DRAFT ENVIRONMENTAL ASSESSMENT

CITY OF LAUREL

WATER TREATMENT PLANT INTAKE

July 28, 2014

Prepared for:

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LIST OF ACRONYMNS & ABBREVIATIONS

BBWA - - Billings Bench Water Association

BFE - - Base Flood Elevation

BMP - - Best Management Practices

BNSF - - Burlington Northern Santa Fe Railway

CATEX - - Categorical Exclusion

cfs - - cubic feet per second

City - - City of Laurel, Montana

CLOMR - - Conditional Letter of Map Revision

COE - - U.S. Army Corps of Engineers

CWA - - Clean Water Act

DEQ - - Montana Department of Environmental Quality

DNRC - - Montana Department of Natural Resources and Conservation

EA - - Environmental Assessment

EIS - - Environmental Impact Statement

EO - - Executive Order

EO 11988 - - Floodplain

EO 11990 - - Wetlands

EO 12898 - - Environmental Justice

EPA - - Environmental Protection Agency

ESA - - Endangered Species Act

FEMA - - Federal Emergency Management Agency

FIS - - Flood Insurance Study

FONSI - - Finding of No Significant Impact

FWP - - Montana Department of Fish, Wildlife & Parks

FWS - - U. S. Fish and Wildlife Service

gpm - - gallons per minute

GIS - - Geographical Information System

Great West - - Great West Engineering, Inc.

H&H - - Hydraulics and Hydrology

HDD - - Horizontal directional drilling

intake - - City of Laurel Water Treatment Plant Intake

LOMR - - Letter of Map Revision

MDT - - Montana Department of Transportation

MGD - - million gallons per day

MEPA - - Montana Environmental Policy Act

NAVD88 - - North American Vertical Datum of 1988

NEPA - - National Environmental Policy Act

NFIP - - National Flood Insurance Program

NGVD29 - - National Geodetic Vertical Datum of 1929

NHPA - - National Historic Protection Act

NLE - - non-levee embankment

NPSH - - net positive suction head

NRCS - - Natural Resources Conservation Service

O&M - - operations and maintenance

PA - - Public Assistance

SHPO - - State Historic Preservation Officer

T&E - - Threatened & Endangered

USACE - - U.S. Army Corps of Engineers

USBR - - U.S. Bureau of Reclamation

USGS - - U.S. Geological Service

WTP - - water treatment plant

SECTION 1 - INTRODUCTION

1.1 DESCRIPTION AND HISTORY OF THE PROJECT

The City of Laurel, Montana has drawn raw water from the Yellowstone River since 1908 as its sole source for public water supply, providing water to the residents and businesses of Laurel as well as the Cenex Harvest States (CHS) refinery. Over the past 100 years, the river has undergone dramatic change in the vicinity of the highway and railroad bridges at Laurel, mostly in response to large flood events. The tendency of the river to meander and migrate has made it difficult for the City to provide a reliable water supply. The current raw water intake, which was constructed in 2003, replaced an existing concrete intake (installed in the 1950s) that was left dry by river migration from the floods of 1996-1997. Both intakes were constructed immediately downstream of the Highway 212/310 bridge.

During the spring of 2011, the entire State of Montana experienced severe flooding due to heavy rains and above average snowpack. Flooding on the Yellowstone, in the vicinity of the intake, caused the river to migrate yet again. The migration and corresponding river bed scour has lowered the water surface at the intake, especially at low flows, and compromised the ability of the intake to draw water from the river on a consistent, year-round basis. It is estimated that upwards of 4.5 feet of bedrock scoured around the existing intake and upwards of 17 feet of scour under the bridges.

Additionally, a large volume of sediment was deposited upstream, downstream, and beneath the Highway 212/310 and railroad bridges located immediately upstream of the intake, particularly on the north side of the river. The bank erosion and sediment deposition indicated the river was migrating to the south. The intake structure had been located in the center of the main channel flow but was now on the north edge of the main channel flows.

