MASTER PLAN - 2020					
Grit Removal Alternative 2 - Vortex Grit Removal System Including Grit Washing					
3/25/2020					
COST ESTIMATE					
ITEM		**QUAN.**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**
Mobilization, Bonding & Ins.		1	LS	$ 49,590.00	$ 49,590.00
Existing Grit System Demolition		1	LS	$ 25,000.00	$ 25,000.00
Site Work (Roadways, and Misc Concrete)		1	LS	$ 15,000.00	$ 15,000.00
Grading		1,500	CUYD	$ 30.00	$ 45,000.00
Grit Piping Inlet (18-Inch Ductile Iron)		75	LFT	$ 150.00	$ 11,250.00
Grit Piping Outlet (18-Inch Ductile Iron)		100	LFT	$ 150.00	$ 15,000.00
Grit Removal Bypass Piping (18-Inch Ductile Iron)		50	LFT	$ 150.00	$ 7,500.00
18" Plug Valves		4	EA	$ 6,500.00	$ 26,000.00
Concrete Grit Structure		14	CUYD	$ 1,600.00	$ 22,400.00
Grit Inlet Troughs		10	CUYD	$ 1,200.00	$ 12,000.00
Vortex Grit System		1	LS	$ 70,000.00	$ 70,000.00
Grit Chamber Equipment Installation		1	LS	$ 40,000.00	$ 40,000.00
Grit Building Foundation and Slab		42	CUYD	$ 1,100.00	$ 46,200.00
Grit Building Structure (32'x32' Building)		1024	SQFT	$ 200.00	$ 204,800.00
Grit Washer		1	LS	$ 115,000.00	$ 115,000.00
Grit pumps and Controls		2	EA	$ 20,000.00	$ 40,000.00
Equipment Installation		1	LS	$ 75,000.00	$ 75,000.00
Grit Building Mechanical Piping		1	LS	$ 40,000.00	$ 40,000.00
Grit Building Plumbing (Including interior NPW Piping)		1	LS	$ 25,000.00	$ 25,000.00
Grit Building HVAC		1	LS	$ 25,000.00	$ 25,000.00
Non-Potable Water Yard piping Piping		200	LF	$ 45.00	$ 9,000.00
Grit Building Drain Piping (8-inch PVC)		200	LF	$ 70.00	$ 14,000.00
Grit Building Manholes		2	EA	$ 6,800.00	$ 13,600.00
Painting		1	LS	$ 20,000.00	$ 20,000.00
Equipment Electrical and Controls		1	LS	$ 75,000.00	$ 75,000.00
Sub Total Construction Cost - 2020					**$ 1,041,340.00**
Number of Years until Construction					2
Inflation Rate					4.25%
Sub Total Construction Cost - 2022					**$1,131,700.00**
Admin @ 5%					$ 56,600.00
Contingency @ 10%					$ 113,200.00
Engineering @ 18%					$ 203,700.00
Total Project Cost					**$ 1,505,200.00**
ANNUAL OPERATING AND MAINTENANCE COSTS					
ITEM		**QUAN.**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**
Power		47900	kWhr	$ 0.15	$ 7,185.00
Equipment Maintenance		1	LS	$ 5,000.00	$ 5,000.00
Total Annual Cost					**$ 12,185.00**
PRESENT WORTH ANALYSIS					
DESCRIPTON					**TOTAL**
Capital Cost					$1,505,200
Annual O&M					$12,185
Salvage Value in 20 years (estimate)					$ (75,580.00)
Interest Rate					0.30%
Number of payments					20
				TOTAL PRESENT WORTH	**$1,670,200.00**
Estimate is a Planning Level Estimate Based on Limited Information					

EAST HELENA WASTEWATER SYSTEM MASTER PLAN - 2020				
Grit Removal Alternative 3 - HeadCell Grit Removal System Including Grit Washing				
3/25/2020				
COST ESTIMATE				
ITEM	**QUAN.**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**
Mobilization, Bonding & Ins.	1	LS	$ 52,680.00	$ 52,680.00
Existing Grit System Demolition	1	LS	$ 25,000.00	$ 25,000.00
Site Work (Roadways, and Misc Concrete)	1	LS	$ 15,000.00	$ 15,000.00
Grading	1,500	CUYD	$ 30.00	$ 45,000.00
Grit Piping Inlet (18-Inch Ductile Iron)	75	Feet	$ 150.00	$ 11,250.00
Grit Piping Outlet (18-Inch Ductile Iron)	100	Feet	$ 150.00	$ 15,000.00
Concrete Grit Structure	22	CUYD	$ 1,600.00	$ 35,200.00
Grit Inlet Troughs	8	CUYD	$ 1,200.00	$ 9,600.00
HeadCell Grit System	1	LS	$ 120,000.00	$ 120,000.00
Grit Chamber Equipment Installation	1	LS	$ 75,000.00	$ 75,000.00
Grit Building Foundation and Slab	42	CUYD	$ 1,100.00	$ 46,200.00
Grit Building Structure (32'x32' Building)	1024	SQFT	$ 200.00	$ 204,800.00
Grit Washer	1	LS	$ 115,000.00	$ 115,000.00
Grit pumps and Controls	2	EA	$ 20,000.00	$ 40,000.00
Equipment Installation	1	LS	$ 75,000.00	$ 75,000.00
Grit Building Mechanical Piping	1	LS	$ 40,000.00	$ 40,000.00
Grit Building Plumbing (Including interior NPW Piping)	1	LS	$ 25,000.00	$ 25,000.00
Grit Building HVAC	1	LS	$ 25,000.00	$ 25,000.00
Non-Potable Water Yard piping Piping	200	LF	$ 45.00	$ 9,000.00
Grit Building Drain Piping (8-inch PVC)	200	LF	$ 70.00	$ 14,000.00
Grit Building Manholes	2	EA	$ 6,800.00	$ 13,600.00
Painting	1	LS	$ 20,000.00	$ 20,000.00
Equipment Electrical and Controls	1	LS	$ 75,000.00	$ 75,000.00
Sub Total Construction Cost - 2020				**$ 1,106,330.00**
Number of Years until Construction				2
Inflation Rate				4.25%
Sub Total Construction Cost - 2022				**$1,202,400.00**
Admin @ 5%				$ 60,100.00
Contingency @ 10%				$ 120,200.00
Engineering @ 18%				$ 216,400.00
Total Project Cost				**$ 1,599,100.00**
ANNUAL OPERATING AND MAINTENANCE COSTS				
ITEM	**QUAN.**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**
Power	2200	kWhr	$ 0.15	$ 330.00
Equipment Maintenance	1	LS	$ 5,000.00	$ 5,000.00
Total Annual Cost				**$ 5,330.00**
PRESENT WORTH ANALYSIS				
DESCRIPTON				**TOTAL**
Capital Cost				$1,599,100
Annual O&M				$5,330
Salvage Value in 20 years (estimate)				$ (79,840.00)
Interest Rate				0.30%
Number of payments				20
			TOTAL PRESENT WORTH	**$1,627,220.00**
Estimate is a Planning Level Estimate Based on Limited Information				

EAST HELENA WASTEWATER MASTER PLAN - 2020					
SCREW PUMP ALTERNATIVE 2 - REHABILITATION OF SCREW PUMPS					
5/2/2020					
COST ESTIMATE					
ITEM	**QUAN.**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**	
Mobilization, Bonding & Ins.	1	LS	$ 5,700.00	$ 5,700.00	
Replace Upper Bearing Assembly	2	EA	$ 13,000.00	$ 26,000.00	
Replace Lower Bearing Assembly	2	EA	$ 8,000.00	$ 16,000.00	
Demo Grout From Screw Pump Troughs	2	EA	$ 12,000.00	$ 24,000.00	
Regrout Screw Pump Troughs	2	EA	$ 14,000.00	$ 28,000.00	
Clean and Repaint Screws	2	EA	$ 10,000.00	$ 20,000.00	
Sub Total Construction Cost - 2020				**$ 119,700.00**	
Number of Years until Construction				2	
Inflation Rate				4.25%	
Sub Total Construction Cost - 2022				**$130,100.00**	
Admin @ 5%				$ 6,500.00	
Contingency @ 10%				$ 13,000.00	
Engineering @ 18%				$ 23,400.00	
Total Project Cost				**$ 173,000.00**	
ANNUAL OPERATING AND MAINTENANCE COSTS					
ITEM	**QUAN.**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**	
Labor		HRS		$ -	
Power		kWhr		$ -	
Total Annual Cost				**$ -**	
PRESENT WORTH ANALYSIS					
DESCRIPTON				**TOTAL**	
Capital Cost				$173,000	
Annual O&M				$0	
Salvage Value in 20 years (estimate)				$0.00	
Interest Rate				0.30%	
Number of payments				20	
			TOTAL PRESENT WORTH	**$173,000.00**	
Estimate is a Planning Level Estimate Based on Limited Information					

APPENDIX J

MANUFACTURER INFORMATION

Date: November 27, 2019

Project: East Helena WWTP, MT **Proposal Number:** 7349 R2

FIRM EQUIPMENT SCOPE

To: East Helena WWTP, MT

From: **Your Duperon® Team**

David Herald
Lead Sales Project Manager
(989) 754-8800
dherald@duperon.com

Rep: Ben Lewis
Ambiente H2O, Inc.
(406) 850-0030
blewis@ambienteh2o.com

Mark Wilson
Regional Sales Manager
(989) 754-8800
mwilson@duperon.com

Duperon® ADAPTIVE TECHNOLOGY™
PRELIMINARY LIQUIDS/SOLIDS SEPARATION SYSTEMS

Date: November 27, 2019

Project: East Helena WWTP, MT **Proposal Number:** 7349 R2

FIRM EQUIPMENT SCOPE

Thank you for considering Duperon® system solutions for your project. We appreciate the opportunity to provide you with a FIRM Equipment Scope. Please do not hesitate to contact your Duperon® Team with any questions as we work with you through the design process and ensure a successful project.

Equipment Scope

SCREENS:

QTY	UNIT	DESCRIPTION		
1	EA	**Duperon® FlexRake® - Front Clean Front-Return**		
		Model:	LF - LowFlow	
Notes: Based on 24" wide x 48" Tall Channel. Unit is rated for 4 MGD Peak Flows and up to 1 MGD Average Flows.		Enclosure (& Material):	Fully Enclosed (304)	
		Channel Width x Height:	2 x 4	Feet
		Clear Opening Size:	0.25 in	
		Angle of Installation:	30	Deg. from Vertical
		Material Construction:	304	SSTL

Screenings Processing

QTY	UNIT	DESCRIPTION
0	EA	**Optional, See Page # 3**

CONTROLS

QTY	UNIT		
1	EA	**Main Control Panel:**	**1 - FPFS**
		Power:	480V/3ph/60hz
Notes:		Panel Rating:	NEMA 4X
		PLC/Relay Based:	Relay
		Screen Instrumentation:	Dual Mechanical Float
		Local Pushbutton Station(s):	Three Button (E-Stop/Run/Jog Rev)

TECH/FREIGHT

QTY	UNIT	DESCRIPTION		
1	LOT	**On-Site Technical Assistance**		
		Number of Trips:	1	Trip(s)
		Days On-Site per Trip:	1	8-hour man-day(s)
1	LOT	**Freight**		
		FOB Factory, Full Freight Allowed		

Clarifications:

- This is not a fully designed project; pricing may be affected by scope change/project development
- Operational, structural, wind, or seismic calculations are not included
- Scope is based on models and assumptions widely utilized in the industry
- Scope does not convey an offer to sell; installation and taxes are not included
- **For reference only:** Standard Delivery Schedule: Submittals 4-6 week from PO - Delivery 8-12 weeks from approval

FIRM PRICING: **$67,500.00**

Duperon® ADAPTIVE TECHNOLOGY™
PRELIMINARY LIQUIDS/SOLIDS SEPARATION SYSTEMS

Date: November 27, 2019

Project: East Helena WWTP, MT **Proposal Number:** 7349 R2

OPTIONAL EQUIPMENT AND ACCESSORIES

Thank you for considering Duperon® system solutions for your project. We appreciate the opportunity to provide you with a FIRM Equipment Scope. Please do not hesitate to contact your Duperon® Team with any questions as we work with you through the design process and ensure a successful project.

Optional Equipment

Washer Compactor

QTY	UNIT	DESCRIPTION	
1	EA		**Duperon® Washer Compactor**
		Model:	LFWC
Notes:		Appx Footprint:	2 ft wide x 5 ft long
		Motor HP:	.50 HP
		Chute Allowance:	10 ft long w/ 1 bend (customizable)
		Material Construction:	304 SSTL
		ADD PRICE (EA):	**$42,000.00**

Optional Accessories

Bar Screen Deadplate Heat Pad
12" x 12" heat pad (power by others)
Thermostat

ADD PRICE (EA): **$1,800**

Washer Compactor Heat Trace & Blanket Kit
Required in applications where freezing temperature are possible
Teflon heat blanket (weather-proof) construction
Thermostat (NEXA 4X) with remote probe for temperature reading
Components are CLASS I DIVISION I rated

ADD PRICE (EA): **$5,000**

Washer Compactor Bagging System
Longofill cassette holder - SSTL & ABS plastic
Longopac PE continuous bagger cassette, 295 ft (90 m)

ADD PRICE (EA): **$3,400**

The Advantage of FlexRake® Adaptive Technology™ for Low Flow Applications

FlexRake® Low Flow

Cost-Effective Screening for Low Flow Applications

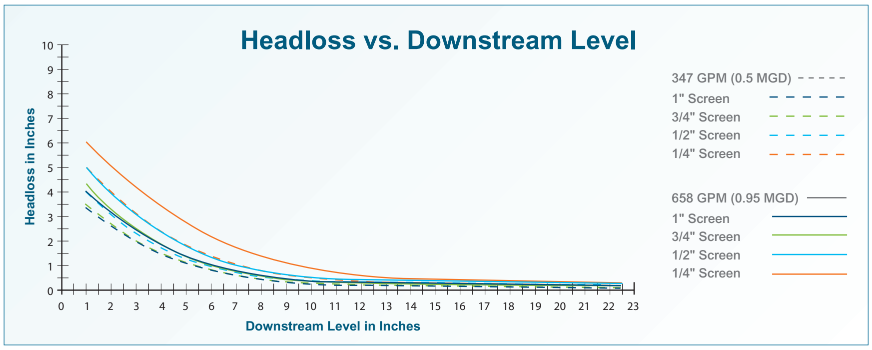
Unusually affordable, simple, front cleaning, front return bar screen technology. Specifically designed for plants of 1 mgd or less average flow with channels 2 to 6 feet deep by 1 to 2 feet wide. Available with bar openings of 1/4 inch, 1/2 inch, 3/4 inch and 1 inch.

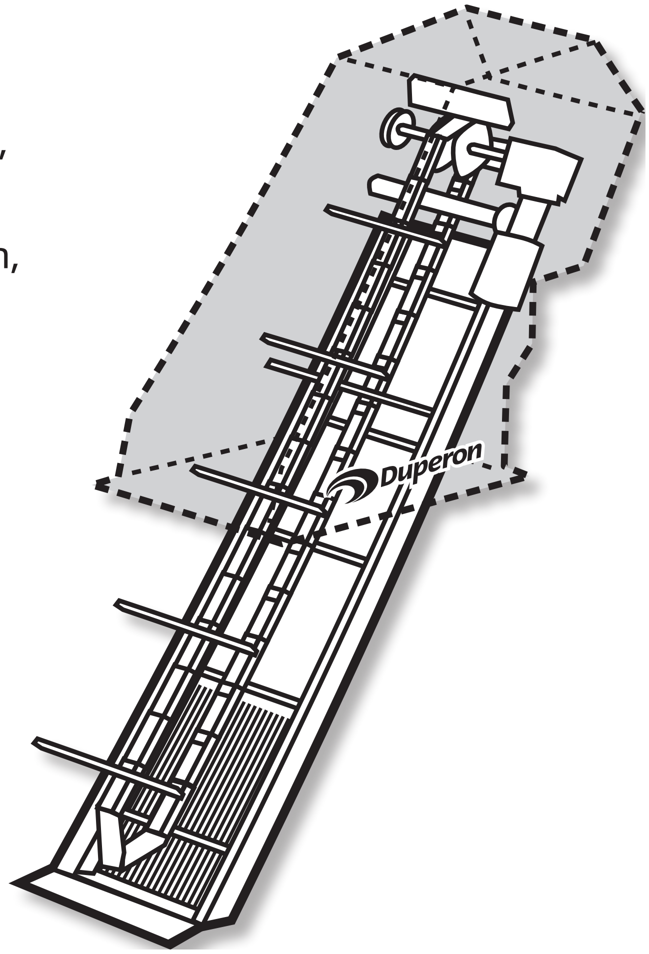
- Pre-Engineered to be Energy Efficient to Save You Time and Money
- Standard Features Include: Easy Controls, Spray Wash for Screenings, All Stainless Steel Construction
- Tear-Drop Shaped Bars Provide Highest Efficiency in the Industry; 25%-50% More Efficient
- Exclusive Thru-Bar™ Scrapers Clean 3 Sides of the Bar
- Proven Duperon® FlexRake® Technology: No Lower Bearings, Sprockets, Jam Points or Confined Space Entries

Duperon® ADAPTIVE TECHNOLOGY™
PRELIMINARY LIQUIDS/SOLIDS SEPARATION SYSTEMS

The Duperon® FlexRake® Low Flow

- UHMW Low Flow SmartLink™— Completely Corrosion-Resistant Links Provide Long Life, Allows for "Dry" Operation
- Integral Enclosure Provides Easy Installation, Access and Viewing
- No Carryover, No Scheduled Lubrication, No Maintenance





GENERAL

Average Flow Capacity:	1 MGD
Peak Flow Capacity:	4 MGD
Channel Width:	1 - 2 ft wide nominal
Maximum Liquid Level:	22″
Screen Area:	3.5 ft (vertical projection)
Bar Opening:	¼″, ½″, ¾″, 1″
Range of Channel Depth:	2′ to 6′
Minimum Water Depth:	0″
Discharge Height:	32.5″ as measured from deck max.
Unit Height:	65.5″ measured from deck
Unit OAL Width:	41.5″ measured at widest point
Lifting Capacity:	500 lb
Motor Size:	¼ hp, TEFC Standard

UTILITY

1 Phase	(115 volt or 230 volt)
3 Phase	(240 volt or 480 volt)

PERFORMANCE

Scraper spacing:	20.8″ (every third link)
Discharge Rate/Cleaning:	Every 24.7 seconds
Scraper Travel Speed:	50.5″/minute
Sprocket Speed:	1.82 RPM

MATERIALS OF CONSTRUCTION

Drive Mechanics:	304 Stainless Steel
Enclosure / Dead plate:	304 Stainless Steel
Screen Bars:	316L Stainless Steel
Chain / Scrapers:	UHMW PE – UV Stable
Motor:	Steel with Std DC coatings

CONTROL FUNCTIONALITY

Emergency Stop • On-Off • Run Monitoring (Dry Contact)
Explosion-proof controls available***

***Custom site wiring is necessary with explosion-proof option. Main panel is remote mounted, explosion-proof motor and NEMA 7/9 push button station provided. Wiring completed per local requirements.

To Learn more about Duperon® Adaptive Technology,™ scan this QR code or visit www.duperon.com

Duperon® ADAPTIVE TECHNOLOGY™
Let's Build a System that Works for You℠

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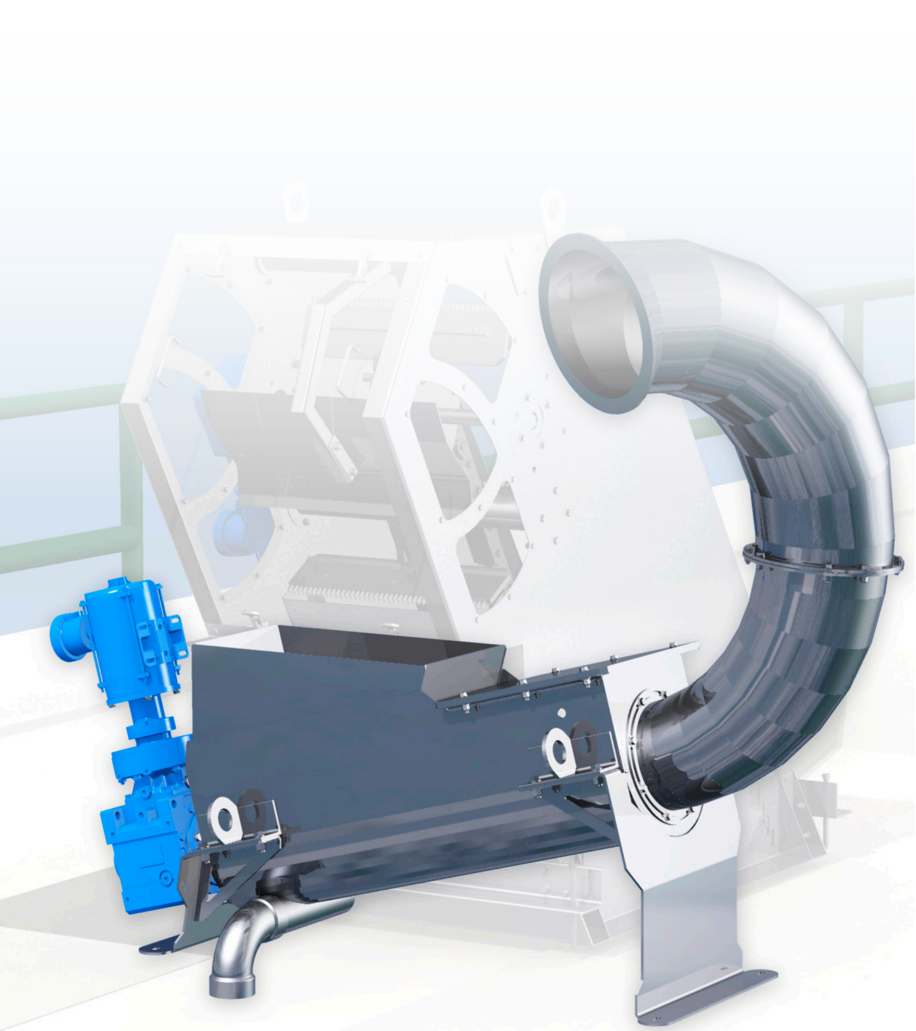
3007/3/16/0M

Enjoying Your FlexRake® Low Flow?
Our New Washer Compactor Was Designed for You!