During January 2012, water over the submerged intake was at its lowest levels since installation of the new intake. This resulted in excessive ice buildup on top of the structure, slush ice developing on the intake screens, and a temporary shutdown of the raw water line from the intake to the CHS Oil Refinery because the City could not meet their own domestic demands. Subsequently in August and September of 2012 water levels again dropped prompting the emergency construction of a temporary rock weir first across a portion of the river and finally the across the entire flow channel. The weir has been successful at keeping the structure submerged but is not permitted and is in violation of the Corps of Engineers regulations.

The City of Laurel is working with the Federal Emergency Management Agency (FEMA) Public Assistance (PA) Grant Program to construct improvements to mitigate the loss of service at the current intake.

1.2 SITE INFORMATION

Site Description & Location

The current water treatment plant (WTP) intake is located approximately 1.4 miles south of Laurel, Montana in the Yellowstone River downstream of the highway bridge (see Exhibits A & B in Appendix A). It lies in the southwest quarter of Section 15, Township 2 South, Range 24 East, Yellowstone County, Montana at latitude 45.654121°N and longitude 108.759182°W.

The intake is located slightly downstream of the south center-span pier and is intended to remain submerged, even at low water. A raw water line runs from the intake to the WTP and is buried beneath the river bed. The intake is designed for future demand and has a capacity of 20 million gallons per day (MGD).

Figure 1: Current WTP intake structure, looking downstream from the highway bridge

Figure 2: Historic intake structure and sediment deposition, looking upstream at highway bridge

Riverside Park, which is owned by the City, is adjacent to the intake on the south side of the river. It is accessed directly from U.S. Highway 212/310 which forms its western boundary. A Burlington Northern-Santa Fe (BNSF) railroad line parallels U.S. Highway 212/310 to the west of the highway. The topography of the park is generally flat with a manmade non-levee embankment (NLE) located along the river from the Highway 212/310 bridge to a point 2,500 feet downstream of the bridge. The non-levee embankment consists of a standard trapezoidal cross section except west of the boat ramp where it was gently graded out on the landward side when the campground was developed. However, the top elevation of the levee was maintained all the way to the Highway 212/310 bridge abutment. Numerous cottonwood trees are found throughout the park and the area surrounding the levee is a dense upland riparian area.

The City of Laurel Water Treatment Plant sits on the north bank of the Yellowstone River opposite of Riverside Park. Also north of the river are the City of Laurel Wastewater Treatment Plant, a decommissioned landfill, the Cenex Harvest States (CHS) Oil Refinery, the CHS wastewater treatment plant, and the Billings Bench Water Association (BBWA) irrigation diversion structure. The CHS Oil Refinery has been in operation since the 1930s and produces 42,000 barrels per day of refined petroleum products including propane, gasoline, diesel, asphalt, and road oil. Residential and agricultural lands are the primary land use south of the river.

Hydrology

The Yellowstone River drains approximately 8,200 square miles at Laurel and has the following peak flows, which were obtained from the FEMA Flood Insurance Study (FIS):

Table 1: Peak flows

Return Interval	Flow (cfs)
Bankfull (1.8 year)	28,000
10-year	43,200
50-year	52,900
100-year	56,700
500-year	65,100

It should be noted that the 100-year flow used in the FIS is lower than what has been predicted previously. The Montana Department of Transportation (MDT) used 69,900 cfs in their hydraulic analysis in 1995, and the COE predicted 65,000 cfs in their 2000 study (Appendix I). However, since the FIS is the most recent analysis completed, its flows will be used on this project.

The nearest stream gage to Laurel is at Billings (USGS gage no. 06214500). However, the data from the gage cannot be used directly since the Clarks Fork of the Yellowstone River (Clarks Fork) drains into the Yellowstone River approximately two miles downstream of Laurel. The FIS gives flows at Laurel and also just upstream of where Five Mile Creek drains into the Yellowstone River in east Billings. The ratio of these flows was used to determine that flows at Laurel are approximately 76% of those in Billings. This percentage can then be applied to the recorded flows at the Billings gage to give an estimate of the flows at Laurel.