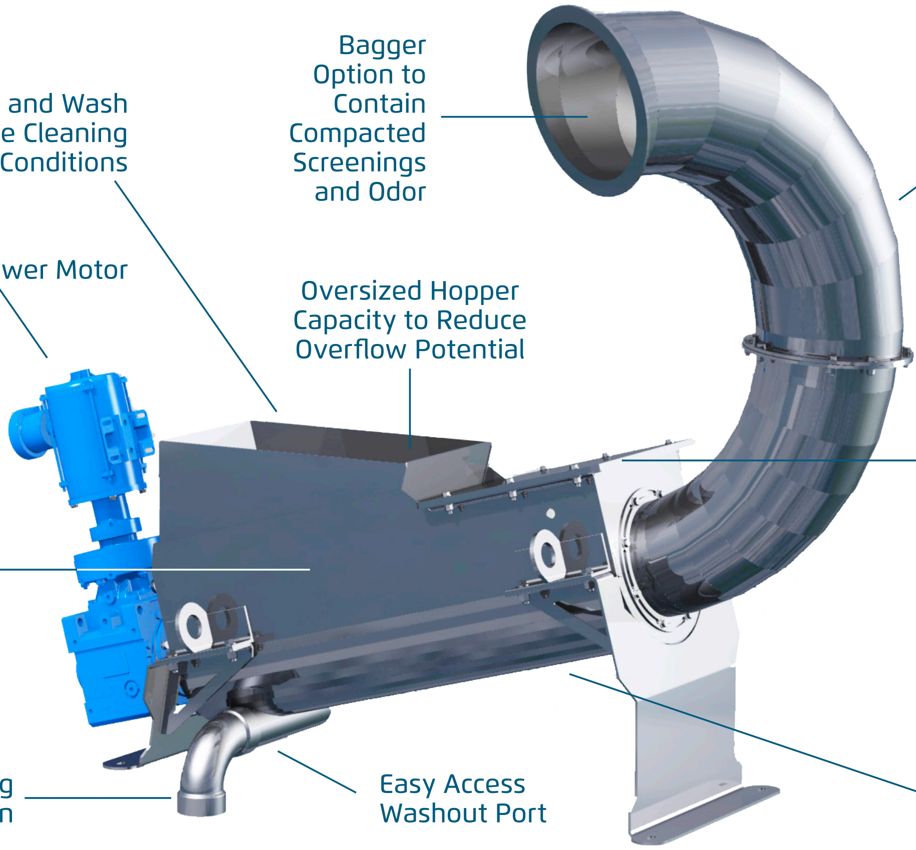


Low Flow Washer Compactor
Single Auger System

The pre-engineered Low Flow Washer Compactor is a perfect fit in size and capacity to receive screenings from your existing FlexRake Low Flow bar screen. The simple design of the Low Flow Washer Compactor requires minimal maintenance and delivers a low cost of ownership that you have come to expect from Duperon innovation. Upgrade today to fully automate your headworks:

- Save Hauling and Landfill Costs: Over 80% Volume Reduction, 60% Weight Reduction
- Spend Less Time Managing Screenings with a Fully Automated Solids Handling System
- Significantly Reduces Odor and Returns Organics Downstream
- Built-in Adaptability: Discharge Chute, Drain Connection and Motor Location Configurable to Your Site Needs
- Energy Efficient: Fractional Horsepower Motor

The Duperon® Low Flow Washer Compactor



GENERAL

- Average Flow Capacity: 5.5 cu.ft/hr
- Peak Flow Capacity: 8 cu.ft/hr
- Screenings Discharge Chute: Customizable up to 10' (CL) in Any Direction

UTILITY

- 1/2 HP
- 1 PH/115 or 230 VAC
- 3 PH/240 or 480 VAC
- Explosion Proof, Inverter Duty

WATER

- Water Supply: Wash Water Filtered Effluent Screened with #20 Mesh Wye Strainer or Potable Water with Check Valve
- Supply Connection: 1/2" NPT Female Connection or GHT 3/4" Female Fitting for Standard Garden Hose
- Consumption: 3-10 GPM
- Required Pressure: 40-60 PSI
- Drain Connection: 3" Fernco Elbow

MATERIALS OF CONSTRUCTION

- 304 SSTL or 316 SSTL: Hopper, Discharge Chute, Auger
- UHMW: Auger Supports

PERFORMANCE

- Odor/Fecal: Significantly Decreases Odor/Fecal
- Passes Paint Filter Test

ACCESSORIES

- 5 ft Straight Section Discharge Chute Extension
- Cold Temperature Package with Heat Blanket
- Bagger System with 90m Continuous Feed Bag

CONTROLS

- Simple Relay Input to Your Existing FlexRake Panel
- PB Station & Estop included

Duperon® | ADAPTIVE TECHNOLOGY™

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9999/5/19/0M

Date: December 9, 2019
Project: East Helena WWTP, MT
Number: 7349

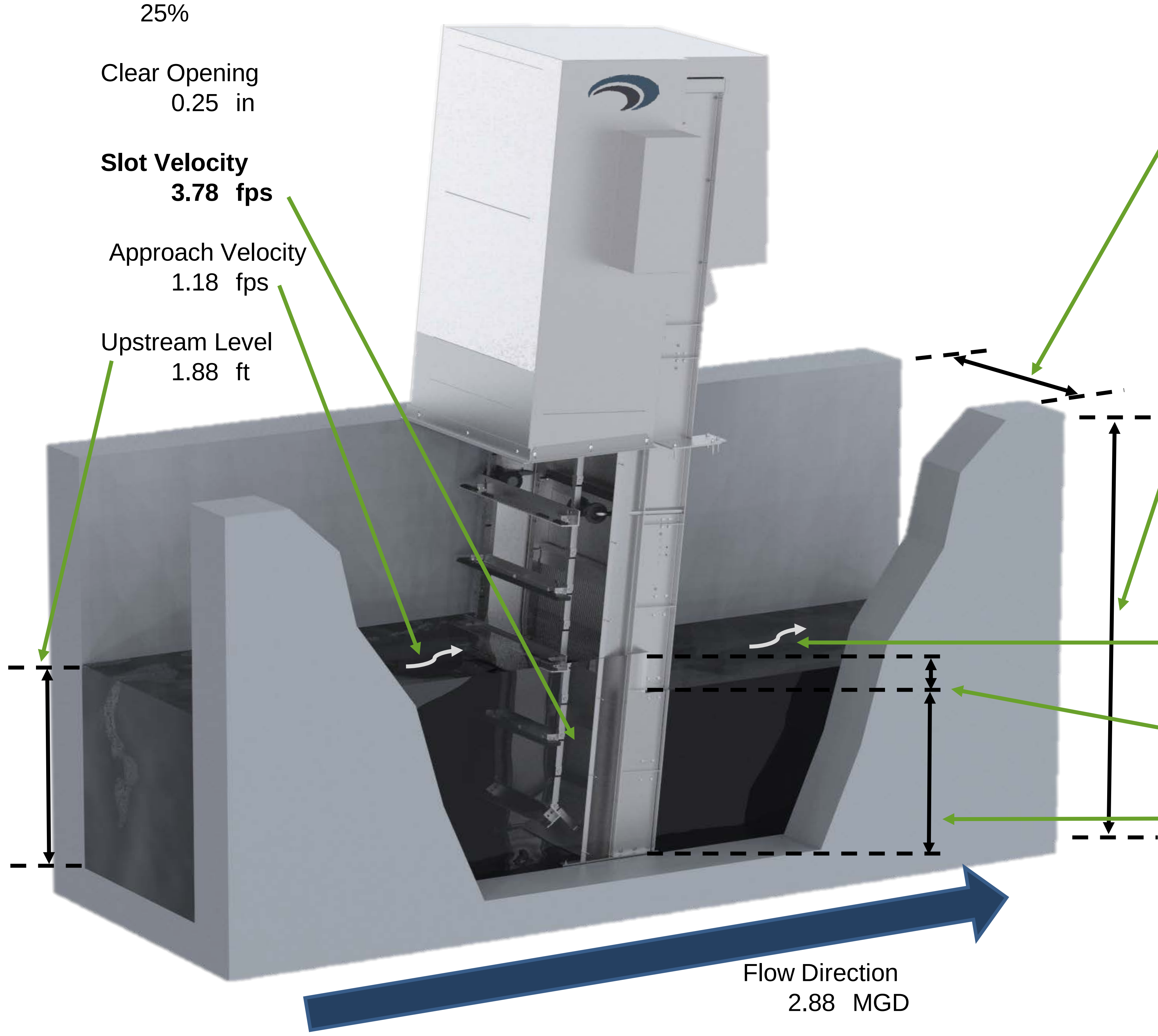
Duperon® ADAPTIVE TECHNOLOGY™
Let's Build a System that Works for You℠

HYDRAULIC CALCULATIONS

Notes: 2.88 MGD Peak Hour Flow, 1/4" Openings, 22" USWL, 25% Blinding

2000 gpm

INPUT: Channel Physics		
Flow in MGD	2.88	MGD
Upstream water level	1.88	ft
Channel width	2.00	ft
Channel depth	4.00	ft
Degree of blinding	25%	
INPUT: Screen Physics		
Clear Opening	0.25	in
Bar thickness	0.25	in
Thickness of side fab and closeout (2)	0.33	ft
Calculations		
Side fab & closeout area	0.62	sft
Flow area between side fab & closeouts	3.14	sft
Number of bars	40.00	ea
Flow area taken up by bars	1.57	sft
Total Channel flow without screen	3.76	sft
Flow area after screen area and blinding taken out	1.18	sft
Approach Velocity	1.18	fps
Slot Velocity	3.78	fps
Downstream Velocity	1.40	fps
Downstream Depth	1.59	ft
Head Loss	3.43	in
Bernoulli Calculations		
Velocity thru bar screen	3.78	fps
Velocity upstream of bar screen	1.18	fps
Gravitational acceleration (constant)	32.20	ft/s^2
Frictional coefficient (constant)	1.43	c
Headloss	0.29	ft
Headloss	3.43	inches



These calculations are an estimation based upon the information available. Flow channel hydraulics are highly dependent on water levels and the degree of blinding. The calculations above are a snapshot of only one condition. To fully analyze the hydraulics please contact your local Duperon representative.
Duperon recommends a minimum of 1.00 ft water depth when the unit is in operation to keep the SSTL FlexLinks lubricated and ensure an optimal amount of screening area.
Duperon recommends using Water Environment Federation (WEF) & "10 States" standards as design guidelines:
Approach velocity should be greater than 1.25 ft/s to prevent settling. Slot velocities should be less than 4 ft/s to prevent forcing material thru openings.

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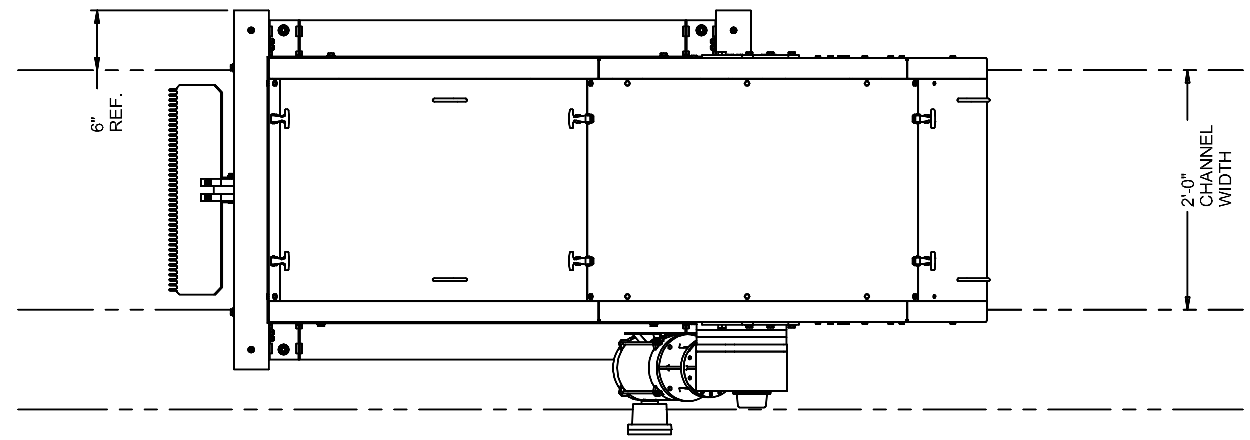
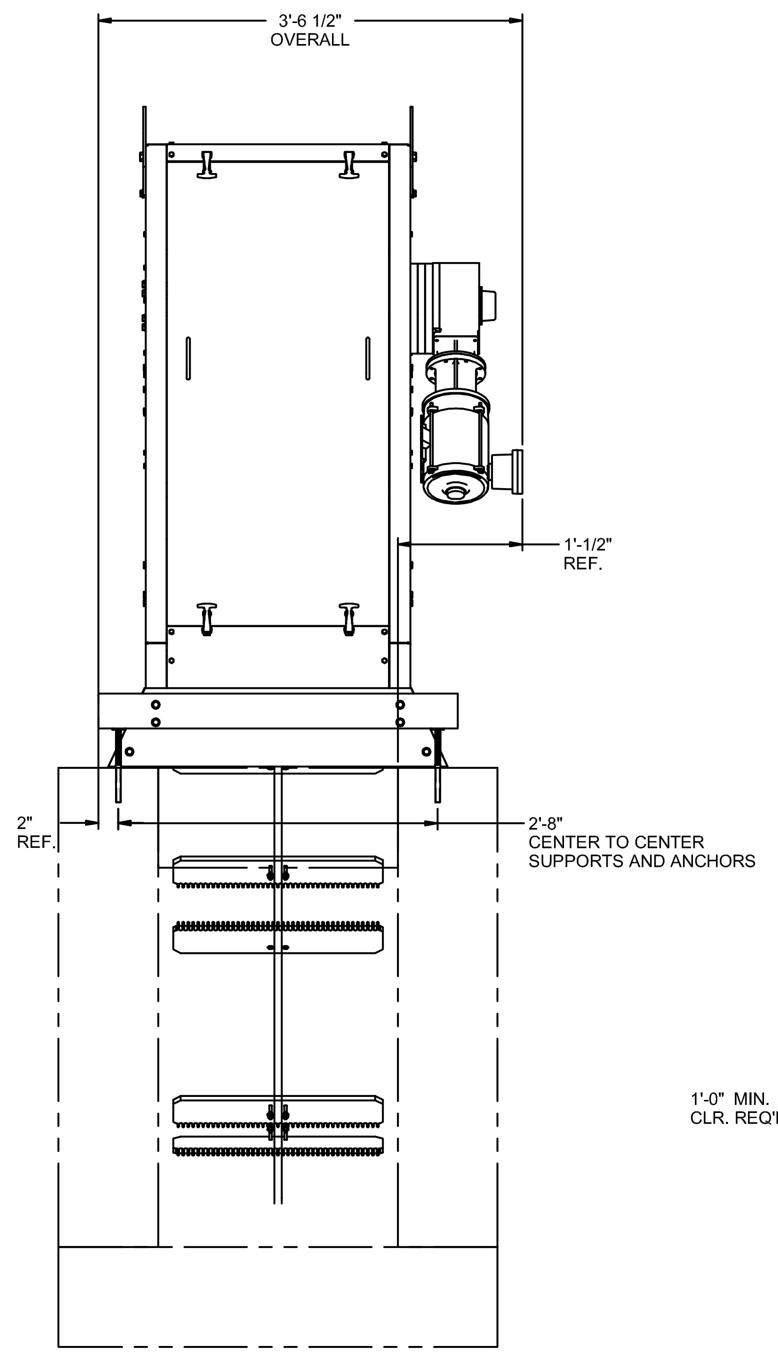
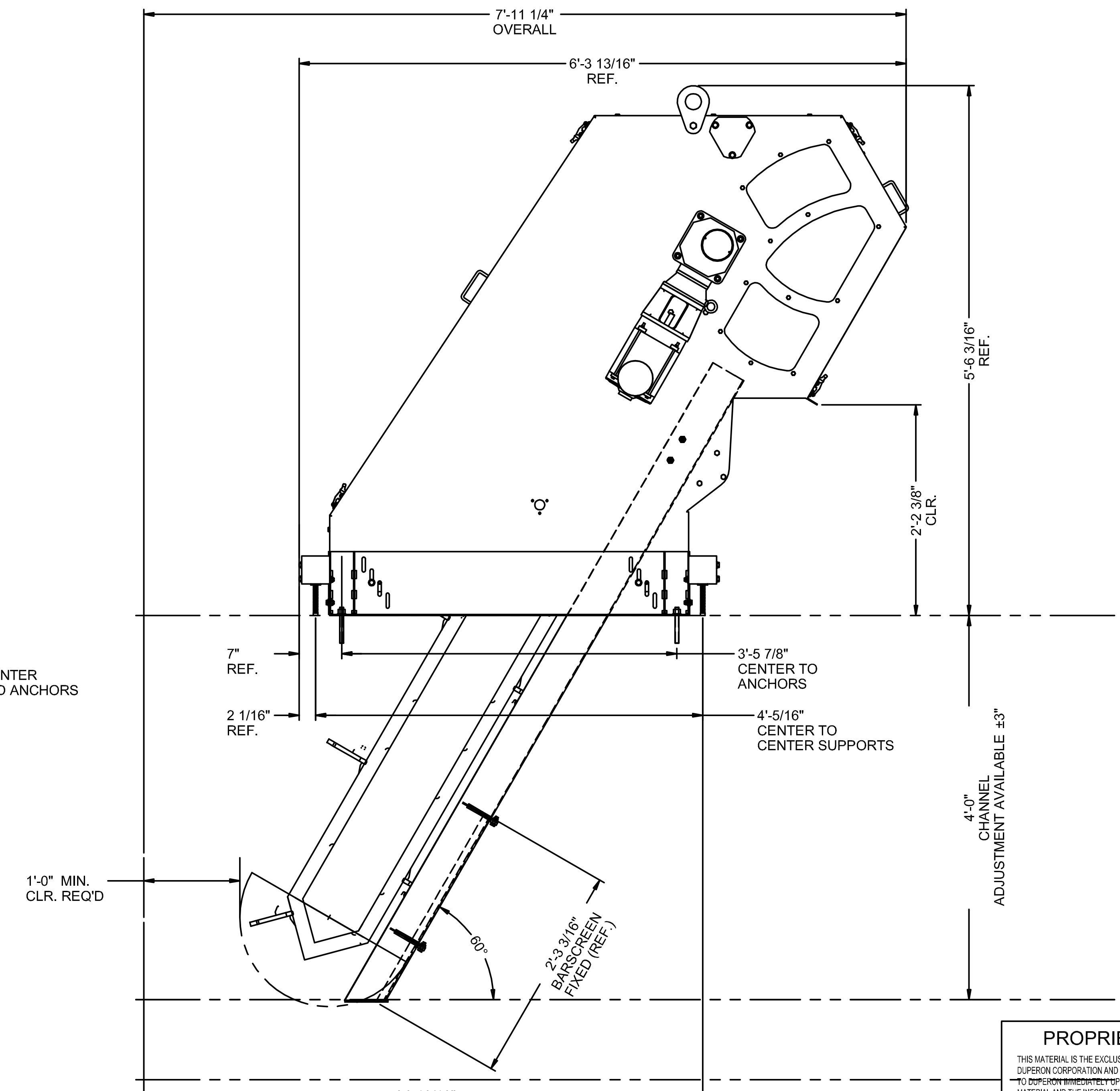
REVISIONS				
REV	DESCRIPTION	DATE	REVISED	APPROVED
1	UPDATED MODEL NAME AND DETAIL VIEW	08/25/09	JKL	-
2	UPDATED TITLE BLOCK LOGO	04/06/11	JKL	-



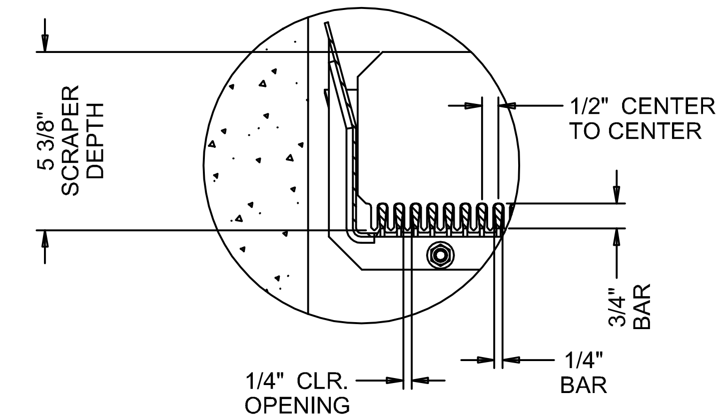
PLAN VIEW



FRONT VIEW



SIDE VIEW



DETAIL 1
1:4

SCRAPER DETAIL
1/4" CLEAR OPENING SHOWN
1/2", 3/4" & 1" OPENINGS AVAILABLE

PROPRIETARY

PART MARK NO.	NO. OF PIECES REQ'D.	DESCRIPTION	MAT'L. / STOCK	WT#	FEET / LENGTH	INCH	NOTES

TEMPLATE

DIMENSIONING & TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1982
TOLERANCES - UNLESS OTHERWISE SPECIFIED
.X = ±0.03
.XX = ±0.01
.XXX = ±0.005
.XXXX = ±0.0005
ANGULAR = ±0.5°

Duperon®
Saginaw, Michigan 48607
TF 800.383.8479

DRAWN: JKL	DATE: 02/01/09	SHEET TITLE: DUPERON CORPORATION Low Flow FlexRake®
CHECKED: -	DATE: -	
APPROVED: -	DATE: -	PART NAME: MAIN LAYOUT
APPROVED	DATE	
APPROVED	DATE	

SIZE	FSCM NO.	DWG. NO.	REV
D		LF FR 24x 4 FT	2
SCALE: -		SHEET 1 OF 1	

BUDGETARY PROPOSAL

DECEMBER 19, 2019

CITY OF EAST HELENA WWTP

MONTANA

Ovivo® Ozzy™ Cup Screen

PREPARED FOR

Trisha Bodlovic

Robert Peccia & Associates Inc.

AREA REPRESENTATIVE

Coombs Hopkins Company

Scott Forsling

PREPARED BY:

LARRY VANCE

Phone: (801) 931-3000

Larry.Vance@ovivowater.com

Ovivo USA, LLC is pleased to submit a budgetary proposal for the following equipment (the “Products”) on the project indicated above (the “Project”). This proposal, either in its original form or in its “as sold” format, constitutes Ovivo’s contractual offer of goods and services in connection with the Project.

While every effort has been made to ensure this quotation captures the intent of the project, we do anticipate further discussion in order to clarify and/or finalize the scope, terms & conditions and other details prior to any formal agreement. We look forward to your favorable review of our offer to further discussions on this important project.

THIS BUDGETARY PROPOSAL CONSTITUTES A NON-BINDING ESTIMATE OF PRICE(S) FOR CERTAIN GOODS AND/OR SERVICES THAT MAY BE PROVIDED BY OVIVO USA, LLC FROM TIME TO TIME, BUT SHALL NOT BE CONSTRUED AS A CONTRACTUAL OFFER FOR OVIVO USA, LLC TO PROVIDE SUCH GOODS AND/OR SERVICES. ANY CONTRACTUAL OFFER FOR THE SUPPLY OF GOODS AND/OR SERVICES BY OVIVO USA, LLC SHALL BE CONVEYED TO CUSTOMER IN THE FORM OF OVIVO USA, LLC STANDARD PROPOSAL DOCUMENT, WHICH INCLUDES, BUT IS NOT LIMITED TO, ITS STANDARD TERMS AND CONDITIONS OF SALE. SUCH PROPOSAL FORM MAY BE PROVIDED TO CUSTOMER UPON REQUEST.

Budgetary Pricing for Proposed Equipment:

ITEM	EQUIPMENT	PRICE
I	Ovivo® Ozzy™ Cup Screen, 6’ Diameter	*$191,140
II	Field Service Trip and Startup/Training	$10,000
III	Optional Upgrade - NEMA 4 PLC based panel (See Below)	$14,000
IV	Model 300 JETA Grit System	$165,000
V	Field Service Trip and Startup/Training	$10,000

*Please see your local Ovivo Rep for:

- Explosion proof environments
- More than 10’ troughing or special features
- **Special Spec Requirements or Testing**

*****8% adder for 316 SS Fabricated steel

ITEM I STANDARD SCOPE OF SUPPLY

ITEMS INCLUDED:

QTY 1 Ovivo® Ozzy™ Cup Screen, 304SS Fabrication, **3 MGD MAX**

- Drum Screen width approximately: 1.10 ft.
- Drum screen diameter: 6 ft.
- 1.0 HP, 1800 RPM, TEFC helical gear motor suitable for 460/3/60 supply, outdoor rated.
- Standard nylon rack and pinion gear drive.
- 2/3rd's Partial cover, Spray wash hood and nozzles
- 6mm Ovivo ProPaPanel®
- Underflow spray wash and solenoid
- Seal and diverter plate in SS with UHMW Seal plates for flow path
- 1.0 inch solenoid valve and pressure gauge
- Wash water requirement of 25 GPM @ 45 psi minimum.
- Anchor and Assembly Fasteners

QTY 1 Screw Compactor, Ovivo Model 200 in 304SS, to include:

- Capacity: 64 cubic feet per hour
- Motor size: 1 HP 1800 RPM, screw compactor motor suitable for 460/3/60 supply.
- Shafted screw in ASTM A36 carbon steel.
- Screw brush on periphery of screw flights- Nylon.
- U-shaped screw housing /drainage trough approximately 1mm smaller diameter than drum screen.
- Self-aligning thrust and radial load bearing to support the screw at the inlet end.
- High performance plastic sleeve bearing at the outlet end of the screw.
- Screw compactor reject drain connection: 4 inch diameter.
- Wash water requirement for screening rinse at screw compactor sleeve bearing: 6-16 GPM @ 16 psig.
- 1.0 inch NPT solenoid.
- Tubular 304 stainless steel compactor discharge chute angled at a minimum of a 45 degree
- 304 stainless steel discharge chute supports.
- Anchor and Assembly Fasteners

QTY 1 Standard NEMA 4 Control Panel:

- 460V system
- Main disconnect
- HOA Switch
- Motor starters with timers
- HI and HI HI float switches
- Solenoid valve control
- Emergency stop pushbutton

Freight, FCA to job site.

ITEMS NOT INCLUDED UNLESS SPECIFICALLY NOTED ABOVE (But not limited to the following):

- Access ladder, platform, or stairs.
- Concrete, grout, or concrete design.
- Consumables.
- Control panel mounting and field wire terminations.
- Disposal of any kind.

- Dumpster.
- Field wire and field conduit
- Field or shop paint.
- Grating.
- Installation.
- Lubricants.
- Man lifts or cranes.
- Offloading at job site.
- Piping and piping insulation.
- Recordings of training sessions.
- Spares.
- Special tools.
- Special site PPE.
- Storage.
- **Taxes.**

UPGRADE OPTIONS:

QTY 1 STANDARD NEMA 4 CONTROL PANEL:

- PLC based control with 4” HMI interface
- Main disconnect switch
- Emergency stop pushbutton
- Faults and Alarms on HMI
- HMI based level control with single upstream laser level sensor
- SCADA Output
- VFD soft start and speed adjustments on Drum
- Adjustable run times and tracking
- Ready for WaterExpert

FIELD SERVICE OPTION:

1 trip of 3 days total of service, at the site for the supervision of equipment start-up, testing supervision, and instructing the operators.

Additional service days can be purchased at the current rate.

TYPICAL LEAD TIMES:

Submittals: 8 weeks after Purchaser’s receipt of Ovivo’s written acknowledgement of an approved purchase order.

Shipping: 24 weeks after receipt of approved drawings from Purchaser.

OVIVO Worldwide Experts in Water Treatment

MUNICIPAL WASTEWATER
DRUM SCREENS

PROVEN OVIVO DRUM SCREEN TECHNOLOGY NOW SMALL, AND IN CHANNEL

- High performance capture ratios
- Straight channel design
- Exceptional solids handling capabilities
- Retrofitable to existing channels
- No maintenance below grade
- 6mm to 0.5mm apertures available
- Up to 5′ deep channels
- High reliability for constant flows

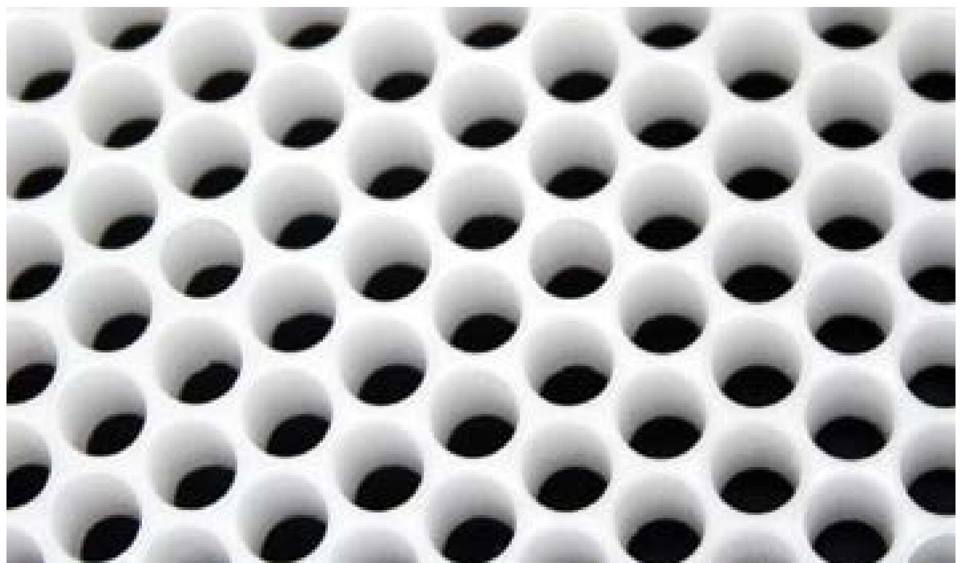
Interested in maximizing the life of your downstream equipment?

Call 1-855-GO-OVIVO to speak with an Ovivo Expert.

OVIVO® OZZY CUP SCREEN

OVIVO'S HIGH PERFORMANCE, LOW MAINTENANCE, ELITE SCREENING TECHNOLOGY

Ovivo's Ozzy drum screens are designed to meet the increasing demand for high capacity coarse and fine screening of raw or wastewater coupled with a robust low maintenance operation.



Close up of Ovivo's ProPaPanel® technology

THE OZZY CUP SCREEN IS THE RESULT OF DECADES OF EXPERIENCE DEVELOPING SOME OF THE LARGEST DRUM SCREENS IN THE WORLD

- Low capital and maintenance cost
- Low energy usage
- Simple, slow rotating mechanism
- Simple to maintain
- Paired with the Ovivo's ProPaPanel to reduced hair-pinning, and maximize corrosion resistance and durability.

THE OZZY CUP IS PAIRED WITH OVIVO'S J&A SCREW COMPACTORS OR SCREW PRESS FOR SCREENINGS HANDLING.

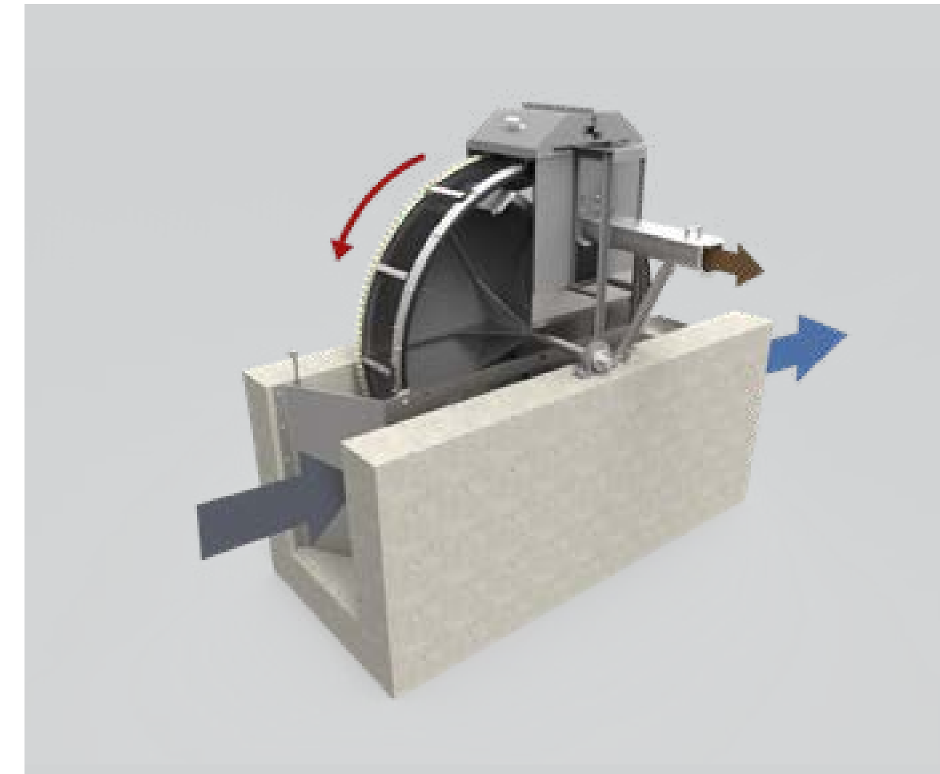
HOW IT WORKS

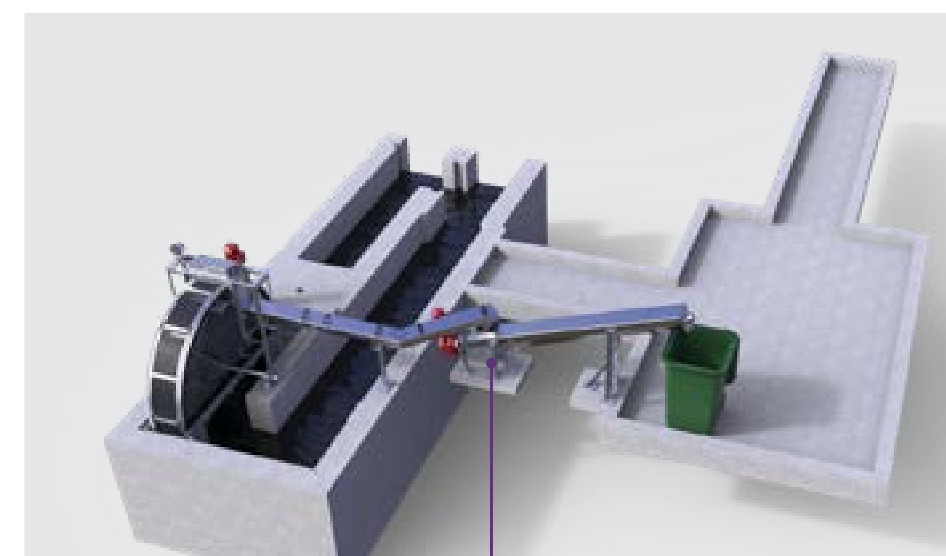
The Ovivo Ozzy Cup screen consists of a robustly constructed drum structure with a solid horizontal main shaft, which revolves slowly in heavy duty, self-aligning roller bearings.

Water flows from the inside to the outside of the drum through mesh panels arranged around its periphery. Mesh panels are cleaned by spray wash nozzles mounted on the outer side of the drum screen. The screenings are then caught by a screening hopper and conveyed to the screw compactor through a sluice trough.

The screen is driven by a simple drive unit positioned at deck level. The final drive is a nylon pinion, which engages with a gear ring on the outside of the drum.

The drum screen structure can be designed to support high differential loading without failure of the mesh panels, thereby ensuring that the downstream plant does not become contaminated by unscreened water and debris.





Typical Ozzy Cup installation with use of an incline screw press

Design allows for the Ozzy Cup to be installed in new or existing straight channels

AVAILABLE SIZES

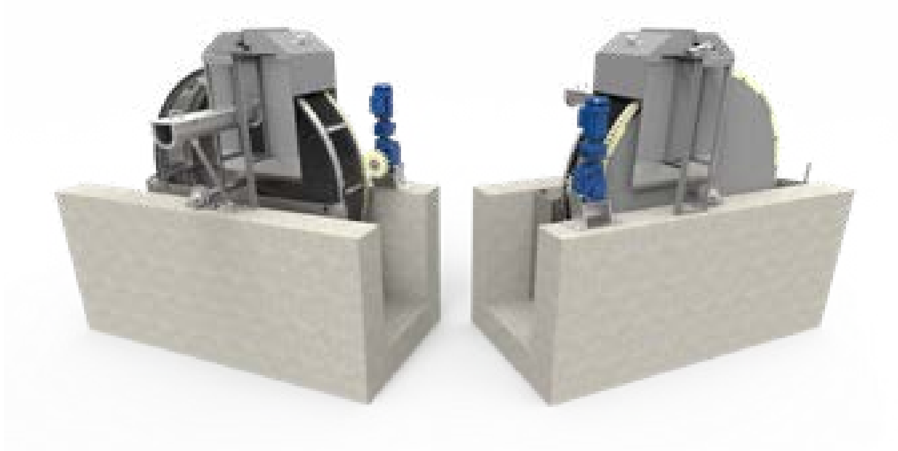
Diameter*: 4′-8′ (2′-4′ channels depths)

Width*: 0.5′-3′+

Aperture diameter: 0.5, 1, 2, 3, 5, 6mm

Flow range up to 10 MGD at 150mg/L TSS*

**For specific flow capacity and sizing, please contact your local Ovivo Representative.*



ENGINEERING SERVICES

DESIGN AND ANALYSIS

Ovivo advanced 3D graphics and modeling, products are designed for different operating conditions and requirements for its customers.

INSTALL, COMMISSION, MAINTAIN

Ovivo's service engineers can install, commission, maintain all machines and will visit sites around the world to advise on all aspects of our products.

SPARE PARTS

All spares supplied are genuine, guaranteed and supported by our detailed knowledge of all historical modifications or upgrades.

TRAINING

As a supplier of engineered capital equipment, we offer our end users on-site or in-house training courses. Contact our spares and service managers for details of the courses available.

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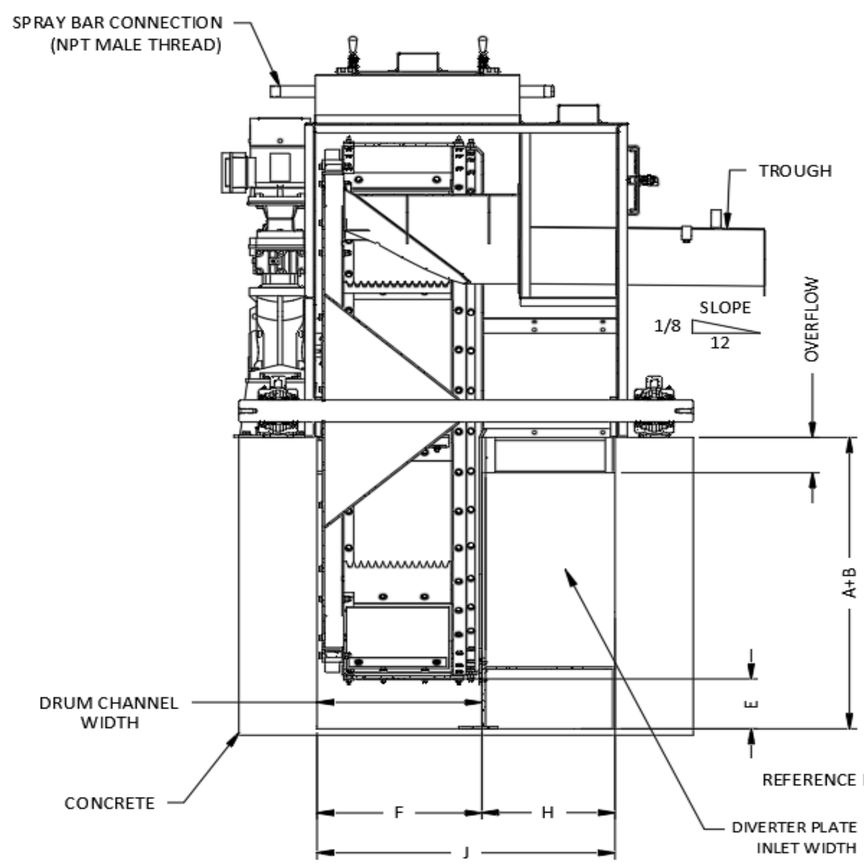
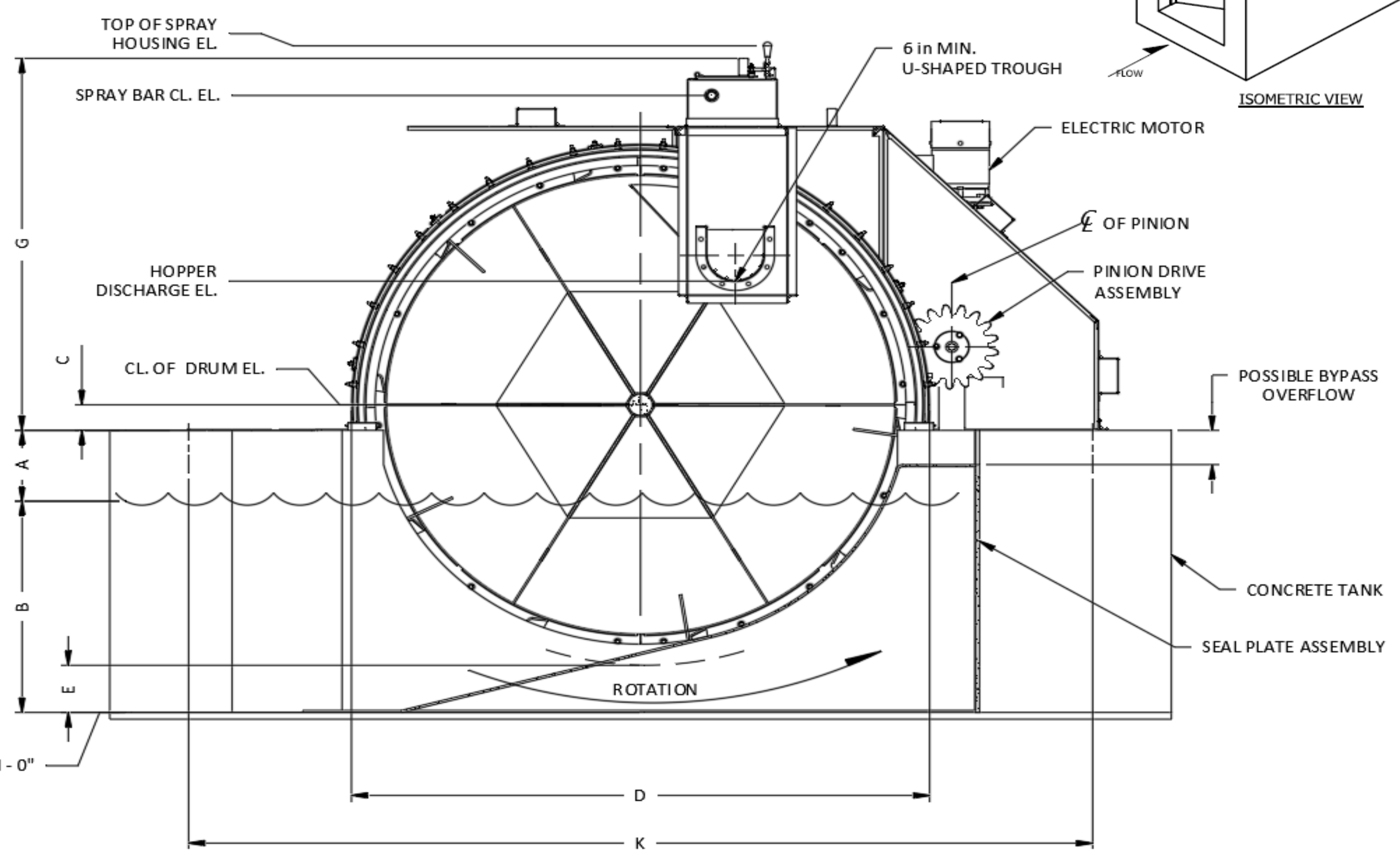
Ozzy Drum Dimensions

Sheet Rev: 1

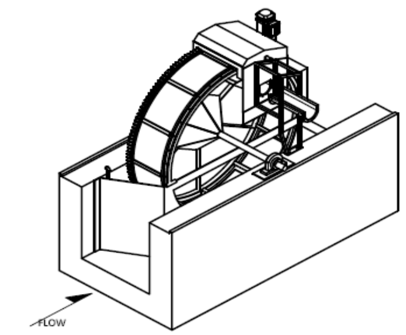
(This dwg is for illustrative purposes only)



FRONT ELEVATION VIEW



SIDE ELEVATION VIEW



ISOMETRIC VIEW

DECK LEVEL (**A+B**):	4.15 ft	MIN. FREEBOARD (**A**):	0.17 ft	DRUM SCREEN CHAMBER WIDTH (**F**):	1.10 ft
		INLET WATER DEPTH (**B**):	3.98 ft		
LEVEL OF SHAFT CL(**A+B+C**):	4.43 ft	DISTANCE OF SHAFT CL FROM DECK (**C**):	0.28 ft	PROJECTION OF SCREEN ABOVE DECK (**G**):	3.72 ft
		NOMINAL DRUM DIAMETER (**D**):	8.00 ft	DIVERTER PLATE INLET WIDTH (**H**):	0.90 ft
		DISTANCE UNDER DRUMSCREEN (**E**):	0.43 ft	TOTAL CHANNEL WIDTH (**J**)	2.00 ft
				MIN. CHAMBER LENGTH (**K**):	13.25 ft

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Worldwide Experts in Water Treatment

TYPICAL ARRANGEMENT OF T-FRAME DRUMSCREEN

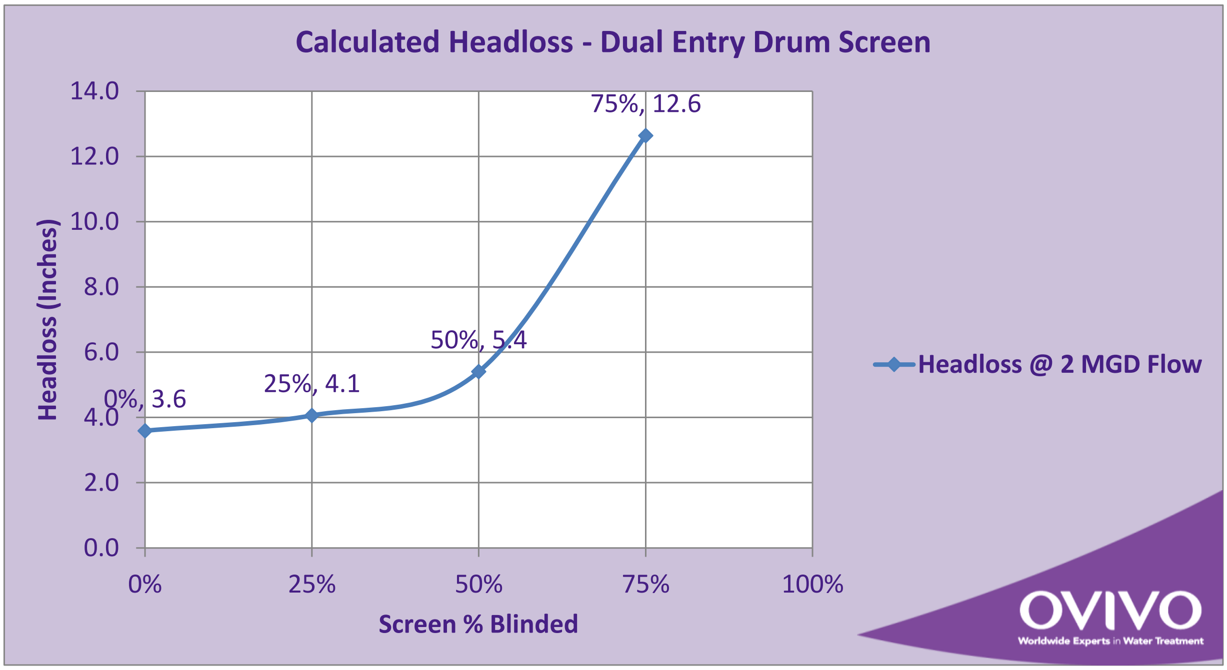
SEDrum Sizing

Sheet Rev: 0

GRAPHICAL REPRESENTATION OF % BLOCKED MESH & HEADLOSS IN INCH

PERCENTAGE CLEAN MESH (%)	PERCENTAGE BLOCKED MESH (%)	HEADLOSS (INCH)
25%	75%	12.6
50%	50%	5.4
75%	25%	4.1
100%	0%	3.6

FLOW DESCRIPTION	**1.7 MGD Flow And 4 feet Inlet Water Depth.**	
GRAPH LINE LABEL	**Headloss @ 2 MGD Flow**	
FLOW IN MGD	1.7	MGD
UPSTREAM FLUID DEPTH	4.0	ft



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WTP EQUIPMENT CORP.
83 Nuggett Court, Brampton, Ontario, Canada L6T 5H2 (905) 799-3403 Fax. (905) 799-6638 sales@wtpcorp.com

SCOPE OF SUPPLY

VORTEX GRIT REMOVAL SYSTEM

East Helena, MT
WTP Ref. 666
9 December 2019

We propose to supply a Vortex Grit Removal System as described below, comprising:

one (1) model VB2500 vortex chamber agitator assembly,
one (1) self-priming grit pump,
one (1) model CC20-10-10 grit classifier c/w cyclone separator, and
one (1) common control system.

ADVANTAGES

- Automatic, stand-alone, complete grit removal system for continuous wastewater flows available in packaged or for concrete tank installation.
- Each customized grit removal application is engineered by WTP Equipment Corp. for compatibility between stages so as to maximize performance of individual equipment items as a complete functioning system. This is in distinction to the use of competitive systems where equipment in different stages of the grit removal system are not necessarily matched for optimum performance. This approach results in the benefit to the end user of optimized system performance and single source responsibility for project performance.
- WTP Equipment Corp. designs and manufactures all grit removal control panels, allowing for specific project customization to the owner's requirements.
- Automatic lubrication to reduce maintenance requirements.
- Grit separation performance is independent of flow variations; the system is sized according to the design peak flow.
- Rotating agitator maintains vortex action, keeping organics in suspension, resulting in cleaner discharged grit.
- Grit chamber sloped bottom allows continuous grit settling even during power failures.
- Minimal headloss and minimal power consumption.
- Small footprint, ideal for retrofit and combined space installations.
- No submerged parts to maintain – all maintenance is done from the operating floor level.
- Components are heavy duty industry standard and easily available. No proprietary mechanisms are used and therefore no complications result from the use of patented components. This can greatly reduce the cost of future replacement parts since there are multiple sources from which they may be obtained.
- Comprehensive manufacturer's warranty on complete system, parts & labour.

VORTEX AGITATOR ASSEMBLY

PERFORMANCE	APPLICATION	To separate from municipal sewage, convey and wash settled grit with a minimum particle density 2650 kg/m^3 (165 #/ft^3). Equipment is sized to remove from the pre-screened process flow: 95% grit particles with diameter larger than 300 micron (50 mesh), 85% grit particles with diameter 200 – 300 microns (70 – 50 mesh), 65% grit particles with diameter 150 – 200 microns (100 - 70 mesh).	
	CAPACITY	2.88 MGD (10,900 m^3 /d) per vortex chamber	
	HEADLOSS	< 25 mm (1”)	
	FLOW DEPTH	Max. design flow depth	1.25’ (381 mm)
	VELOCITIES	Inlet channel peak flow speed	2.7 fps (0.8 m/s)
		Outlet channel peak flow speed	1.4 fps (0.4 m/s)
	DIMENSIONS	Grit Chamber diameter	8’-3” (2515 mm)
		Inlet channel	16” W x 48” D
		Outlet channel	30” W x 48” D

TANKAGE — Equipment provided for installation into concrete tanks, consisting of circular vortex separation and grit storage chambers (tank and bridge are by others).

AGITATOR — One (1) bridge-mounted agitator provided to maintain organics in suspension at all flows, driven by a constant speed gearmotor and geared drive/baseplate assembly with support slewing bearing at <25 rpm, c/w: four (4) hydrofoil blades; 250 mm (10") diameter torque tube. Gearmotor is AGMA II class, SEW Eurodrive or equal, c/w: direct coupled, 0.56 kW (0.75 HP), 230-460VAC/3/60, class F insulation, NEMA design B, continuous duty, 40 C ambient temperature rated, 1.15 SF, CSA approved, TEFC motor for washdown duty, Class 1, Division 2, Group D hazardous environment); design SF > 2.

AUTO LUBRICATION — Agitator drive assemblies are each provided with an automatic lubricant dispenser, approved for Class 1, Division 2 applications, c/w: user controlled operation; status monitor/operation indicator; refillable transparent lubricant storage reservoir.

GRIT WASHING — Water and (optional) air scouring is provided at the grit pump extraction pipe inlet, to fluidize and wash grit slurry of organics, prior to pumping; water scour requires 190 L/m at 345 kPa (50 gpm at 50 psi); air scour requires 100 m^3/h (60 scfm).