The problems with the intake occur almost exclusively at low flows, and therefore, a thorough analysis of low flows was completed. In Appendix A of the 2000 COE study it states, “An annual seven day minimum low flow of about 800 cfs is reported in the USGS summary statistic for the Billings station. A similar value of about 100 cfs is reported for the Clarks Fork River. Thus, the intake should function with about 700 cfs to be reliable.”

The Billings gage was analyzed, and the lowest mean daily flow for each year dating back to 1904 was used in a Log-Pearson regression. The gage flows were multiplied by 76% to make them accurate for Laurel. The results of the regression are shown in the table below.

Table 2: Low flow regression

Return Interval	**P_{lower}**	**Flow (cfs)**
100-year	1%	438
50-year	2%	450
25-year	4%	473
10-year	10%	555
5-year	20%	718
2-year	50%	951
1.25-year	80%	1259
1-year	99%	2065

The probability shown is not the *exceedance probability*, which is a typical output of these regressions; rather, it is the probability that the mean daily flow will drop below the corresponding flow in any given year (P_{lower}). For example, a P_{lower} of 4% means that there is a 4% chance that the mean daily flow will fall below 473 cfs in any given year. As is conventional, the Return Interval is the inverse of the probability (i.e. 25-year = 1 ÷ 4%). The table is reproduced in the graph below.