VALVES — Included for automated operation of the grit removal water scour cycle are: one (1) 1.5" (40 mm) threaded end, ASCO or equal, NEMA 4, bronze body, 120VAC/1/60, N.C., electric solenoid valve and one (1) 1.5" (40 mm) threaded end, bronze body throttling manual ball valve.

MATERIALS OF CONSTRUCTION	Agitator drive/baseplate assembly	A-36 steel, epoxy coated
	Wetted agitator components	304 stainless steel
	Grit extraction pipe	304 stainless steel
	Assembly hardware	304 stainless steel

BRIDGE-MOUNTED GRIT PUMP

GRIT PUMP	Settled grit is removed from the storage chamber by a bridge-mounted grit pump through a 100 mm (4") diameter vertical grit suction pipe. Separated and scoured grit slurry is fed to a grit classifier for final concentration and discharged to a receiving container (container by others).
CAPACITY	Grit pump provides 55 m^3/h (240 gpm) grit slurry pumping capacity at 9.1 m (30 ft.) estimated TDH (TDH to be confirmed once pump and piping arrangements are finalized); pump will pass a 75 mm (3”) diameter sphere.
DESCRIPTION	Gorman-Rupp model T4A71S-B/F horizontal inlet, self-priming, non-clog centrifugal pump consisting of: no. 30 grey iron case construction; G-R hard iron impeller and seal plate; hardened alloy steel replaceable wear plate; double floating mechanical seal with silicon carbide faces in its own oil bath; proprietary external shimless adjustment providing double impeller and wear plate life; driven at VFD controlled, direct coupled WEG 7.5 HP (5.6 kW), 1750 rpm, high efficiency, severe duty, 230-460VAC/3/60, class F insulation, NEMA design B, continuous duty, 40 C ambient temperature rated, 1.15 SF, TEFC motor for washdown duty, Class 1, Division 2, Group D hazardous environment; fabricated steel baseplate; 60 month limited pump warranty. Provided loose for installation by Contractor are: Automatic air release valve (for connection to pump discharge piping); inlet and outlet pressure gauge assembly.
PIPING	Piping from grit pump to separator cyclone (provided by others) to be 100 mm (4”) nominal size; all elbows to be long radius bends to promote laminar flow.

GRIT CLASSIFIER, MODEL CC20-10-10

PERFORMANCE	APPLICATION	To separate, wash and discharge settled grit.	
	CAPACITY	Inlet flow:	55 m^3/h (240 gpm) to cyclone inlet;
		Underflow:	7 m^3/h (31 gpm) maximum to classifier from cyclone underflow for settling of minimum 2650 kg/m^3 density particles at 7 m/h (2.9 gpm/ft^2) overflow rate;
		Grit conveying:	0.25 m^3/h (9 ft^3/h) at 18% trough filling.
CONNECTIONS	INLET	cyclone 4" (100 mm) dia. Victaulic pipe.	
	OUTLET	cyclone 6" (150 mm) dia. Victaulic pipe. classifier settling tank 4" (100 mm) diameter Victaulic pipe.	
	DRAIN	50 mm (2") dia. NPT threaded straight pipe tank drain.	

SEPARATOR CYCLONE	One (1) 10" nominal diameter cyclone separator included per classifier, to operate at 70 kPa (10 psi) pressure loss at 55 m^3/h (240 gpm) inflow from feeding pump(s), including: replaceable neoprene internal liners; nihard vortex finder; Victaulic pipe inlet & overflow (outlet) connections; quick disconnect apex assembly; pressure gauge connection. Cyclone(s) are mounted on a support stand above the settling tank.
DRIVE UNIT	AGMA II class, shaft-mounted gearmotor, SEW Eurodrive or equal, c/w direct coupled 0.38 kW (0.5 HP), 230-460VAC/3/60, class F insulation, NEMA design B, continuous duty, 40 C ambient temperature rated, 1.15 SF, TEFC motor for

washdown duty, Class 1, Division 2, Group D hazardous environment); design SF > 1.4.

SCREW & HOUSING Shaftless screw, 216 mm (8.5") O.D., 67 % pitch, of dual steel flatbars, 89 mm (3.5”) flight width x 10 mm (3/8”) outer thickness. U-trough, 254 mm (10") inside width, according to CEMA 300 standards, inclined 25º to horizontal, c/w: flanged drive end plate; sectional, bolted u-trough covers; replaceable wear liner; (1) discharge chute. Settling tank, of reinforced steel plate, c/w: 1 m^2 (11 $ft.^2$) liquid surface area; hinged drive end access cover; integral floor supports; adjustable outlet weir.

MATERIALS OF CONSTRUCTION	Tank, screw housing	1/8" (3 mm) th. 304 stainless steel
	Supports	1/4" (6 mm) th. 304 stainless steel
	Trough covers	FRP sheet
	Drive shaft assembly	C4140 carbon steel, epoxy coated
	Screw	hardened alloy steel, painted
	U-trough wear liner	10 mm (3/8") thick UHMW-PE
	Hardware & anchor bolts (Imperial)	304 stainless steel

CONTROL SYSTEM

MAIN PANEL One (1) 230 or 460VAC/3/60 NEMA 4X control system in a 304 stainless steel enclosure provided c/w controls for automatic operation of the grit removal cycle, including, as a minimum: door-mounted 600VAC-3ph disconnect switch; fused control power transformer; Allen-Bradley Programmable Controller and door mounted HMI screen to access user adjustable functions (adjustable 24 h / 7 day system timer; classifier delay off timer, scour timer); system “H-O-A switch; agitator “RUN/STOP” switch; scour solenoid valve “H-O-A” switch; grit pump “H-O-A” switch; classifier “H-O-A” switch; “AGITATOR RUN”, “WATER SCOUR”, “PUMP RUN” & “CLASSIFIER RUN” indicator lights; (2) non-reversing IEC motor starters with thermal overload protection (agitator & classifier); Allen Bradley VFD (grit pump).

Note: plc based control systems, with or without Ethernet communication in a number of custom configurations are also available.

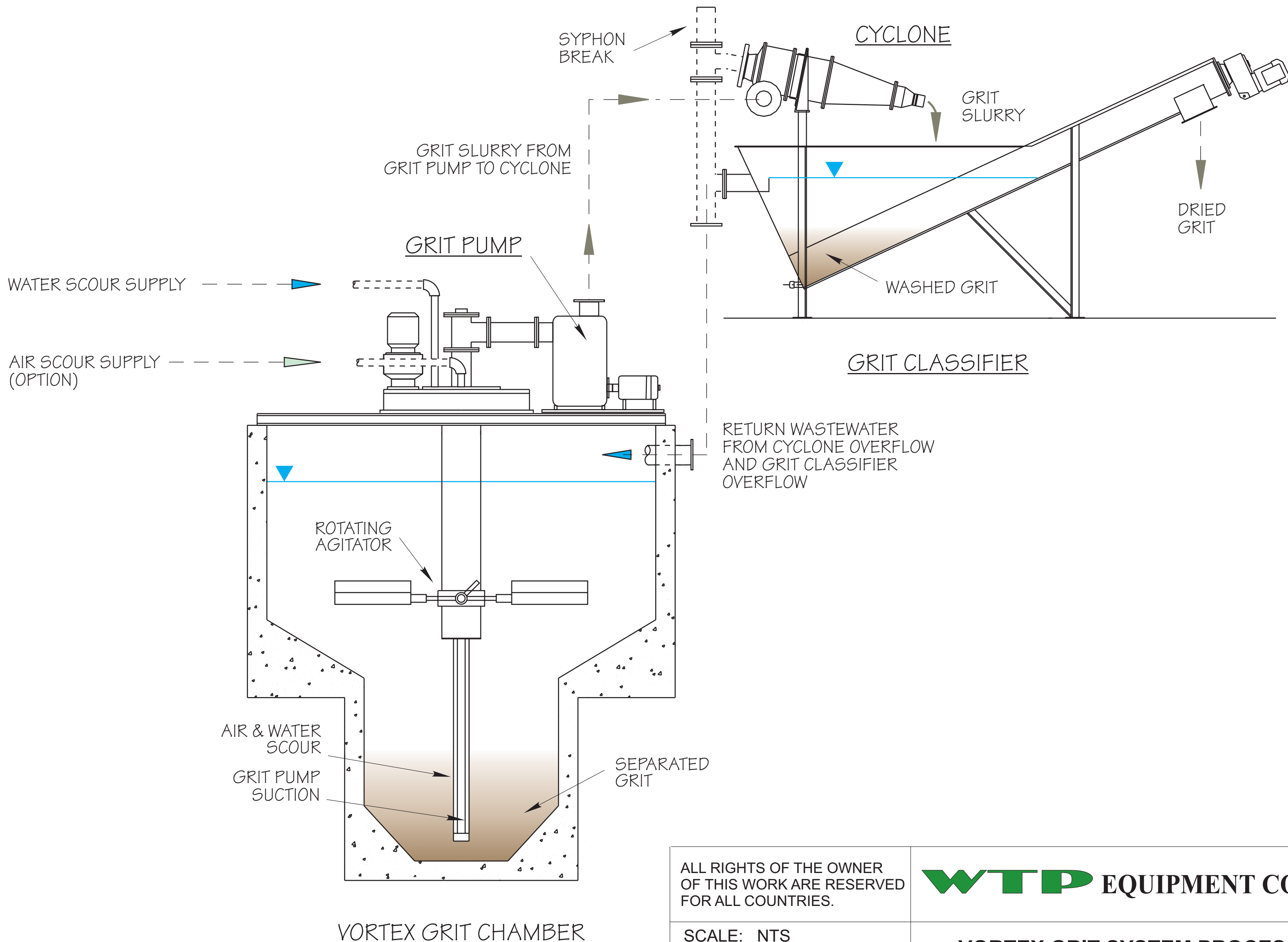
GENERAL

WARRANTY Manufacturer’s standard warranty is included for 12 months duration.

FINISHING All non-stainless and non-galvanized fabricated steel components are coated with the manufacturer's standard finish, unless otherwise stated above. Gearmotors and cyclones are provided with manufacturer's standard finish for washdown/ severe duty application.

EXCLUSIONS The following are not included and are to be supplied by others as required: equipment off-loading from carrier & installation; civil work/ concrete, grout & sealants; cathodic protection (if required); wiring and conduit between mains, controls, sensor(s), valves and motors; grit receiving container; grit chamber & channel covering/ grating, walkways, ladders, railings other than included above; all influent, effluent, air/ water supply and ancillary piping and valves; stop gates; pressure gauges not included above; electrical controls not included above;

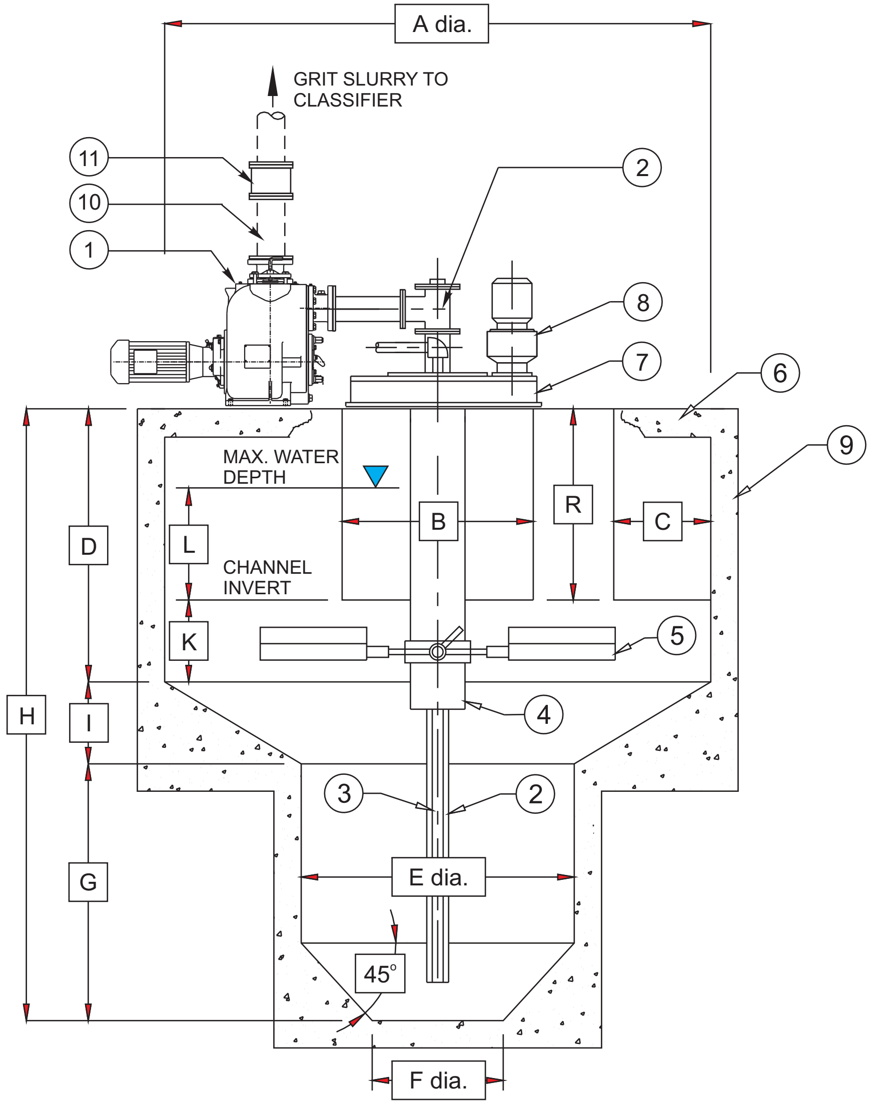
spare parts; air/water supply for grit scour; permits/ certificates/ reviews; field applied coatings/lubricants; field alignment; vibration & performance testing (if required); field applied coatings; heat tracing, insulation & controls (if required); labels/tagging.



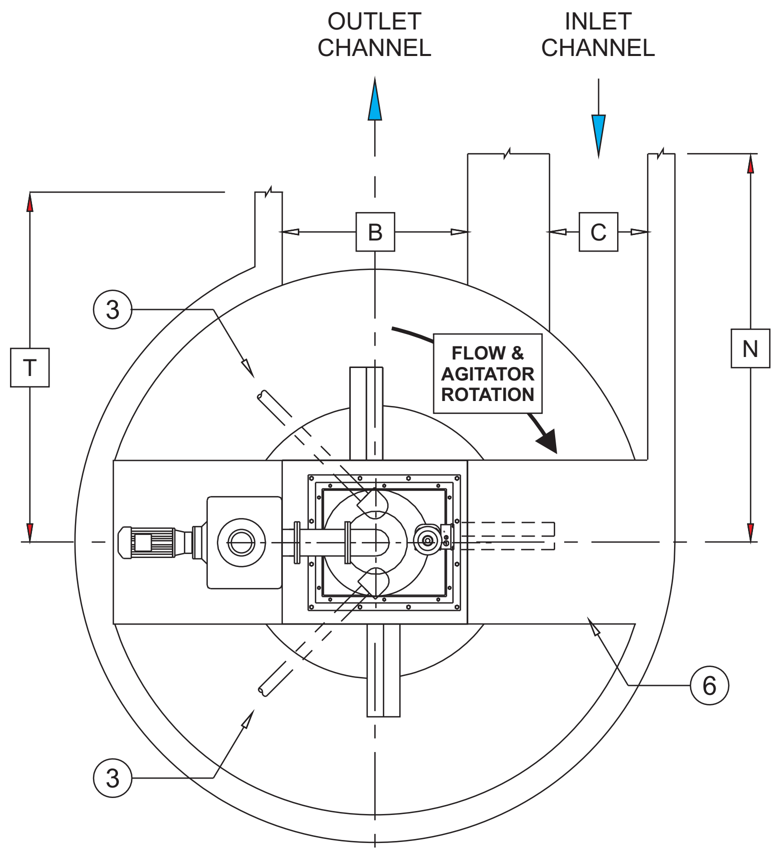
WTP EQUIPMENT CORP.

SCALE: NTS
DWG. #: CA1105C
DATE: 3 / 2004

VORTEX GRIT SYSTEM PROCESS
SELF PRIMING GRIT PUMP



SECTION



PLAN

DIMENSIONS

	model number	2500			
A	separation chamber diameter	2515	mm	8.25	ft.
B	outlet channel width	762	mm	2.50	ft.
C	inlet channel width	406	mm	1.33	ft.
D	separation chamber height	1600	mm	5.25	ft.
E	storage chamber diameter	1118	mm	3.67	ft.
F	bottom diameter	406	mm	1.33	ft.
G	storage chamber height	1524	mm	5.00	ft.
H	tank depth	3530	mm	11.58	ft.
I	transition section height	406	mm	1.33	ft.
K	inlet offset	381	mm	1.25	ft.
L	channel water depth (design max.)	381	mm	1.25	ft.
N	inlet channel straight length (min.)	2743	mm	9.00	ft.
R	channel depth	1219	mm	4.00	ft.
T	outlet channel length (min.)	1829	mm	6.00	ft.

NO.	ITEM	NO.	ITEM
6	CONCRETE BRIDGE		
5	MECHANICAL AGITATOR	11	CHECK VALVE (BY OTHERS)
4	AGITATOR TORQUE TUBE	10	GRIT DISCHARGE PIPE (BY OTHERS)
3	AIR/WATER SCOUR INJECTION PIPE	9	CONCRETE VORTEX CHAMBER
2	GRIT SLURRY EXTRACTION PIPE	8	AGITATOR GEARMOTOR
1	SELF-PRIMING GRIT PUMP	7	AGITATOR DRIVE/BASEPLATE

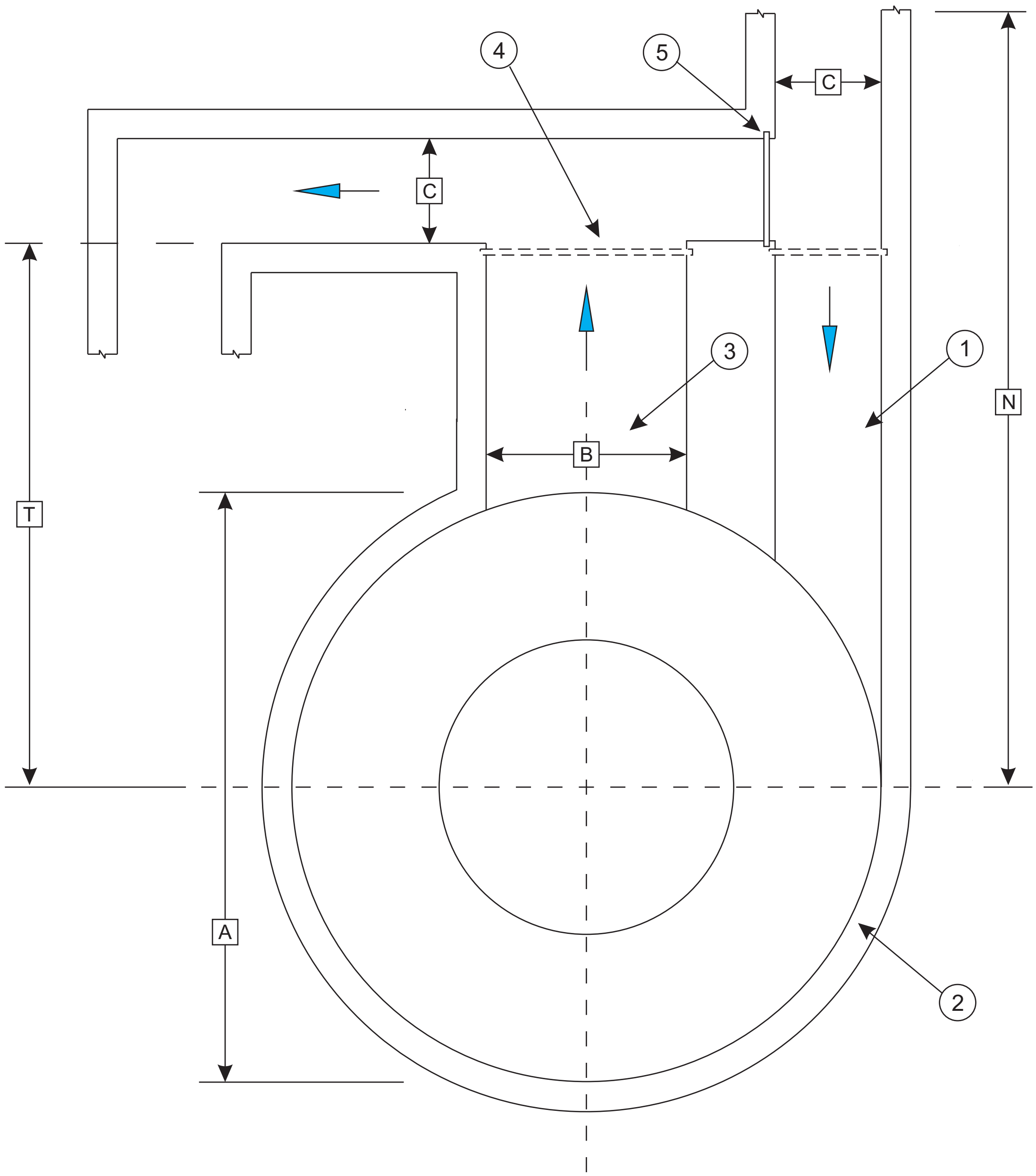
DESCRIPTION

NOTE:
1. All external piping and control gates are by others.
2. Maintain minimum inlet channel straight length N and outlet channel length T to streamline flow.
3. Mirror image arrangements also available.
4. Some elevations are variable - consult factory.

WTP EQUIPMENT CORP.

SCALE: NTS
DWG. #: PA 1100-1 GR
DATE: 12 / 2019
REF.: 666

VORTEX GRIT REMOVAL SYSTEM
SELF-PRIMING GRIT PUMP
GENERAL ARRANGEMENT



NOTES:
1. Maintain minimum inlet channel straight length N and minimum outlet channel length T to streamline flow.
2. Inlet channel width C and outlet channel width B are selected to maintain optimum flow velocities.
3. See PA1100-1 for dimensions.
4. Mirror image arrangements also available.

WTP EQUIPMENT CORP.