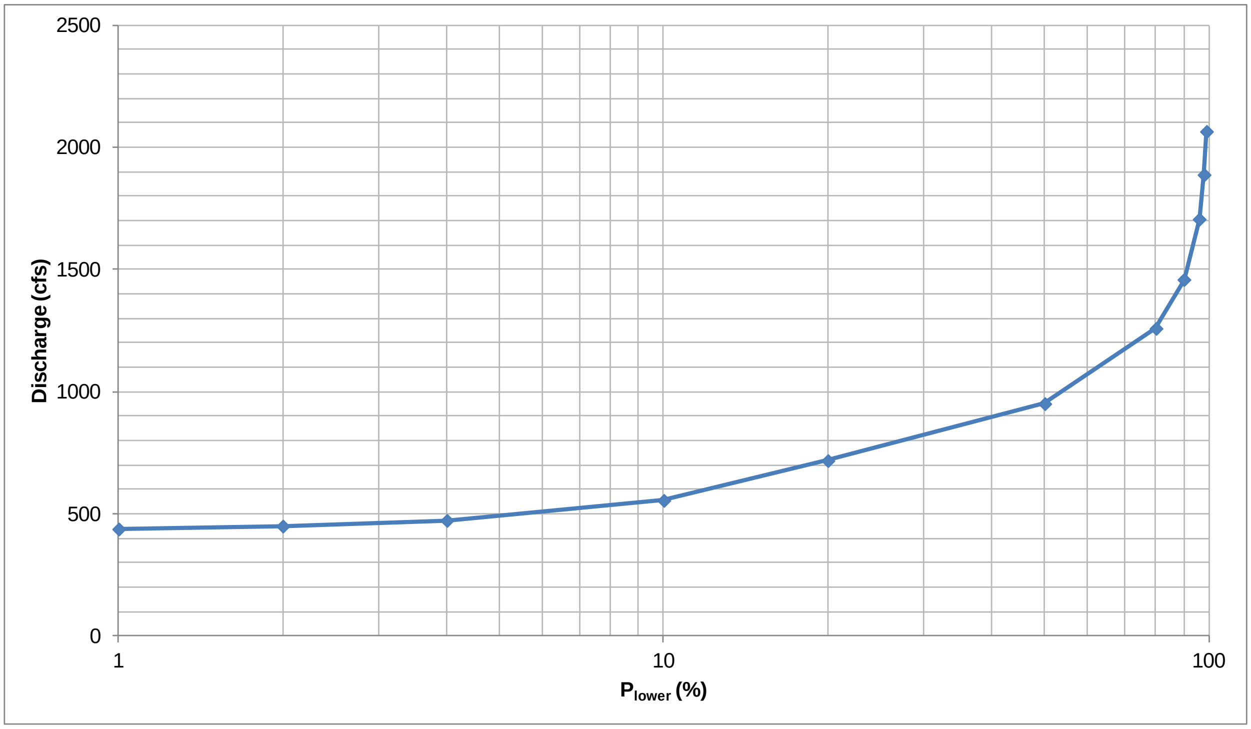

Figure 3: Graph of low flow regression

This analysis shows that the design low flow of 700 cfs, recommended by the COE in 2000, has an approximate 20% chance of occurring in any given year. Since the water treatment plant has on the order of one to two hours of storage capacity, this is not an acceptable risk to take. Therefore, 450 cfs will be used as the design low flow, which has an approximate 2% chance of occurring in any given year. See Appendix L for supporting hydrologic information.

Detailed Description of the Intake Problems

The current intake, originally designed by HKM Engineering, Inc., consists of four "tee" screens, encased in a concrete protective structure (see Figure 4 below). As-Constructed plans of the current intake, which are included in Appendix K, show that the intake was designed for a capacity of 20 MGD.

The intake is passive and does not "suck" water from the river. Water flows by gravity from the intake screens, through two parallel 24" diameter pipes, and then enters a manifold in the pump building where it is then pumped by a series of vertical turbine pumps to the water treatment plant and the CHS refinery.

Figure 4: Photo of current intake during construction, showing screens

In order for the pumps to operate at capacity and avoid cavitation, sufficient Net Positive Suction Head (NPSH) must be maintained and is directly related to the static water surface elevation at the pumps. Cavitation results in reduced operational capacity and even damage to the pumps.

The pumps were designed so that when the water surface elevation in the river is 3260.7 (NAVD88) or greater, there is sufficient NPSH for the pumps to operate. The elevation of the top of the concrete lid is 3261.0, so for reference, the design low water elevation is 0.3 feet below the top of the concrete lid. Hydraulic modeling of existing conditions, including the permanent bank stabilization at Riverside Park, for a flow of 450 cfs (see Hydrology discussion above) shows the water surface elevation at the intake would be 3258.71; that is <u>2.6 feet</u> below the design low water stage. The same model shows that a flow rate of approximately 1900 cfs is needed to maintain the design low water elevation of 3260.7. Based on the hydrologic analyses above, the river has a 99% chance of dropping below this flow in any given year.

Of equal concern is the probability of frazil ice clogging the screens and the pumps during the winter months when the water level is low. Frazil ice, also known as slush ice, sporadically forms in open, turbulent, supercooled water and is a frequent occurrence on the Yellowstone

River, see Figure 5 below. The screens are equipped with an air backwash system to keep them clear of seaweed, debris, and ice. During the winter months the backwash compressors are required to run nearly constantly in order to keep ice off the screens. According to WTP personnel, the intake and pumps begin to have problems with frazil ice when the water level drops to near the top of the lid (elev. 3260.7). The top of the lid is 1.5 feet above the top of the intake screens. Therefore, it is safely concluded that a depth of two feet of water is needed over the screens to prevent frazil ice to be drawn in and cause the pumps to cavitate.

Figure 5: Frazil ice beneath highway and railroad bridges, December 2012

In January 2012, the top of the intake, which is supposed to remain submerged in all flows, was exposed to air, and ice began to build up on the intake structure. Additionally, slush ice flows in the river, which have never affected the intake because they occur at the water surface, began clogging the intake screens. These occurrences culminated in the City having to temporarily shut off the raw water supply to the CHS Oil Refinery in order to meet domestic demands.

City of Laurel Public Works Director, Kurt Markegard, documented the recent intake problems in a letter to Great West Engineering dated February 16, 2012, and is quoted as follows:

> "The water supplied to the CHS Oil Refinery was disrupted on January 30, 2012, due to low river flows and a buildup of ice over the top of the intake structure…The river flow

> over the water intake on January 30th was the lowest that any City employee has seen it since the intake was installed in the river in 2003…I feel that it is imperative that the river channel migration to the south be stopped and actually restored at the bridge structure in order to prevent the City of Laurel from running out of water for domestic, industrial, and fire suppression efforts."