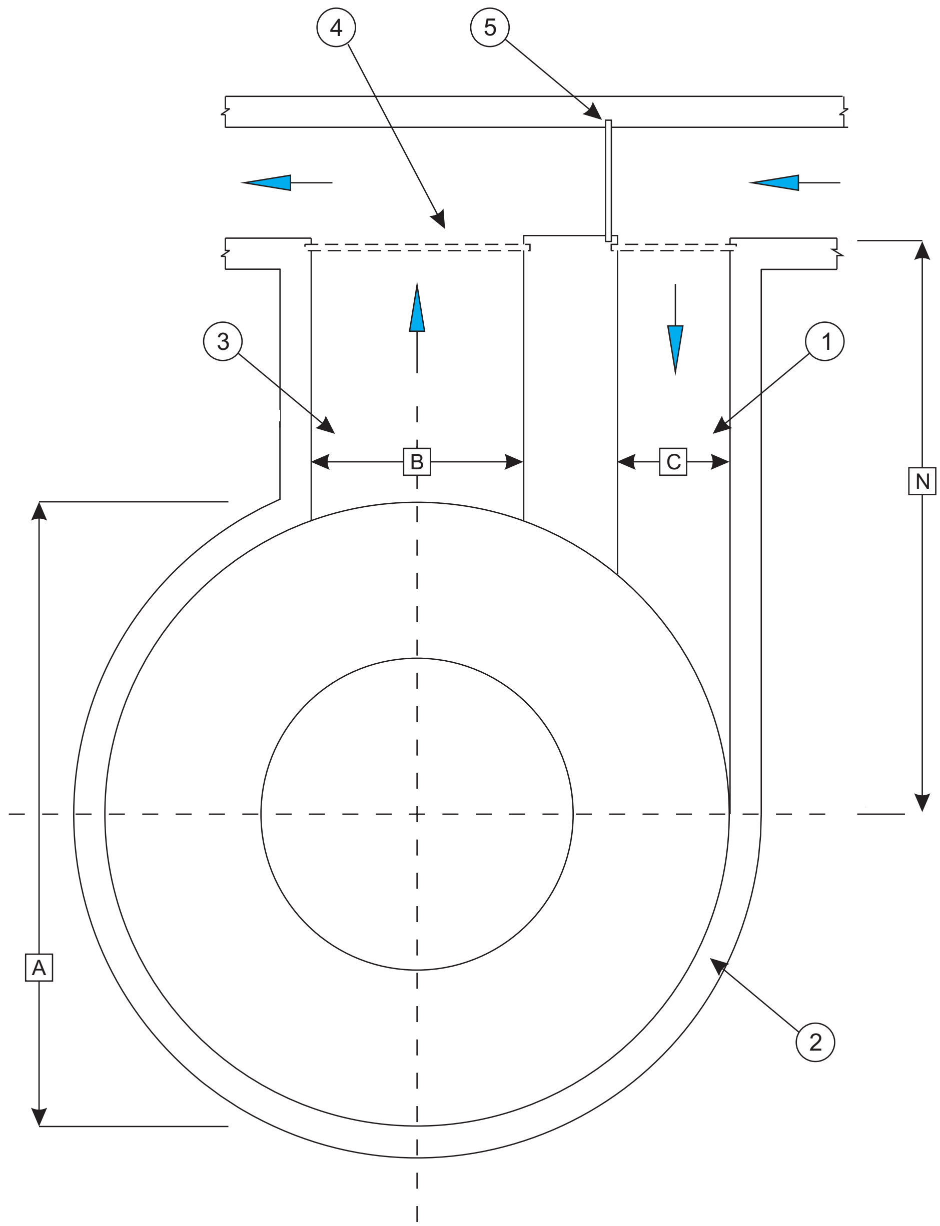
SCALE: NTS

DWG. #: PA 1100-2A

DATE: 2 / 2005

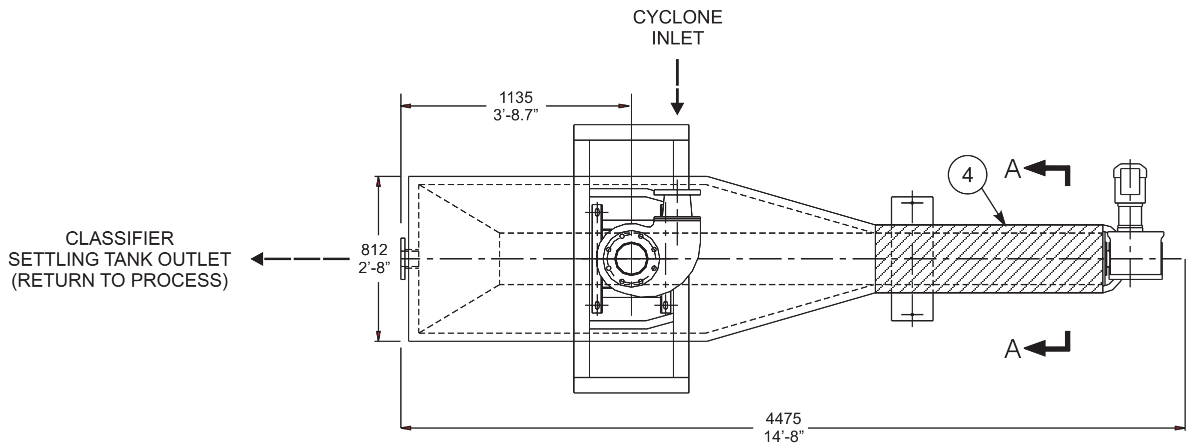
VORTEX GRIT REMOVAL SYSTEM
IN-LINE ARRANGEMENT
PLAN VIEW

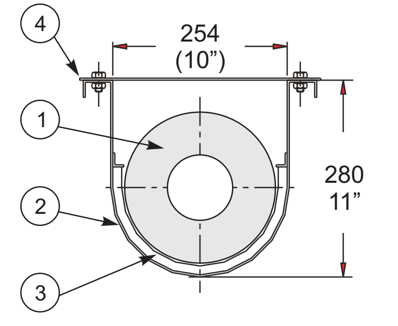
5	CLOSED GATE TYP. (BY OTHERS)
4	OPEN GATE TYP. (BY OTHERS)
3	OUTLET CHANNEL
2	VORTEX CHAMBER
1	INLET CHANNEL



NOTES:
1. Maintain minimum inlet channel straight length N to streamline flow.
2. Inlet channel width C and outlet channel width B are selected to maintain optimum flow velocities
3. See PA1100-1 for dimensions
4. Mirror image arrangements also available.

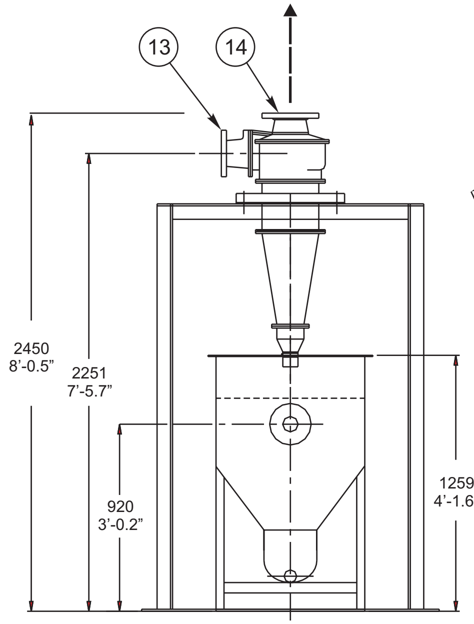
	WTP EQUIPMENT CORP.	5	CLOSED GATE TYP. (BY OTHERS)
SCALE: NTS	VORTEX GRIT REMOVAL SYSTEM OFF-LINE ARRANGEMENT PLAN VIEW	4	OPEN GATE TYP. (BY OTHERS)
DWG. #: PA 1100-2B		3	OUTLET CHANNEL
		2	VORTEX CHAMBER
DATE: 2 / 2005		1	INLET CHANNEL

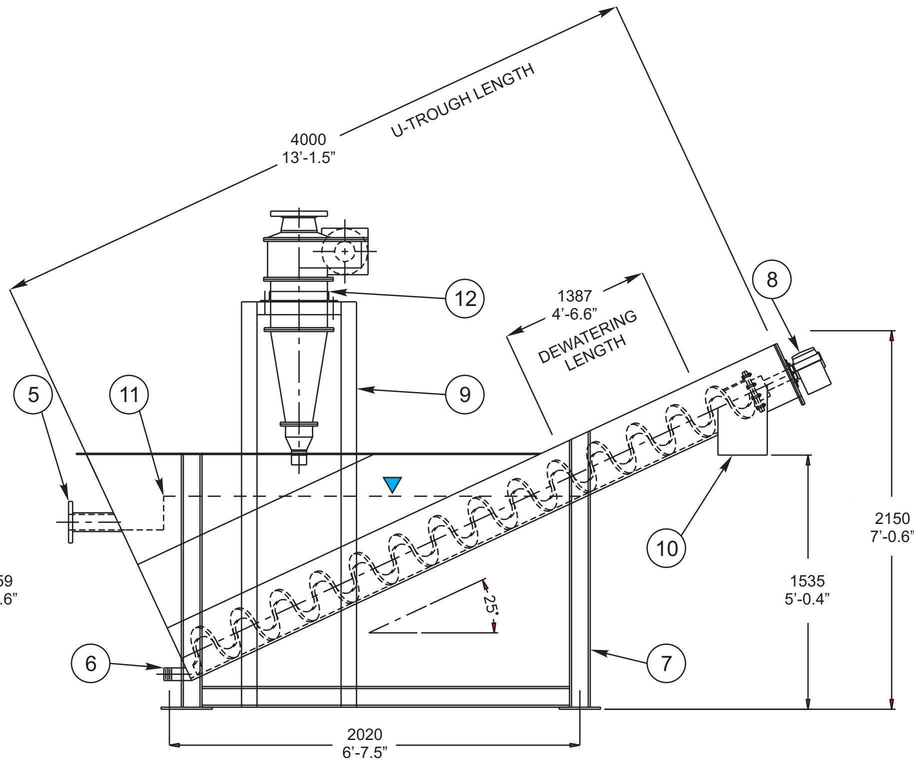


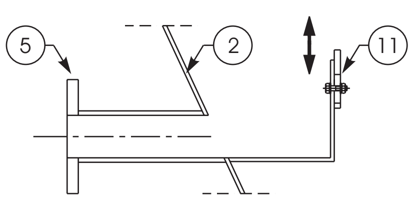


U-TROUGH CROSS SECTION A-A

NOTE:
1. CYCLONE ORIENTATION MAY BE ROTATED.
2. CYCLONE SHOWN WITH OPTIONAL FLANGED INLET/OUTLET CONNECTIONS.
3. DISCHARGE CHUTE IS 254 x 254 mm (10" x 10").
4. ALTERNATE CYCLONE ORIENTATIONS AND DRIVE UNITS AVAILABLE.







OVERFLOW WEIR DETAIL

14	CYCLONE OUTLET	150 mm (6")
13	CYCLONE INLET	100 mm (4")
12	SEPARATOR CYCLONE	MODEL 10
11	OUTLET WEIR	UHMW-PE
10	GRIT DISCHARGE CHUTE	254 mm (10") □
9	CYCLONE SUPPORT STAND	
8	DRIVE UNIT	
7	FLOOR SUPPORT	
6	SETTLING TANK DRAIN	2" NPT w/ cap
5	SETTLING TANK OUTLET	3" 125# ASA flange
4	TROUGH COVER	FRP
3	TROUGH WEAR LINER	UHMW-PE
2	SETTLING TANK & TROUGH	
1	SHAFTLESS SCREW	ALLOY STEEL

COMPONENT LIST

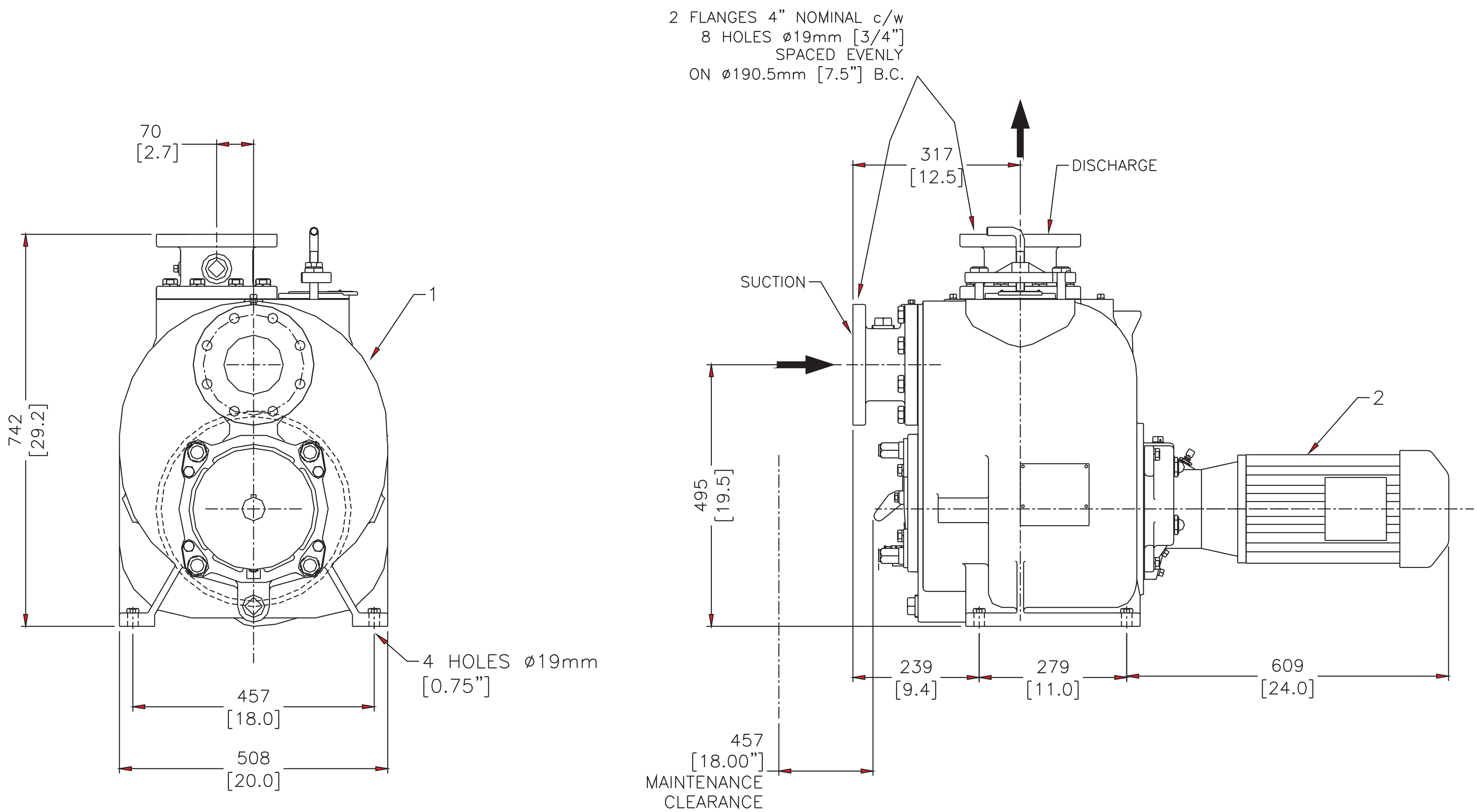
TANK SETTLING AREA	1 m^2 (11 ft^2)
CONVEYOR SCREW O.D.	215 mm (8.5")
MOTOR SIZE (min.)	0.38 kW (1/2 HP)

DESIGN DATA

WTP EQUIPMENT CORP.

GRIT CLASSIFIER CC20-10-10
GENERAL ARRANGEMENT

	DATE: 3/2014	
	SCALE:	DWG: PA5136



NOTE:
1. DIMENSIONS ARE mm [in.].

ITEM	SPECIFICATION/DESCRIPTION	QTY
2	AC MOTOR	1
1	SELF PRIMING GRIT PUMP GORMAN RUPP T4A71S-B/F	1

MATERIAL LIST

REV. 2			WTP EQUIPMENT CORP.	
REV. 1				
APPR.				SELF PRIMING GRIT PUMP
DRAWN	G.D.	11/14		GENERAL ARRANGEMENT
12/8	BY	DATE	SCALE	REF.: DWG # MA 9864

C D S W

G-R Hard Iron Fitted

Self Priming Centrifugal Pump

Basic Pump

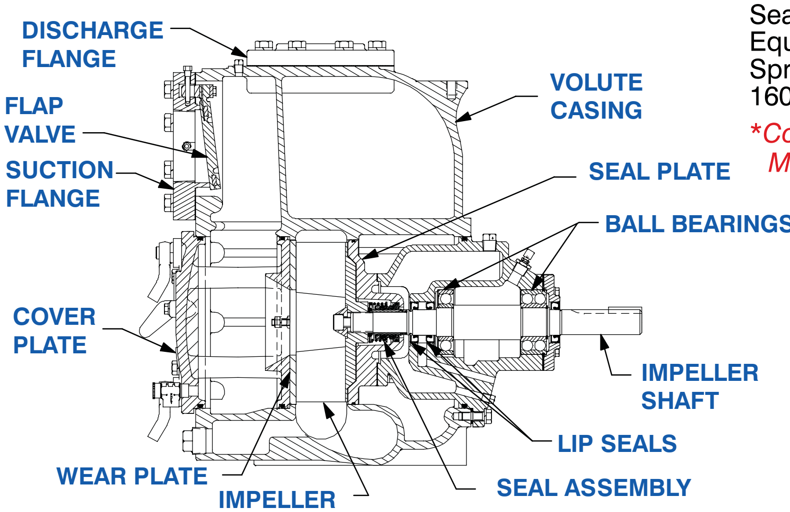
Model T4A71S–B

Size 4” x 4”

PUMP SPECIFICATIONS

Size: 4” x 4” (101 mm x 101 mm) NPT - Female.
Pump Casing: Gray Iron No. 30. Maximum Operating Pressure 86 psi (593 kPa).*
Open Type, Two Vane Impeller: G-R Hard Iron. Handles 3” (76,2 mm) Diameter Spherical Solids.
Impeller Shaft: Alloy Steel No. 4140.
Replaceable Wear Plate: Hardened Alloy Steel.
Removable Adjustable Cover Plate: Gray Iron No. 30; 37 lbs. (17 kg).
Flap Valve: Neoprene W/Steel Reinforcing.
Bearing Housing: Gray Iron No. 30.
Seal Plate: G-R Hard Iron.
Shaft Sleeve: Alloy Steel No. 4130.
Radial Bearing: Open Single Ball.
Thrust Bearing: Open Double Ball.
Bearing and Seal Cavity Lubrication: SAE No. 30 Non-Detergent Oil.
Flanges: 125# Gray Iron No. 30.
Gaskets: Buna-N, Compressed Synthetic Fibers, Vegetable Fiber, PTFE, Cork, and Rubber.
O-Rings: Buna-N.
Hardware: Standard Plated Steel.
Brass Pressure Relief Valve.
Bearing and Seal Cavity Oil Level Sight Gauges.

Optional Equipment: Metal Bellows Seal. Automatic Air Release Valve. 120V/240V Casing Heater. High Pump Temperature Shutdown Kit.
Gray Iron No. 30 Suction and Discharge Spool Flanges;
4” ASA **(Specify Model T4A71S–B /F)**.
100 mm DIN 2527 **(Specify Model T4A71S–B /FM)**.



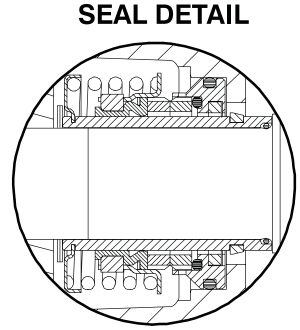
Shown with Optional Suction & Discharge Spool Flanges (Available in ASA or DIN Standard Sizes).

SEAL SPECIFICATIONS

Cartridge Type, Mechanical, Oil-Lubricated, Double Floating, Self-Aligning. Silicon Carbide Rotating and Stationary Faces. Stainless Steel No. 316 Stationary Seat. Fluorocarbon Elastomers (DuPont Viton® or Equivalent). Stainless Steel No. 18-8 Cage and Spring. Maximum Temperature of Liquid Pumped, 160°F (71°C).*

**Consult Factory for Applications Exceeding Maximum Pressure and/or Temperature Indicated.*

SEAL DETAIL



THE GORMAN-RUPP COMPANY ● MANSFIELD, OHIO

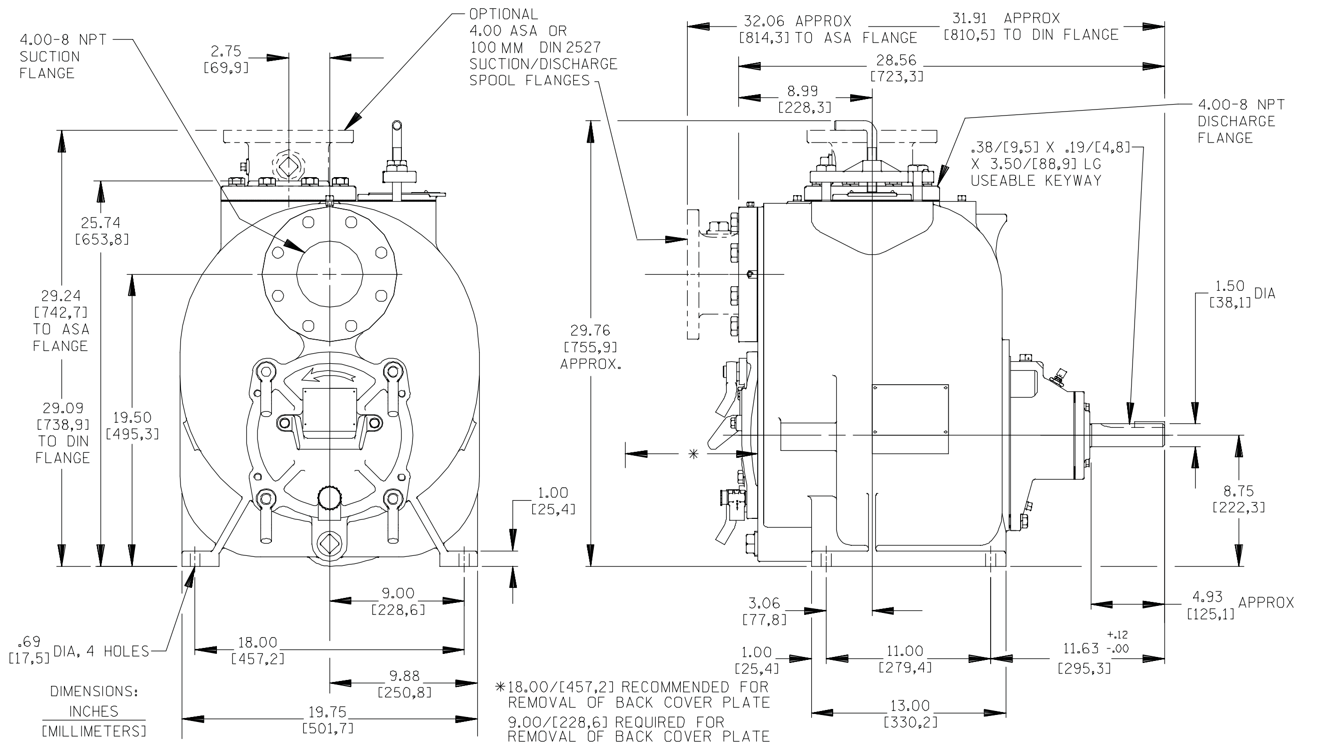
GORMAN-RUPP OF CANADA LIMITED ● ST. THOMAS, ONTARIO, CANADA

www.gormanrupp.com

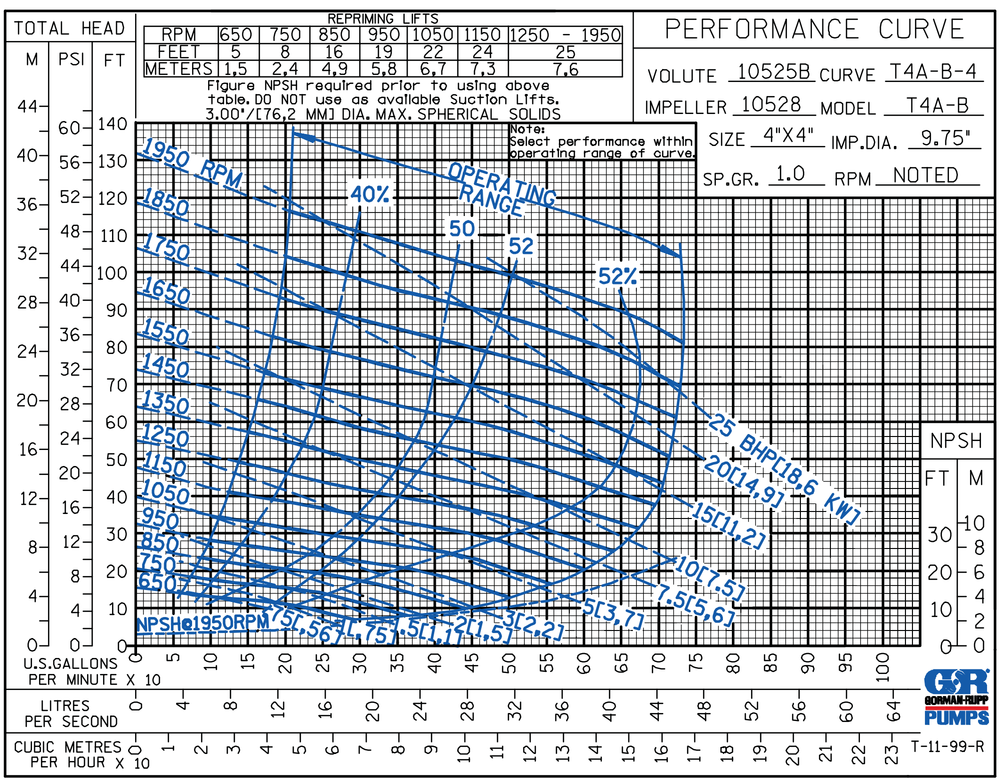
Specifications Subject to Change Without Notice

Printed in U.S.A.

Specification Data	APPROXIMATE DIMENSIONS and WEIGHTS	NET WEIGHT: 575 LBS. (261 KG.)*
SECTION 55, PAGE 2140		SHIPPING WEIGHT: 614 LBS. (279 KG.)*
		EXPORT CRATE: 22.7 CU. FT. (0,6 CU. M.)
		*ADD 15 LBS. (6,8 KG.) W/EACH SPOOL FLANGE



OPTIONAL ASA OR DIN STANDARD SUCTION & DISCHARGE SPOOL FLANGES AVAILABLE



THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO

GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA

Specifications Subject to Change Without Notice

Printed in U.S.A.

Pump Data Sheet - Gorman-Rupp Industrial Catalog

GORMAN-RUPP PUMPS

Service: Grit Pump
Fluid: Grit Slurry - 2-4% Solids
Flod: 45 M3/Hour

Pump:

Size: T4A-B-4

Type: T-SERIES
Synch speed: Adjustable

Speed: 1020 rpm
Dia: 248 mm

Curve: T4A-B-4

Impeller:

Specific Speeds:

nq: ---
S: ---

Dimensions:

Suction: --- mm
Discharge: --- mm

Pump Limits:

Temperature: --- °C
Pressure: --- kPa g
Sphere size: 76.2 mm

Power: --- kW
Eye area: --- mm²

Search Criteria:

Flow: 45 m³/hr

Head: 9.1 m

Fluid:

Water
SG: 1
Viscosity: 1.104 cP

NPSHa: --- m

Temperature: 15.6 °C
Vapor pressure: 1.773 kPa a
Atm pressure: 101.4 kPa a

Motor:

Standard:
Enclosure: TEFC

--- kW
Speed: ---
Frame: ---

Sizing criteria: Max Power on Design Curve

---- Data Point ----

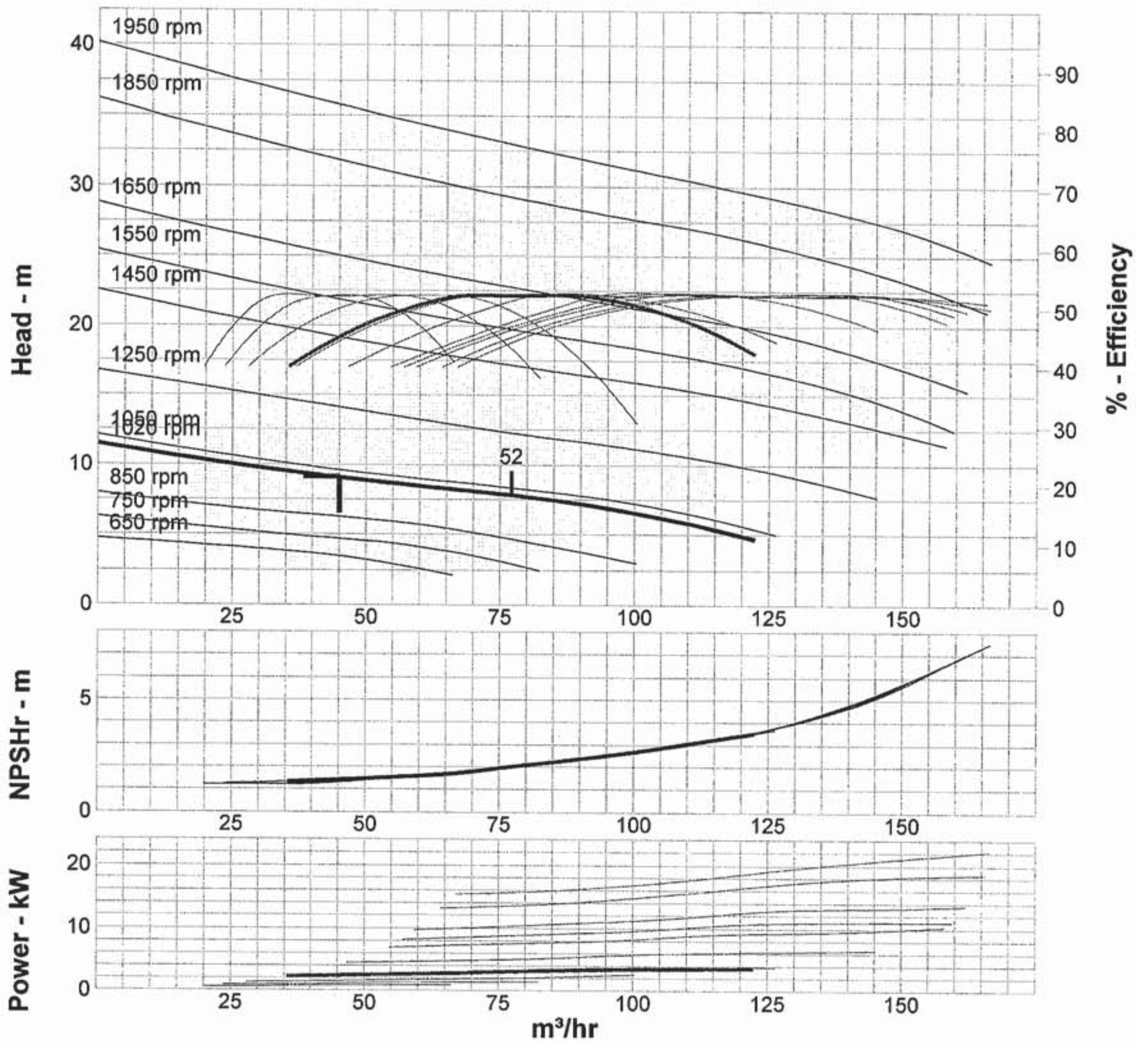
Flow: 45 m³/hr
Head: 9.11 m
Eff: 44%
Power: 2.46 kW
NPSHr: 1.45 m

---- Design Curve ----

Shutoff head: 11.5 m
Shutoff dP: 113 kPa
Min flow: --- m³/hr
BEP: 52% @ 77.1 m³/hr
NOL power:
3.71 kW @ 122 m³/hr

-- Max Curve --

Max power:
22.2 kW @ 166 m³/hr



Performance Evaluation:

Flow m³/hr	Speed rpm	Head m	Efficiency %	Power kW	NPSHr m
54	1020	8.73	48	2.63	1.55
45	1020	9.11	44	2.46	1.45
36	1020	9.49	40	2.3	1.36
27	1020	9.99	36	2.14	1.26
18	1020	10.5	32	1.98	1.17

WTP EQUIPMENT CORP.
83 Nuggett Court, Brampton, Ontario, Canada L6T 5H2 (905) 799-3403 Fax. (905) 799-6638 sales@wtpcorp.com

BUDGET ESTIMATE

TO	Robert Peccia & Associates Inc.	**OUR REF. NUMBER**	666
ATTN:	Trisha Bodlovic **|** Project Designer	**DATE**	9 December 2019
		ESTIMATED DELIVERY	16 weeks after approval
REF.	City of East Helena, MT	**SHOP DRAWINGS**	4 – 6 weeks ARO
	Screening & Vortex Grit Removal Systems	**FREIGHT & DUTY**	Included to jobsite
		TAXES	Not Included

We are pleased to offer the following price estimate for supply of:

ITEM	QTY	DESCRIPTION	AMOUNT
		SCREENING SYSTEM	
1.1		Screening System rated for 2.88 MGD, for installation by others into an existing channel, according to our 9 December 2019 Scope of Supply, comprising:	
	1	one (1) model SL100 Mechanical Bar Screen w/ control system,	$ 87,350.00
	1	one (1) model CPW20 Screenings Washing Dewatering Press.	$ 30,300.00
		TOTAL AMOUNT, 1 SHIPMENT TO JOBSITE	$ 117,650.00
1.2	1	OPTION – Screenings bagger on press discharge chute.	$ 1,265.00
		VORTEX GRIT REMOVAL SYSTEM – CONCRETE TANK OPTION	
2.1		Vortex Grit Removal System rated for 2.88 MGD, for installation by others into a concrete chamber, according to our 9 December 2019 Scope of Supply, comprising:	
	1	one (1) model VB2500 vortex chamber agitator assembly, one (1) self-priming grit pump & one (1) common control system.	$ 63,950.00
	1	one (1) model CC20-10-10 grit classifier c/w cyclone separator.	$ 44,700.00
		TOTAL AMOUNT, 1 SHIPMENT TO JOBSITE	$ 108,650.00
		VORTEX GRIT REMOVAL SYSTEM – FABRICATED TANK OPTION	
2.2		Vortex Grit Removal System rated for 2.88 MGD, for installation by others, according to our 9 December 2019 Scope of Supply, comprising:	
	1	one (1) model VB2500 vortex chamber agitator assembly in a fabricated tank, one (1) self-priming grit pump & one (1) common control system.	$ 122,900.00
	1	one (1) model CC20-10-10 grit classifier c/w cyclone separator.	$ 44,700.00
		TOTAL AMOUNT, 1 SHIPMENT TO JOBSITE	$ 167,600.00

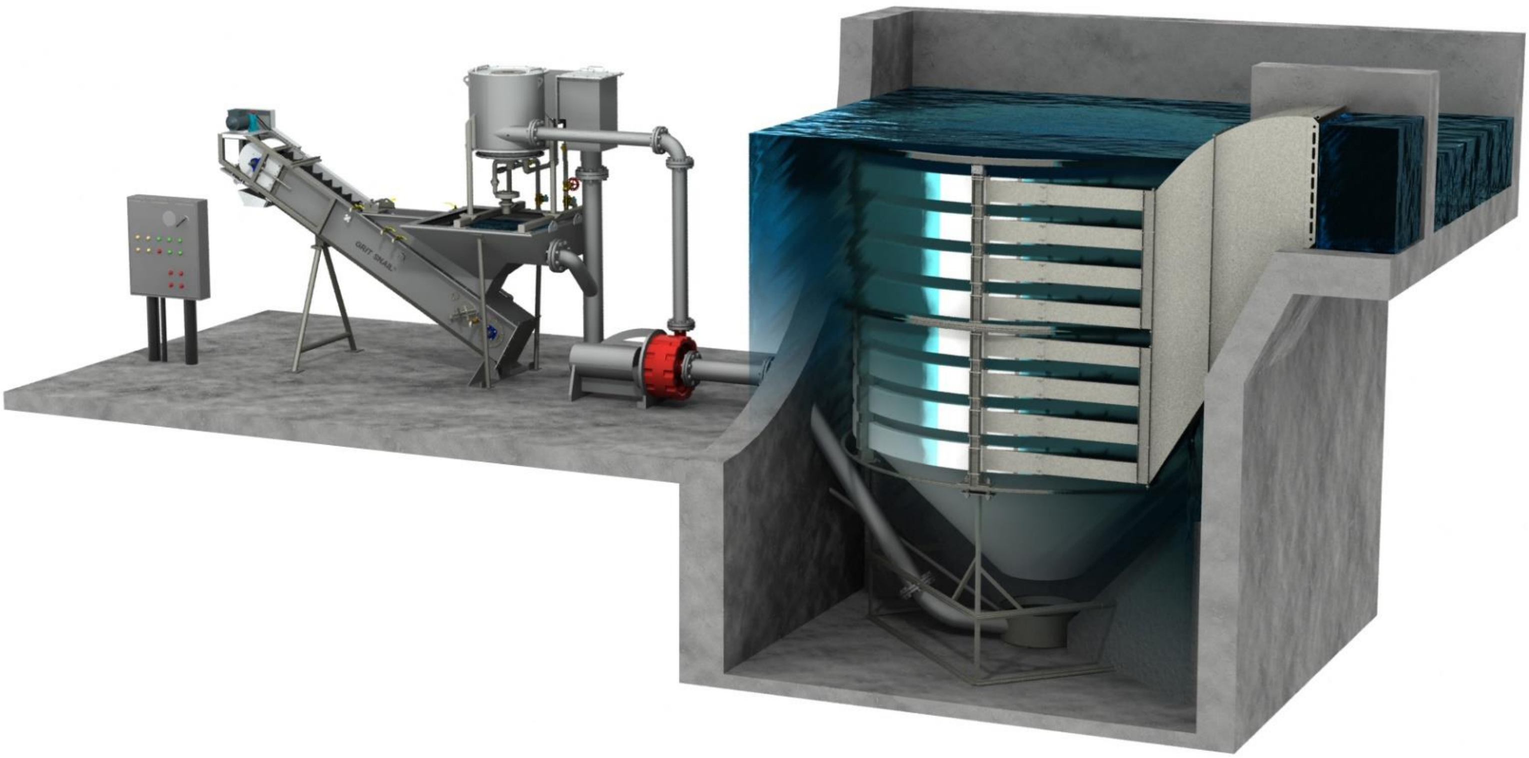
Yours Truly,

K Argyle
Ken Argyle
Engineering Manager
Cell (416) 910-1743

Should you wish additional information please contact:

William Flanagan | *isi*WEST | 3168 Oliver Street | Bozeman, MT 59718 | c: 406.599.0575
| MT Sales Engineer |

This estimate is in US dollars and is valid for 120 days from the date shown.



Grit Removal System Proposal Package
East Helena, MT WWTP
Robert Peccia & Associates

Manufacturer

Hydro International
2925 NE Aloclek Suite 140
Hillsboro, OR 97124
(866) 615-8130 ph
(503) 615-2906 fax
hydro-int.com

Representative

Coombs-Hopkins Company
668 N. 44th Street
Phoenix, AZ 85008
(801) 990-3174 ph
(435)659-7199 fax
coombshopkins.com

hydro-int.com

Hydro International ®

December 13, 2019

Ms. Trish Bodlovic
Robert Peccia & Associates
3147 Saddle Drive
Helena, MT 59601

RE: Headworks Grit Removal System
East Helena, MT WWTP
File #19_11_0664 A

Dear Ms. Bodlovic:

Thank you for your interest in Hydro International. We are pleased to present our proposal for a HeadCell® Grit Removal, Classification, Washing, and Dewatering System. Hydro International is dedicated to providing innovative, high performance advanced grit management systems grit removal equipment. Supported by over 30 years of research, testing both in our lab and in the field, product development and superior engineering we pride ourselves on providing high-quality products and unmatched customer service. Our extensive experience includes thousands of installations throughout the world.

Grit is continually introduced into collection systems, but is not uniformly carried to treatment facilities. As flows increase, the grit load entering the plant elevates. Once in the treatment plant, where velocities are slower, grit will deposit in processes, disrupting systems, decreasing equipment longevity, and increasing maintenance costs. The HeadCell® Grit Removal System offers many benefits over conventional grit removal systems including:

- Complete system designed to process the solids load as well as the hydraulic load through each step of the process, collection, washing/classification and dewatering and producing a clean, dry product.
- Removing fine and slowly settling grit, protecting equipment and processes from abrasive wear and sedimentation
- All-hydraulic design with no moving parts, minimizing operating and maintenance costs
- Small footprint yet capable of high efficiency solids capture and removal
- Robust design allowing long component life with minimal wear

We sincerely appreciate your interest in our equipment and look forward to working with you on this project. As you progress with the design, we can quickly generate CAD drawings, budget updates, and specifications as well as provide review of equipment layouts and specifications for your particular application. Reference lists are available through your local representative. If you have any questions or concerns, do not hesitate to contact us.

Regards,
Hydro International

Nathaniel McArthur
Nate McArthur
Applications Engineer

Performance Objective

Hydro International is pleased to propose the following HeadCell® grit removal, washing, and dewatering system to be installed in an existing plant which has flows of 0.491 mgd average and 2.88 mgd peak. Each component of the grit removal systems performance shall be outlined below.

Proposed Equipment Summary

HeadCell® Grit Concentrator Unit

The HeadCell® is an all-hydraulic grit concentrator, which uses vortex flow and a stacked tray design to efficiently capture and settle fine grit via large surface area and short settling distances. The unit can be installed into the process flow, downstream of screening, in any system where limited head is available. The unit requires no external power source, has no internal moving parts, is self-cleaning, and has a compact modular construction. Wide turndown ratios can be accommodated in the HeadCell® when it is combined with Hydro's high performance washing system.

Specifications

Quantity:	1
Size:	6' diameter
Number of Tray/Unit:	7
Surface Area/Unit:	198 ft^2
Loading Rate @ Peak Flow/Unit:	10.1 gpm/ft^2
Performance @ Peak Flow:	95% removal of all grit (SG 2.65) ≥ 106 microns
Performance @ Average Flow:	95% removal of all grit (SG 2.65) ≥ 75 microns
Peak Flow/Unit:	2.88 mgd with 12" headloss
Average Flow/Unit:	0.491 mgd with 1" headloss
Discharge:	Weir
Underflow Connection:	4" flanged pipe
NPW Connection:	1.5" NPT
NPW Requirement/Unit:	Intermittent 20 gpm @ 50 psig
Material of Construction:	304 SS Support Structure/Duct/Underflow Low Density Polyethylene Trays
Weight Dry (approximate):	1300 lbs

TeaCup® Grit Washing Unit

The TeaCup® is an all hydraulic, high efficiency vortex separator designed to remove grit, sediment and sand from wastewater, raw water and other liquids using vortex motion and boundary layer effects to aid in organics removal. The TeaCup® provides finer particle removal as flow rate increases. The TeaCup® discharges a clean (low organic) grit slurry, which emits fewer odors and requires only dewatering to meet stringent disposal regulations.

Specifications

Quantity:	1
Size:	24" diameter
Performance @ Design Flow:	95% removal of all grit (SG 2.65) ≥ 75 microns @ design flow
Design Flow/Unit:	150 gpm with 39" headloss
Maximum/Peak Flow/Unit:	250 gpm with 108" headloss
Influent Solids Concentration:	≤1.0%
Influent Connection:	3" flanged pipe
Effluent Connection:	4" flanged pipe
Underflow Connection:	3" flanged pipe
NPW Connection:	1.5" NPT

NPW Requirement/Unit	Intermittent 20-30 gpm @ 50 psig (for 30-120 sec. every 1–2 hrs.)
Material of Construction:	304 SS
Weight Dry/Wet (approximate):	650/750 lbs
Operation Time:	Continuous or a minimum of 10-15 minutes

Decanter Dewatering Unit

The Decanter dewaters grit by quiescently settling high-density solids to retain all grit and abrasives. The Decanter is an economical option for smaller plants that require performance dewatering. The Decanter comes in three basic configurations to match local disposal trucks or equipment configurations: front-loading, rear-loading, and self-dumping.

Specifications

Quantity	1
Size:	1.5 cy
Overflow Connection:	3” NPT
Drain Connection:	2” NPT
Drain Screen:	0.10” 304 SS wedgewire
Material of Construction:	Galvanized Steel
Weight Dry/Wet (approximate):	800 / 4800 lbs.
Performance:	≥60% (wt.) total solids and ≤25% volatile solids

Grit Pump

The grit pump shall be designed to convey grit slurry from the HeadCell® grit concentrator unit to the TeaCup® grit washing unit. The grit pump shall be a recessed impeller, vortex-type unit, specifically designed to pump slurries of grit, debris and organic solids without clogging. The parts exposed to abrasive wear (case, impeller and wearplate) shall have a minimum 650 Brinell hardness for maximum wear resistance.

Specifications

Quantity:	1
Style:	Dry-Pit
Nominal Size:	TBD
Design Flow Rate:	150 gpm
Design TDH:	30’
Power Supply:	480V/3-phase
Horsepower:	TBD

Control Panel

The panel shall contain all timers, VFDs, switches, and indicator lights to operate one (1) HeadCell® NPW Supply, one (1) TeaCup® unit, and one (1) grit pump in either fully automated or manual mode.

Specifications

Quantity:	1
Enclosure Material:	304 SS
Enclosure Type:	NEMA 4X
Power Supply:	480V/3-phase
Control Logic:	Programmable Relay
Grit Pump Control:	VFD

System Hydraulics

System hydraulics is the responsibility of the design engineer. Hydro International can provide information on HeadCell® hydraulics, TeaCup® flow vs. headloss curves and pumping and piping FAQ’s to assist the engineer in determining system hydraulics and pump requirements, upon request.

Design Recommendations

- 1/2" or finer screening prior to the grit removal system
- Velocity through bar screen openings/slots/apertures should not exceed 4 ft/s at peak flow as recommended by industry design manuals.
- Estimated grit load at peak flow is 0.10 yd^3/hr.
- Stated output grit quality (total solids/volatile solids) is based on a minimum plant influent grit quantity of 50 pounds FS/million gallon.
- All piping connected to Hydro equipment must be supported by other means than the Hydro equipment
- 2 – 3 ft/s channel velocities at peak flow as recommended by industry design manuals
- 4 – 7 ft/s grit slurry pipe velocities as recommended by industry design manuals
- Incorporate a drain line, piped to a floor drain, in the grit dumpster to allow for further dewatering prior to disposal
- A minimum 18" of access clearance around all equipment and minimum 3' of access clearance above equipment
- Operators find that it is useful to locate a spray hose adjacent to the equipment so that they can spray all equipment down during an inspection
- Incorporate a minimal access platform to facilitate inspection access to the top of the equipment
- Grit pumps may require NPW for seal flushing. Requirements for flushing are dependent on the make, model, and seal type of the pump specified by the engineer.

Start-up

One (1) factory trained representative, two (2) trips, for start-up and instruction services as required totaling four (4) days.

Quote Validity: 30 days After expiration of validity Hydro International reserves the right to adjust pricing to account for any significant increases in material costs.

Exclusions

Any item(s) not specifically described above are excluded and are not to be supplied by Hydro International including but not limited to the following:

- Field assembly, erection and installation
- Anchor Bolts
- Interconnecting piping and valving not expressly stated above
  Pipe connections and fittings not expressly stated above
- All pipe supports, hangers and braces
- Controls, switches, control panels and instrumentation of any kind not expressly stated above
- Wiring and conduit
- Grit pump associated piping, valving, gauges
- Covers and access hatches
- Field or touch-up paint, painting, blasting and touch-up of surface finish
- Spare parts not specifically stated above
- Unloading, hauling and storage charge
- Lubricating oil and greases
- Grit study, field performance testing, laboratory testing and sample collection and analysis
- All concrete and grouting work
- Insulation and heat tracing of any kind
- Structural / Seismic analysis
- Performance, Warranty, Efficacy and/or Supply Bond(s)
- Grit dumpsters
- Translation Services

Options

Quotes will be provided upon request for the following optional features:

- Stainless steel valve bodies
- Additional field days for startup or training

- Explosion proof upgrade
- PLC Based Control Panel
- Upgrade 304 to 316 Stainless Steel
- Structural / Seismic Anchorage Certification
- Field performance testing, laboratory testing and sample collection and analysis
- Service & maintenance contract
- Additional Decanters
- Extended warranty

Warranty

Hydro International's Standard Warranty shall apply per the Terms and Conditions of Sale.

Delivery

Please allow 4 to 6 weeks after receipt of purchase order for approval drawings. Shipment is typically a maximum of 12-16 weeks after receipt of "Approved" or "Approved As Noted, Resubmittal Not Required" submittal package. Price includes truck freight to jobsite, but does not include any state or local taxes if required.

Terms & Conditions

This proposal is made pursuant to Hydro International's standard Terms & Conditions of Sale, attached hereto and made a part hereof.

Contacts

Plant Representative:

Mr. Scott Forsling

Coombs-Hopkins Company

2825 East Cottonwood Parkway, Suite 500

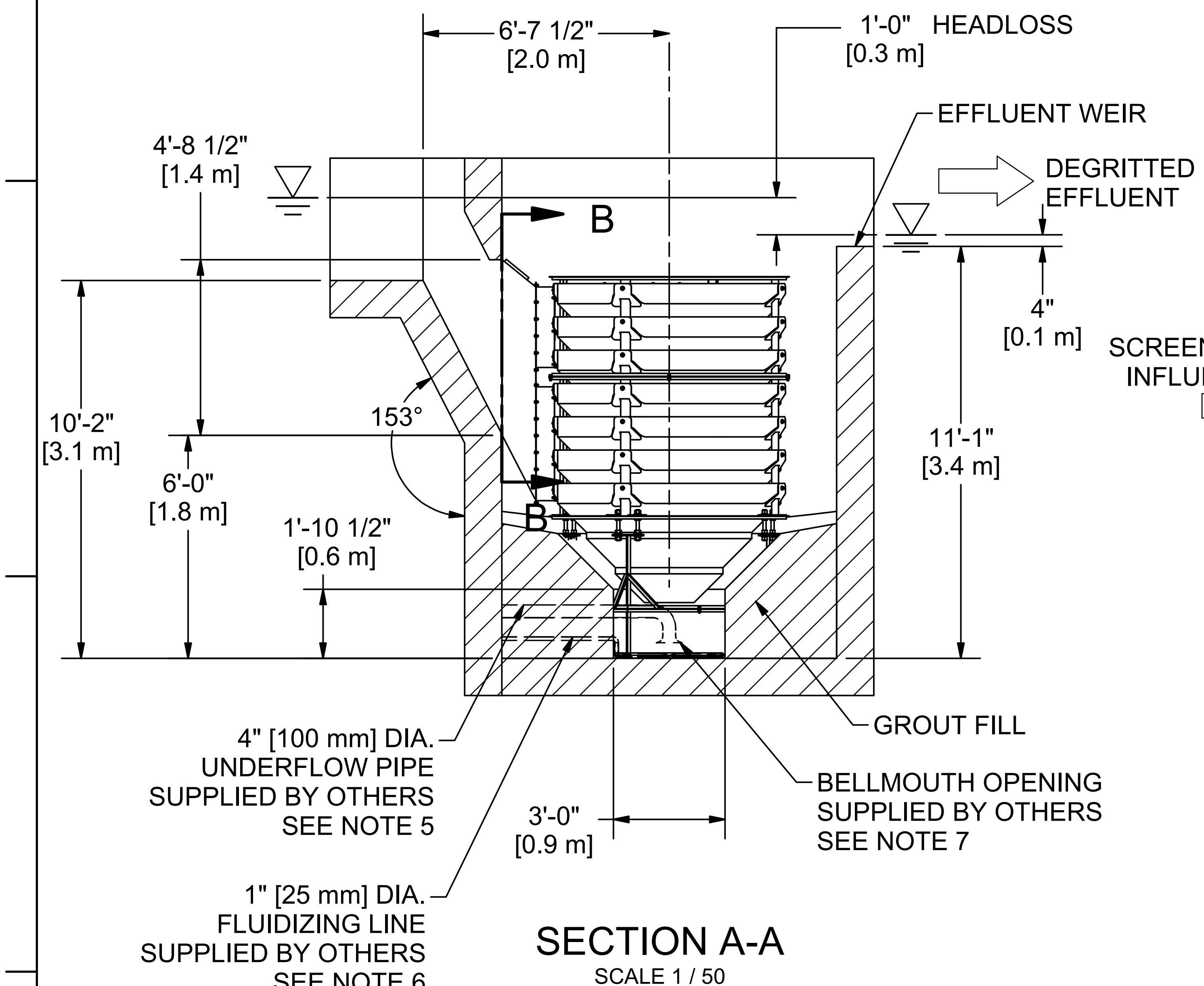
Salt Lake City, Utah 84121

(801) 990-3174 ph

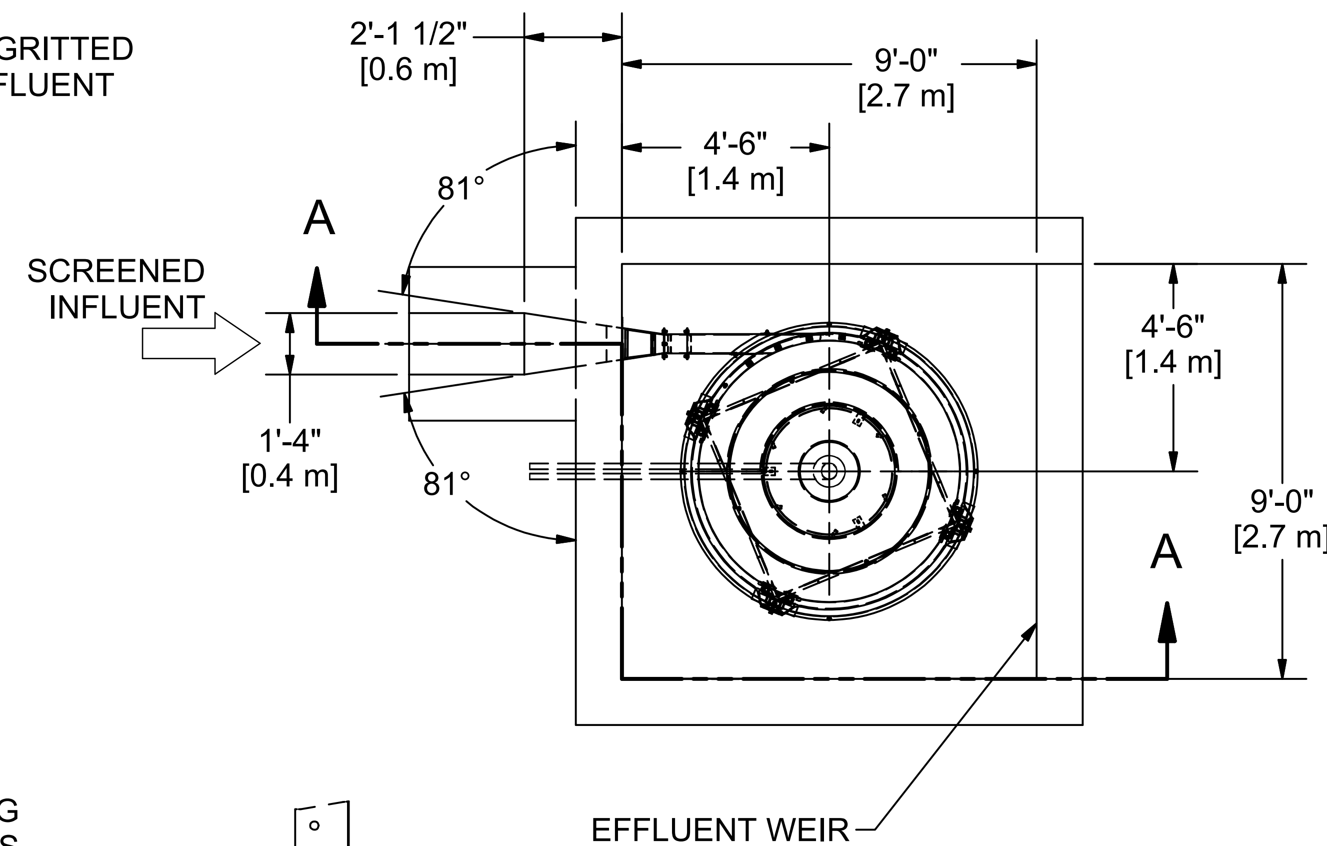
(801) 990-3247 fax

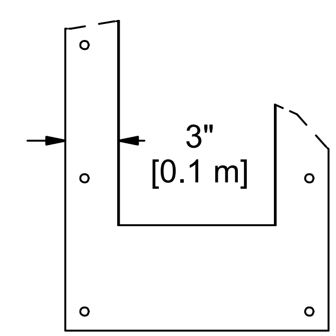
scott@chcwater.com

DO NOT CHANGE DUCT LAYOUT OR PIPE ORIENTATION
WITHOUT CONSULTING HYDRO INTERNATIONAL

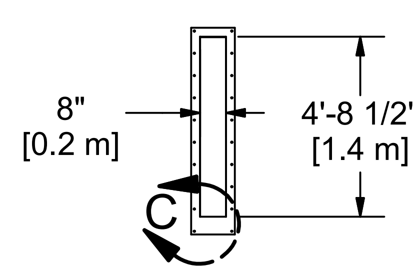


SECTION A-A
SCALE 1 / 50





DETAIL C
SCALE 1 / 10



SECTION B-B
SCALE 1 / 60

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

TOLERENCES ARE:
FRACTIONS ± 1/16
DECIMALS:
X.X ± .06
X.XX ± .03
X.XXX ± .015
ANGLES: ± .5°

PROJECTION

COMMENTS:
1. ALLOW GRIT PUMP TO FULLY DRAIN HEADCELL TANK.

2. PLANT FLOW BYPASS RECOMMENDED TO ALLOW THE HEADCELL TO BE TAKEN OUT OF SERVICE FOR MAINTENANCE.

3. CLOCKWISE & COUNTERCLOCKWISE UNITS ARE AVAILABLE. CW SHOWN

4. ALTERNATE EFFLUENT CONFIGURATIONS ARE AVAILABLE.

5. THE GRIT PUMP SUCTION LINE SHOULD BE DESIGNED FOR A 4-7 FT/S [1.2-2.2 M/S LINE VELOCITY.

6. FLUIDIZING WATER REQUIREMENTS:
INTERMITTENT 20 GPM [1.3 L/S] AT 50PSI

7. DISTANCE BETWEEN BELL MOUTH AND BOTTOM OF TANK 1.25 X SUCTION PIPE DIAMETER

REVISION HISTORY

REV	BY	DESCRIPTION	DATE
-		FIRST RELEASE	

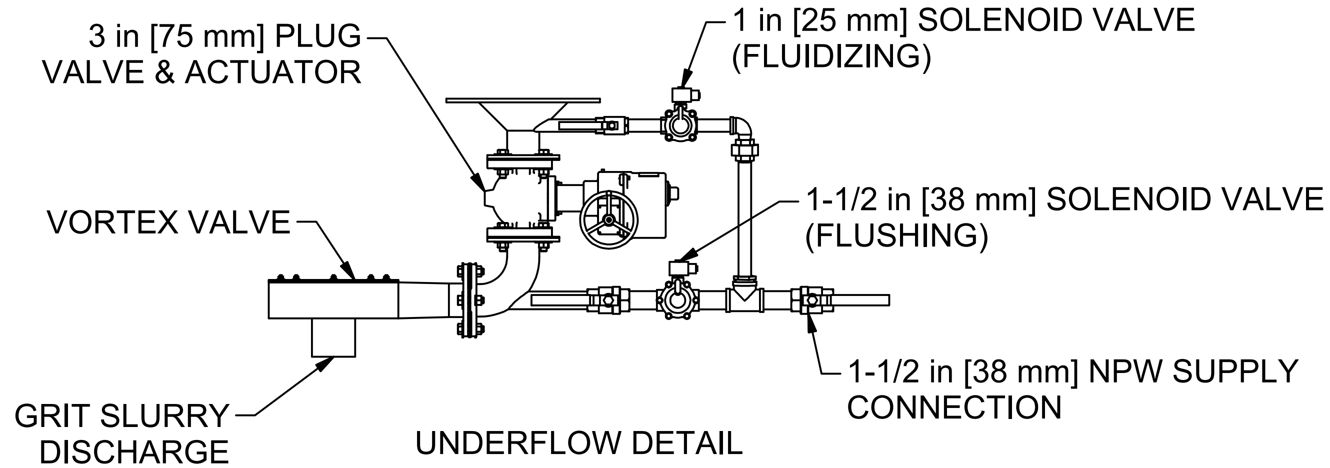
DATE: 1/14/2019	SCALE: 1 / 50	
DRAWN BY: SIR	CHECKED BY: ACS	APPROVED BY JG

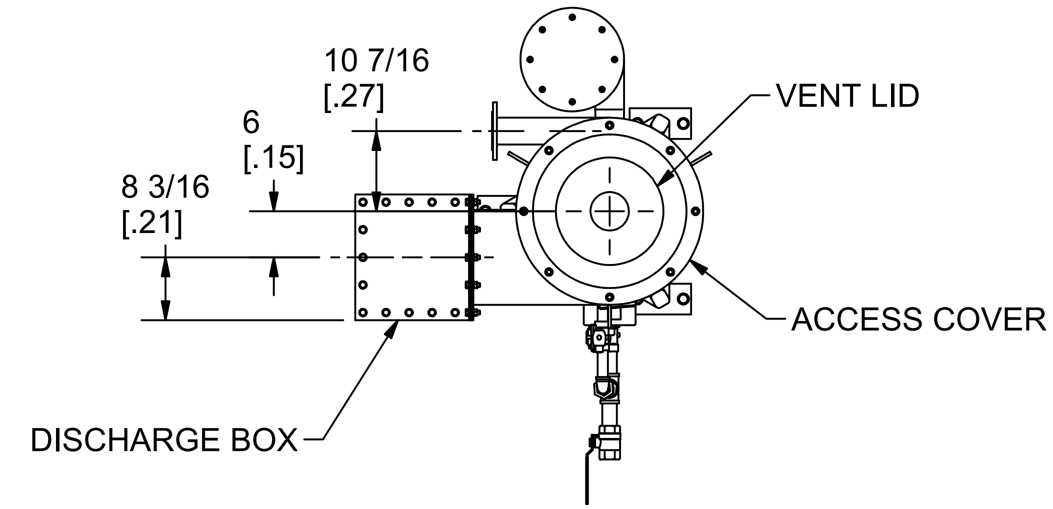
Title
HEADCELL
6" DIAMETER
7 TRAYS
CONCRETE DUCT
INTERMITTENT UNDERFLOW
106 MICRON

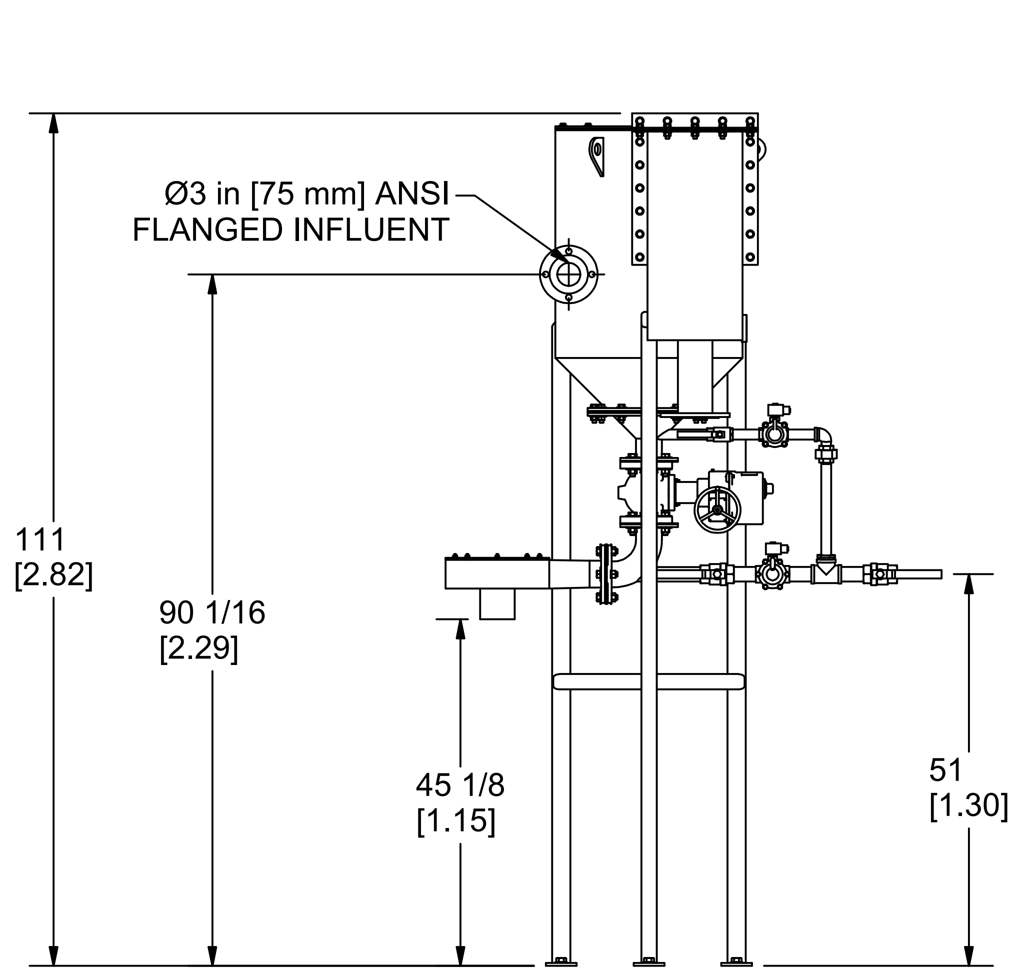
Proposal

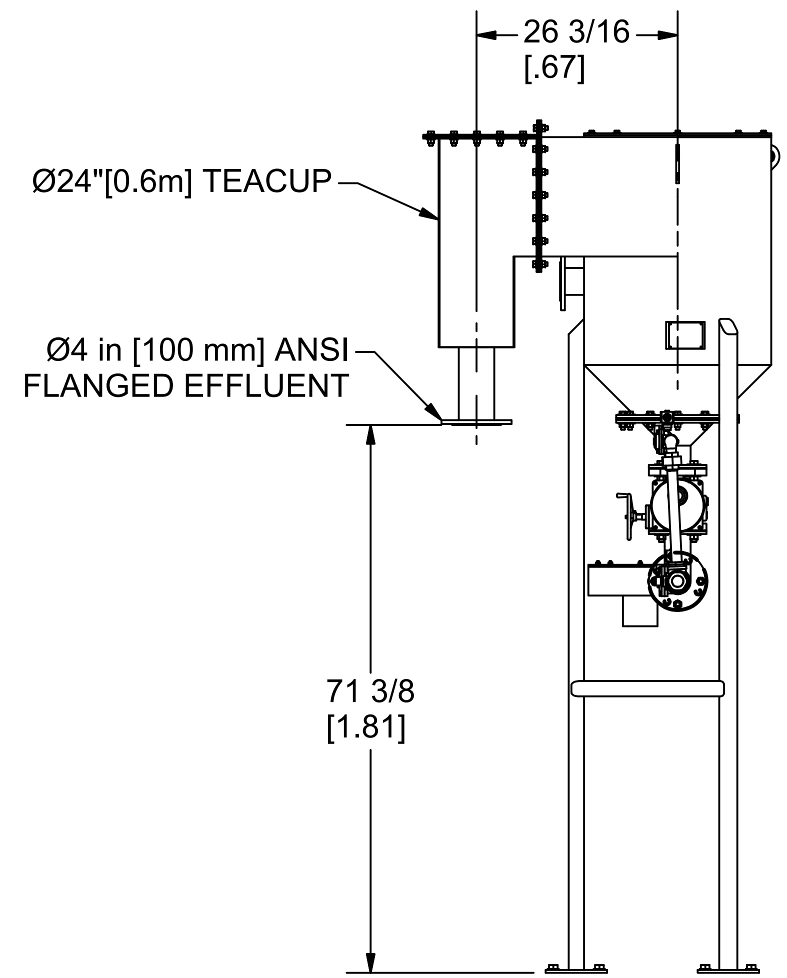
Hydro International®
2925 NW Aloclek Drive
Suite 140
Hillsboro, OR 97124
Tel: +1 (503) 615-8130
Fax: +1 (503) 615-2906
hydro-int.com

WEIGHT: 1258.4 lbmass	MATERIAL:	
NEXT ASSEMBLY: 6' 7T 0.48 INT-CON		
DRAWING NO.: 6' 7T 0.48 INT-CON		
SHEET SIZE: B	SHEET: 1 OF 2	Rev: -









PROJECTION

COMMENTS:

1. TEACUPS ARE AVAILABLE IN CW & CCW ORIENTATION.
2. PLUMBING WILL BE LAYED OUT AND INSTALLED ON EQUIPMENT DURING FABRICATION.
3. CONTRACTOR REQUIRED TO MAKE ONE CONNECTION FOR THE NPW SUPPLY.
4. TEACUP WEIGHT: DRY: 1,000 LBS ; WET: 1,300 LBS
5. PROVIDE 18" OF CLEARANCE AROUND AND 3' ABOVE EQUIPMENT FOR O&M.
6. NPW REQUIREMENTS: INTERMITTENT 30 GPM @ 50 PSIG ±10 PSIG

REVISION HISTORY

REV	BY	DESCRIPTION	DATE
A	DR	FIRST RELEASE	2/22/17

DATE:	SCALE:	
2/22/2017	1:25	
DRAWN BY: DR	CHECKED BY: AS	APPROVED BY JG

Title
24 INCH - 75 MICRON

TEACUP

Proposal Drawing

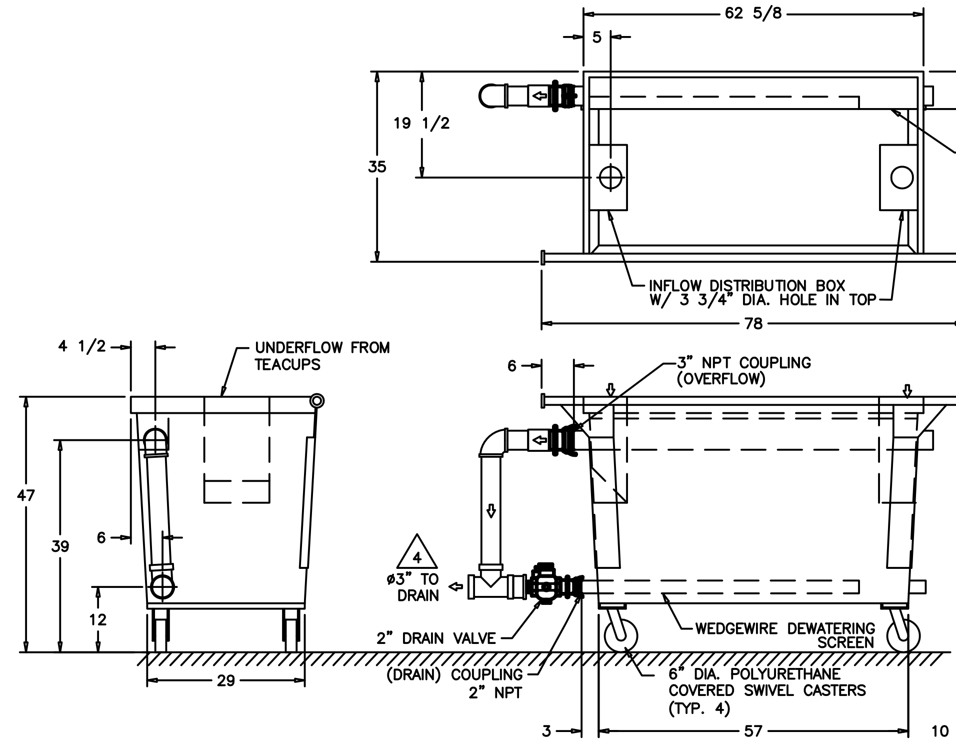
Hydro International®

2925 NW Aloclek Drive
Suite 140
Hillsboro, OR 97124
Tel: +1 (503) 615-8130
Fax: +1 (503) 615-2906
hydro-int.com

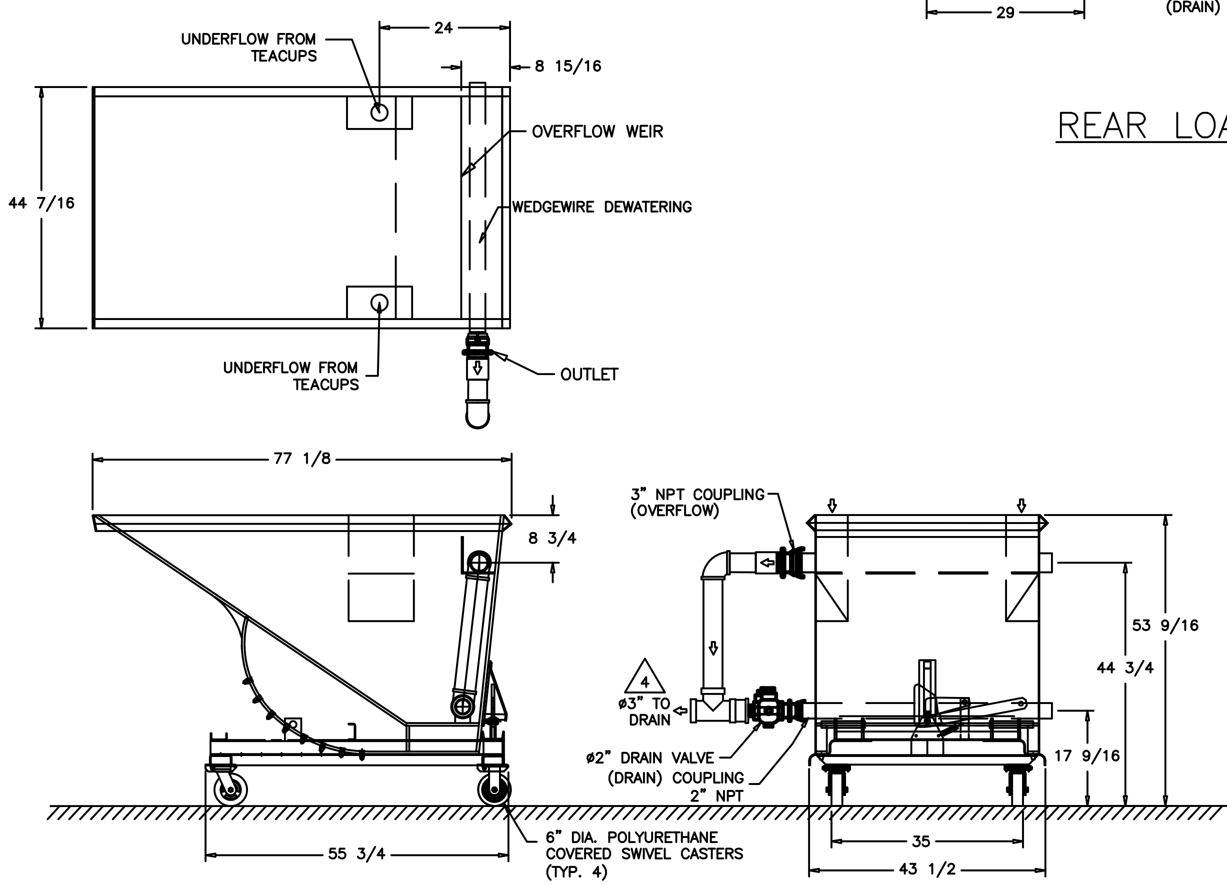
DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES [METERS].
TOLERENCES ARE:
FRACTIONS ± 1/16
DECIMALS:
X.X ± .06
X.XX ± .03
X.XXX ± .015
ANGLES: ± .5°

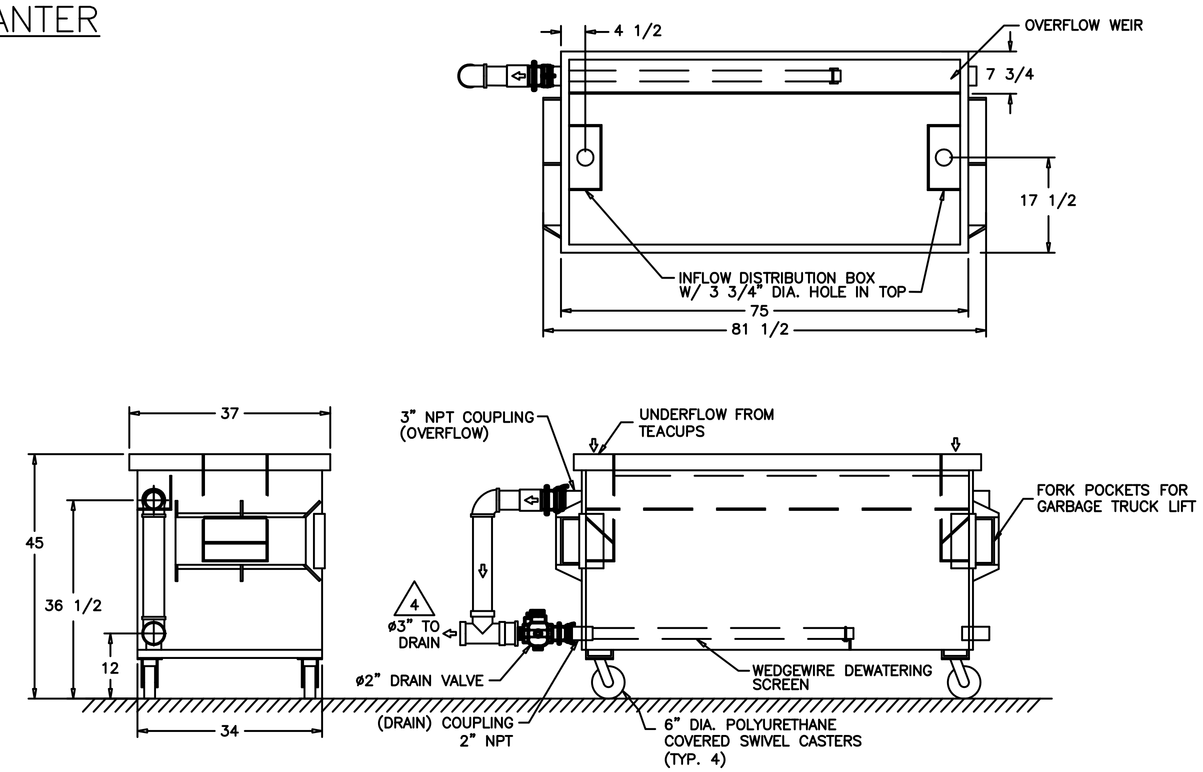
WEIGHT:	MATERIAL:	
1009.8 lbmass		
NEXT ASSEMBLY: TC24-75DB-01		
DRAWING NO.: TC24-75DB-02		
SHEET SIZE: B	SHEET: 1 OF 1	Rev: A



REAR LOADING DECANTER



SELF–DUMPING DECANTER



FRONT LOADING DECANTER

PROJECTION

1. 3" NPT OVERFLOW CONNECTION AND 2' NPT DRAIN CONNECTION IS SHOWN ON THE LEFT SIDE (SEE PLAN VIEW). PLEASE NOTE THAT THESE COMPONENTS CAN ALSO BE LOCATED ON THE RIGHT SIDE.

2. EQUIPMENT WEIGHT (LBS):
DRY: 800; WET: 4,800

3. SCREENINGS ARE NOT TO BE DUMPED INTO THE DECANTER.

4 CONTRACTOR TO DIRECT FLOW TO AN OPEN DRAIN.

REV	BY	DATE	DESCRIPTION
D	AP	121311	UPDATED SD
C	LS	10/10/11	PIPING & NOTES ADDED
B	SR	01/05/10	RE-ISSUE NEW BORDER

REVISION HISTORY

Date 03/08/01 | Scale NTS

Drawn By SAJ/MA | Checked By AN | Approved By

Title
1.5 cy DECANTERS

PROPOSAL DRAWING

Hydro International wastewater

2925 NW Aloclek Drive
Suite 140
Hillsboro, OR 97124
Tel: (503) 615-8130
Fax: (503) 615-2906
email: sales@eutek.com

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES. TOLERENCES ARE:

FRACTIONS ± 1/16
DECIMALS ± .06
ANGLES ± 1˚

Approximate Weight: SEE TABLE

Finish:

Treatment:

Sheet Size: B | Sheet: 1 OF 1

Next Assembly: N/A

Ref. No. PROPOSAL

Drawing No. S00006-002 | Rev D

North American Grit Gradations

Hydro International is pleased to announce the availability of national and regional grit gradation data. This data, which has been compiled from over 120 tests across North America, contains average physical size data as well as settling velocity (SES) data, making it the most comprehensive information available on grit and its behavior.

Virtually all conventional grit removal processes rely on gravity sedimentation to achieve the separation of grit from wastewater. Most conventional grit removal processes are designed based on the assumption that grit is spherical and has a specific gravity 2.65. However, not all grit maintains a specific gravity of 2.65 and other factors such as shape and encapsulation by fats, oils and grease significantly impact its settling velocity. Therefore, the best means to analyze grit is to determine the settling velocity for given particle size ranges. Settling velocity data can be correlated to the measured settling velocity of a clean sand sphere. The settling velocity is expressed as the Sand Equivalent Size (SES), which is the sand particle size having the same settling velocity as the more buoyant grit particle. The correlated particle size, or Sand Equivalent Size can then be used for design of the grit removal process.

When settling velocity is considered in the design actual removal efficiency of grit particles can be estimated more realistically.

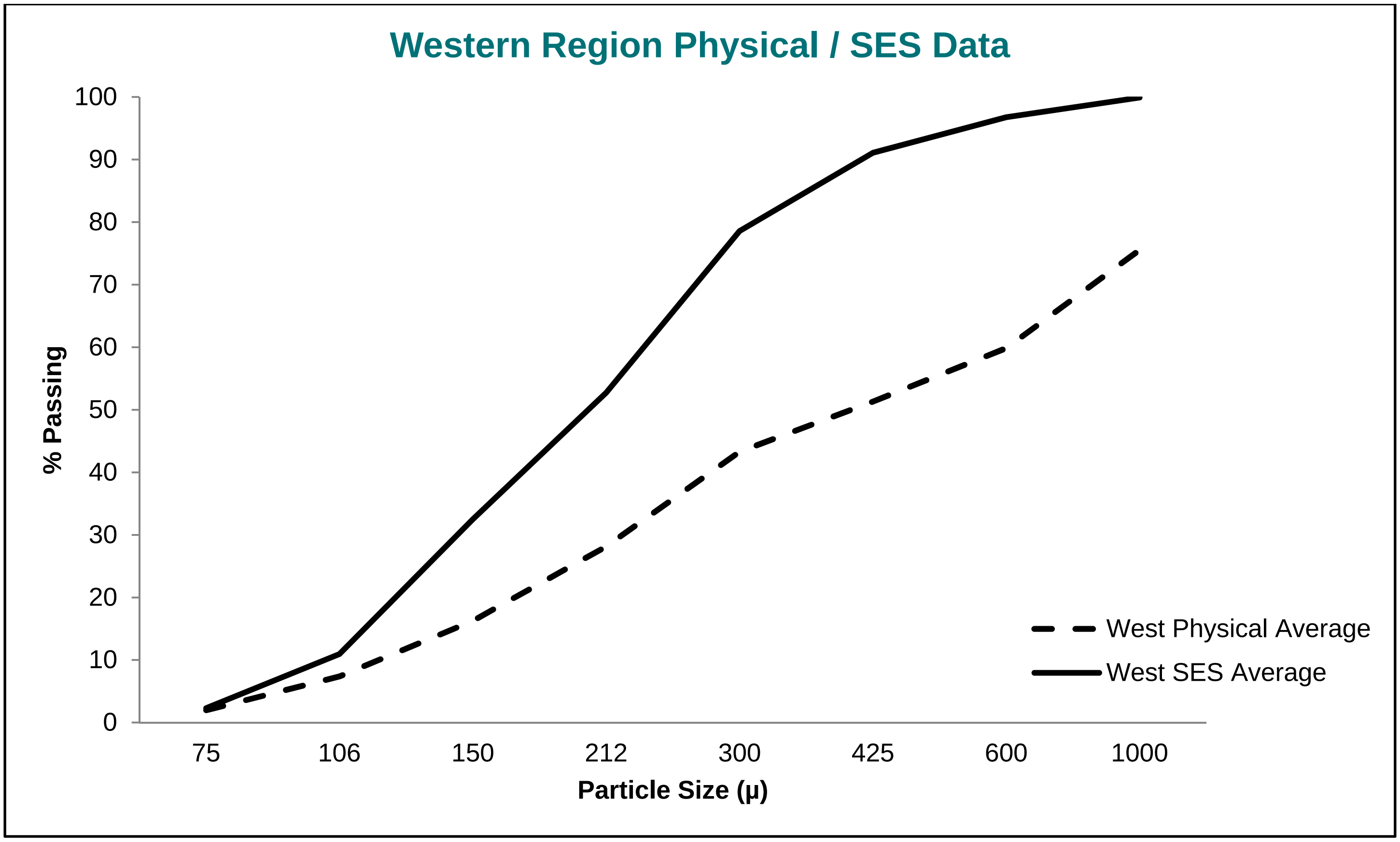
Data is available for the following regions:

Region	States / Provinces Included
Northeast	ME, VT, NH, MA, RI, NY, CT
Mid-Atlantic	PA, NJ, MD, DE, DC, VA, WV
Southeast	NC, SC, GA, AL, FL, MS
North Central	MO, KS, KY, IN, OH, IL, MI, WI, IA, MN, ND, SD, NE
South Central	TN, AR, OK, TX, LA
West	WA, OR, CA, AK, HI, AZ, NV, NM, CO, ID, MT, UT, WY
Western Canada	AB, MB, SK
Ontario Canada	ON

State data is available for individual states where more than 5 data points are available; those states currently include: Georgia, Texas, Florida, California, and Virginia.

Hydro International – Water & Wastewater
2925 NW Aloclek Suite 140, Hillsboro, OR 97124
Tel: (503) 615-8130 Fax: (503) 615-2906 Web: www.hydro-int.com

Western US Regional Gradation



Micron	% Passing 75	106	150	212	300	425	600	1000	
West Physical Average	2.0	7.4	16.3	28.2	43.3	51.3	59.9	75.6	*Physical*
West SES Average	2.3	11.0	32.5	52.7	78.6	91.1	96.8	99.9	*SES*

The above table shows the % of grit passing through various sieve sizes based on physical size (unshaded) and Sand Equivalent Size (SES) (shaded). SES provides the settling velocity distribution of the grit particles.

Standard Terms and Conditions of Sale

1. **DEFINITIONS.** "Hydro" is Hydro International with an address of 2925 NE Aloclek Drive #140 in Hillsboro, Oregon. "Buyer" is the party purchasing the goods from Hydro.

2. **ENTIRE AGREEMENT**. Hydro's agreement is based on these terms and conditions of sale. This document, together with any additional writings signed by Hydro, represents a final, complete, and exclusive statement of the agreement between the parties and may not be modified, supplemented, explained, or waived by parol evidence, Buyer's purchase order, any course of dealing, Buyer's payment or acceptance, or in any other way except in writing signed by Hydro through its authorized representative. These terms and conditions are intended to cover all activity of Hydro and Buyer hereunder, including sales and use of products, parts, and work, and all related matters (references to products include parts and references to work include construction and installation). Hydro's obligations hereunder are expressly conditioned on Buyer's assent to these terms and conditions. Hydro objects to any terms that are different from, or additional to, these terms and conditions. Any applicable detail drawings and specifications are hereby incorporated and made a part of these Terms and Conditions of Sale insofar as they apply to the material supplied hereunder.

3. **SPECIFICATIONS.** Products are supplied in accordance with information received by Hydro, or its duly authorized agent, from Buyer. Hydro shall have no responsibility for products created or sold based upon inaccurate and/or incomplete information supplied to it. Buyer shall ensure that Hydro receives all relevant information in time to enable it to supply the appropriate products.

4. **INSTALLATION AND APPLICATION OF PRODUCTS.** Products supplied hereunder shall be installed and used only in the application for which they were specifically designed. Buyer should not presume that any products supplied by Hydro may be utilized for any applications other than those specified; nor shall Hydro's obligations, including, without limitation, any warranty obligations, survive Buyer's transfer of products supplied hereunder to third parties unless the products are transferred with Hydro's consent. In addition, Buyer shall not use any product supplied hereunder at any location other than at the location for which Hydro has previously received notice from Buyer. Any breach of any of the foregoing restrictions may amount to an infringement of the patent for the products in question and will in any event void all express or implied warranties relating to the products supplied hereunder.

5. **PURCHASE PRICE AND PAYMENT TERMS.** All prices are in U.S. dollars and all payments shall be made in U.S. dollars. Payment terms are as follows:

	Incremental Payment	Cumulative Payment
Upon Approval of Shop Drawings	10%	10%
Upon Delivery of Equipment to Site	80%	90%
Upon Final Acceptance or 45 days following completion of equipment start up	10%	100%

If payments are not made in conformance with the terms stated herein, any unpaid balance shall be subject to interest at a rate 1½% per month, but not to exceed the maximum amount permitted by law. If shipment is delayed by Buyer, the previously agreed date of readiness for shipment shall be deemed to be the date of shipment for payment purposes. If manufacture is delayed by Buyer, a payment shall be made based on purchase price and percentage of completion, with the balance payable in accordance with the terms as stated. If at any time in Hydro's judgment Buyer may be or may become unable or unwilling to meet the terms specified, Hydro may require satisfactory assurance or full or partial payment as a condition to commencing, or continuing manufacture, or in advance of shipment.

Until payment in full has been received by Hydro, this Standard Terms and Conditions of Sale shall constitute a security agreement and Buyer hereby grants Hydro a purchase money security interest in and to the products produced by Hydro hereunder, and any products or proceeds thereof. In particular:

a. Hydro will retain an express purchase money security interest in and to the products and all proceeds thereof.

b. Until full payment for the products is received by Hydro, Hydro reserves the right to retake possession of the products at any time and for this purpose Buyer authorizes Hydro or its duly authorized agent to enter upon land or premises where it believes the product may be.

c. Proceeds of any disposal of the products shall be held in trust for Hydro pursuant to the terms of the Maine Uniform Commercial Code.

d. Buyer grants Hydro a power of attorney for the purpose of filing a UCC-1 financing statement in the name of Buyer to evidence Hydro's security interest in the products.

6. **BACKCHARGES.** In the event that Buyer is required to make repairs, corrections or modifications to the goods supplied by Hydro, it shall only do so upon written approval from Hydro. Backcharges shall be limited to the costs directly associated in making the repairs, corrections or modifications to the goods supplied by Hydro. The costs of such backcharges shall be subject to approval by Hydro and shall be limited to: (1) directly related labor and material costs, (2) directly related equipment and tool rental at prevailing rates in the project location and (3) Buyer's overhead & supervision costs to make repairs, corrections or modifications to the goods supplied by Hydro. Buyer shall submit complete documentation to Hydro's satisfaction including but not limited to labor time sheets, material lists, and rental fees detailing the nature of the back charges. Backcharges shall be in the form of an adjustment to the contract price or reduction in retained payments and not a direct payment. No incidental or consequential backcharges shall be allowed.

7. **DELIVERY.** The goods are sold DDP (Incoterms 2010) jobsite, freight prepaid to Buyer at job site. Except as outlined in Paragraph 8 below, the risk of loss passes to Buyer after Hydro delivers the goods to the jobsite. Hydro reserves the right to select the method of shipment and carrier. Delivery dates are approximate only and are not a guarantee of delivery on a particular day. Hydro is not liable for failure or delays in deliveries of any cause whatsoever beyond the control of Hydro.

8. **TITLE & INSURANCE:** Title to the product(s) and risk of loss or damage shall pass to Buyer upon delivery to a carrier as outlined in Paragraph 7 above, or, in the event Buyer delays shipment, by the previously agreed date of readiness for shipment, except that a security interest in the product(s) or any replacement shall remain in Hydro's name, regardless of the mode of attachment to realty or other property, until the full price has been paid in cash. Buyer agrees to protect Hydro's interest by adequately insuring the product(s) against loss or damage from any external cause with Hydro named as insured or co-insured.

9. **ERECTION:** Unless otherwise stated in writing, the goods provided hereunder shall be assembled and erected by and at the expense of Buyer.

10. **CANCELLATION & BREACH:** Orders placed cannot be canceled, nor shipments of goods made up, or in process, be deferred beyond the original shipment dates specified, except with Hydro's written consent and upon terms which shall indemnify Hydro against all loss. In the event of cancellation or the substantial breach of Buyer's obligations, as by failing to make any of the payments when due, the parties agree that Hydro will suffer a serious and substantial damage that will be difficult, if not impossible, to measure, both as of the time of entering into this purchase agreement and as of the time of such cancellation or breach. Therefore, the parties agree that, upon such cancellation or breach, Buyer shall pay to Hydro the sums set forth herein below, which sums the parties do hereby agree shall constitute agreed and liquidated damages in such event:

    a. If cancellation or breach shall occur after the acceptance of the purchase order but prior to mailing of submittal documents by Hydro to Buyer, liquidated damages shall be 10% of the selling price.

    b. If cancellation or breach shall occur within thirty (30) days from the mailing of submittal documents by Hydro to Buyer, the liquidated damages shall be 20% of the selling price.

    c. If the cancellation or breach occurs after thirty (30) days from the mailing of submittal documents by Hydro to Buyer, but prior to notification that the order is ready for shipment, the liquidated damages shall be the total of 30% of the selling price plus the expenses incurred, cost of material, and reasonable value of the work expended to fill the order involved herein by Hydro's engineers and other employees, agents and representatives after the mailing of general arrangement drawings by Hydro to Buyer, said sums to be determined at the sole reasonable discretion of Hydro; provided, however, that the total liquidated damages under this provision shall not exceed the total selling price.

    d. If cancellation or breach shall occur after Hydro has notified Buyer that the order is ready for shipment, then the liquidated damages shall be the total selling price, less costs associated with startup or field testing.

11. **MATERIALS OF CONSTRUCTION, PAINTS AND COATINGS**: Buyer is responsible for determining the suitability of, and for giving final approval of, the materials of construction, paints, coatings, etc. to be used by Hydro.

12. **WARRANTY:** Any product that proves defective in material, workmanship or design within twelve (12) months after delivery (or entry into storage) will be, at the discretion of HYDRO, modified, repaired or replaced, or Buyer's payment for the products will be refunded. This shall be Buyer's sole remedy. HYDRO EXPRESSLY EXCLUDES AND DISCLAIMS ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHER WARRANTIES, EXPRESS OR IMPLIED.

    This warranty does not cover any defects or costs caused by: (1) normal wear and tear of equipment from designed operation. (2) modification, alteration, repair or service of the goods by anyone other than Hydro; (3) physical abuse to, or misuse of, the goods, or operation thereof in a manner contrary to Hydro's instructions; (4) any use of the goods other than that for which they were intended; (5) chemicals or components which were not disclosed to Hydro; (6) storage contrary to Hydro's instructions; or (7) failure to maintain the goods in accordance with Hydro's instructions.

    This warranty does not apply to component parts of the goods that were not both originally designed and manufactured by Hydro, including, but not limited to, valves and controls. These component parts do not carry any warranties by Hydro, and only carry the warranties, if any, of their manufacturers.

In order for Buyer to make a claim under this warranty, Buyer must promptly, and within the warranty period, notify Hydro in writing of any defect(s) in the goods covered by this warranty. If any defect(s) in the goods covered by this warranty are visible at the time of delivery, Buyer must notify Hydro of the defect(s) in writing within five working days. To make any claim under this warranty, Buyer must also fully comply with written authorization and return instructions from Hydro.

13. **FIELD SERVICE:** Startup/Field Service will only be scheduled upon written request. Buyer shall notify Hydro of schedule requirements at least ten (10) working days in advance, or additional charges may be added to cover late-scheduled travel costs. Additional costs will be limited to those arising out of late-scheduled costs. Should Buyer have outstanding balances due Hydro, no startup / field service will be scheduled until such payments are received by Hydro. Hydro will send documents to Buyer defining the service or startup requirements. Buyer assumes all responsibility for the readiness of the system when it requests startup service. Should Hydro's Field Service Engineer arrive at the jobsite and determine that the system cannot be started up within a reasonable time, Hydro shall have the option to bring the Field Service Engineer home and bill Buyer for time, travel and living expenses. Additional field service is available from Hydro at the prevailing per-diem rate at the time of the request for service plus all travel and living expenses, portal-to-portal. A purchase order or change order will be required prior to scheduling this additional service.

14. **LIMITATION OF HYDRO'S LIABILITY**. Hydro assumes no liability or responsibility for the misuse of its products by Buyer, Buyer's employees, agents or assigns, or other use inconsistent with the use appropriate to the performance specification requirements submitted to Hydro, and Buyer agrees to indemnify and hold harmless Hydro for any loss, costs, expense or liability that it may incur or be put to as a result of misuse or inconsistent use of the products. In addition, Hydro shall have no liability to Buyer for any consequential or incidental damages incurred by Buyer in connection with the contract documents or the products purchased by Buyer. Hydro shall not be liable for any loss which results from delay in delivery caused by any reason beyond its control, including, but not limited to, acts of God, casualty, civil disturbance, labor disputes, strikes, transportation or inability to obtain materials or services, any interruption of its facilities, or act of any governmental authority. The time for delivery shall be extended during the continuance of such conditions. The total liability of Hydro to Buyer in the form of liquidated damages for any loss, indemnity, damage or delay of any kind will not under any circumstances exceed 25% of the Contract Sum.

15. **INTELLECTUAL PROPERTY**. Hydro shall retain sole ownership of all of its intellectual property used or produced in connection with the Project, including but not limited to all drawings, specifications, software, written materials, manuals, marks, business methods, and all other property that is capable of protection by a patent, copyright or trademark (whether or not such protection has actually been sought). Buyer shall not use such intellectual property except for the purpose of confirming the quality of design and/or manufacturing of the products and services set forth in the Proposal. Buyer shall not photocopy, duplicate or in any way copy such intellectual property except for the Buyer's internal purposes only (but not for rendering services or selling products to third persons). Buyer shall not sell, license, assign or transfer the intellectual property protected by this paragraph to anyone. Buyer shall ensure that Owner is in possession of valid licenses for all third-party software (not provided by Hydro) used for the Project, and shall indemnify and hold harmless Hydro against all claims by licensors of such software. Hydro makes no warranty regarding the effect of such third-party software on the performance of the software to be developed by Hydro for the Project and Hydro shall be released from any warranties given to Buyer to the extent that such software causes or contributes to problems. Following acceptance and final payment to Hydro, Hydro will grant to the Owner a non-transferable, non-exclusive license to use the software for the Owner's internal purposes only in the form of the license agreement attached as Exhibit A. Patent: www.hydro-int.com/patents

16. **TAXES.** Prices stated herein do not include any tax, excise, duty or levy now or hereafter enacted or imposed, by any governmental authority on the manufacture, sale, delivery and/or use of any item delivered. An additional charge will be made therefore and paid by Buyer unless Hydro is furnished with a proper exemption certificate relieving Hydro of paying or collecting the tax, excise, duty or levy in question.

17. **INTERPRETATION OF CONTRACT.** This contract shall be construed according to the laws of the State of Maine.

18. **CHOICE OF FORUM**. Buyer and Hydro hereby consent and agree that the United States District Court for the District of Maine or the District Court or Superior Court located in the City of Portland, County of Cumberland, Maine will have exclusive jurisdiction over any legal action or proceeding arising out of or relating to the contract documents, and each party consents to the personal jurisdiction of such Courts for the purpose of any such action or proceeding. Buyer and Hydro further hereby consent and agree that the exclusive venue for any legal action or proceeding arising out of or relating to the contract documents will be in the County of Cumberland, Maine. Each party hereby waives all rights it has or which may hereafter arise to contest such exclusive jurisdiction and venue.

19. **ATTORNEYS' FEES.** If any judicial or non-judicial proceeding is initiated for the purpose of enforcing a provision of this contract, the prevailing party shall be awarded reasonable attorneys' fees in addition to all other costs associated with the proceeding, whether or not the proceeding advances to judgment.

20. **SEVERABILITY.** If any provisions of this contract are held invalid by a court of competent jurisdiction, the remainder of this contract shall not be rendered invalid, and such invalid provisions shall be modified, in keeping with the letter and spirit of this contract, to the extent permitted by applicable law so as to be rendered valid.

21. **ANTI-BRIBERY.** Hydro International will not engage in any form of bribery or corruption. The offering, giving or receiving of bribes is contrary to Hydro International's values and can play no part in the way in which it carries out its business. Hydro requires you to support our approach and implement provisions consistent with our policy through your own organization and your supply chain. Please find a copy of our Anti-Bribery and Corruption Policy on our website at: https://www.hydro-int.com/sites/default/files/hydro_international_anti-bribery_and_corruption_policy_-_july_2018.pdf

Budget Pricing

Project Name:	East Helena, MT WWTP	Date Prepared:	12/13/2019
Project Number:	19_11_0664 A	Validity: 30 days from issue.	
Engineer Firm:	Robert Peccia & Associates		

Equipment	Quantity	Price
Primary Grit Removal 2.88 mgd/unit		
6 ft. 7 Tray 106 micron HeadCell® Grit Removal unit	1	
HeadCell® inlet flow distribution header, 304 Stainless Steel	1	
Fluidizing ring, 304 Stainless Steel	1	
		$116,000.00
Grit Classifying and Washing		
24" TeaCup®: 304 Stainless Steel,	1	
Valves, plumbing, and single-point water connection	1	
Grit Dewatering		
1.5 yd³ Decanter: Galvanized, Front or Rear Loader/Self Dumping	1	
Pumps		
Dry Pit, Recessed Impeller, horizontal mount, 150 gpm grit pump, 30 ft TDH	1	
Control Panel		
NEMA 4X, 304 Stainless Steel Enclosure, 480 VAC, Three Phase, VFD	1	
Programmable Relay	1	$113,000.00
Start Up		
One (1) factory representative for two (2) trips for a total of four (4) days	1	
Freight	1	
Total Proposal Budget Price:		**$229,000.00**

Budget Adder Summary

1 Year Asset Management Contract		
One (1) factory representative for two (2) trips for a total of two (2) days	1	**$7,100.00**
Parts Allowance $ 1000		

Terms & Conditions: As defined by Hydro International standard Terms & Conditions.

After expiration of validity Hydro International reserves the right to adjust pricing to account for any significant increases in material costs.

Hydro International, 2925 NE Aloclek Drive Suite 140, Hillsboro OR 97124
Tel: +1 (503) 615-8130   Fax: +1 (503) 615-2906   Web: www.hydro-int.com

Turning Water Around...®