In summary, the problems with the intake are twofold: 1) low water surface relative to the pumps, which causes cavitation and 2) low water surface relative to the screens, which clogs the screens and the pumps with frazil ice and causes cavitation. The low water surface at the current intake is a direct result of the channel migration and scour that occurred during the flooding in 2011.

1.3 NEPA/MEPA REQUIREMENTS

The President's Council on Environmental Quality (CEQ) has developed regulations for implementing the National Environmental Policy Act (NEPA). These federal regulations, set forth in Title 40, Code of Federal Regulations (CFR) Parts 1500-1508, require an evaluation of alternatives, and a discussion of the potential environmental impacts of a proposed federal action, as part of the Environmental Assessment (EA) process.

Since this project will use state and federal funds, compliance with the National Environmental Policy Act (NEPA) and the Montana Environmental Policy Act (MEPA) is required. The primary purpose of this EA is to determine whether proposed actions would have significant impacts on the human environment. If significant impacts are identified in the EA that cannot be mitigated, an Environmental Impact Statement (EIS) will be prepared. The EA will also be used to inform decision makers and the public of proposed actions, reasonable alternatives, and their environmental impacts before decisions are made. A Finding of No Significant Impact (FONSI) will be signed after the Final EA is completed if no significant impacts are identified from the selected alternative that cannot be mitigated to insignificant levels. The FONSI explains the finding that no significant impacts would result from the selected alternative and the decision not to prepare an EIS.

SECTION 2 - PURPOSE AND NEED

The purpose of this project is to provide a sustainable and consistent water supply through winter freezing, high runoff, and summer drought conditions. The need exists because the City of Laurel's raw water intake has experienced a loss of function and is in jeopardy of failing to provide a consistent water supply through winter freezing, high runoff, and summer drought conditions.

SECTION 3 - ALTERNATIVES CONSIDERED

3.1 INTRODUCTION

The analysis of alternatives considered for this project has been extensive. For the purpose of this EA, only the No Action Alternative and those alternatives which have been identified as meeting the purpose and need of the project are presented. The full description, evaluation and explanation of all of the alternatives considered are included in the report entitled, "Alternatives Analysis, City of Laurel Water Treatment Plant Intake" which is included in Appendix C for reference.

Alternative 1: No Action (continue present operation)

The No Action Alternative would require the City to continue operating its current intake without any modifications. This would not meet the purpose and need of the project as it would leave the city susceptible to the risks outlined earlier in this report such as:

- Low flows in the river affecting the operating capacity and capability of the raw water pumps;
- Low flows in the river resulting in less than required submergence of the intake to prevent the buildup of ice on the intake screens and passing of frazil icing to the raw water pumps;
- Lack of stability in the river resulting in the intake being located out of the main flow of the river;
- Continued bed scour potentially undermining the foundation of the intake.

Alternative 2: Proposed Alternative – New intake, lower current intake and add hot water heater, and remove sediment beneath bridges

The proposed alternative is a combination of three of the alternatives outlined in the Alternatives Analysis to create a project which will meet the stated purpose and need. The main component of the alternative is the construction of a new raw water intake 3 miles upstream of the WTP at a stable location in the river. The second component of the alternative (i.e. lowering the current intake and adding a hot water heater) will address the overall reliability of the water source for the City and improve the safety of the waterway by lowering the current intake. Finally, the removal of excess sediment on the north side of the river will reclaim the hydraulic capacity of the bridges. Each of the components of this alternative is explained in further detail in the following paragraphs.

New Intake

The proposed intake site 3 miles upstream from the WTP, shown in the figures below, was chosen because it is on the outside bend of a meander and is constrained on the southeast (right) bank by a high bank, comprised of Belle Fourche shale (see Figure 19 in Appendix A). As discussed in Appendix B, this is one of three sites within 6 miles upstream and 6 miles downstream of Laurel that has remained stable for the last 60 years. These characteristics make it a good candidate to site a new intake. Because the site is up-gradient, raw water would flow by gravity through a pipeline from the intake to the WTP. The pipeline will generally follow the alignment of the Canyon Creek Ditch.

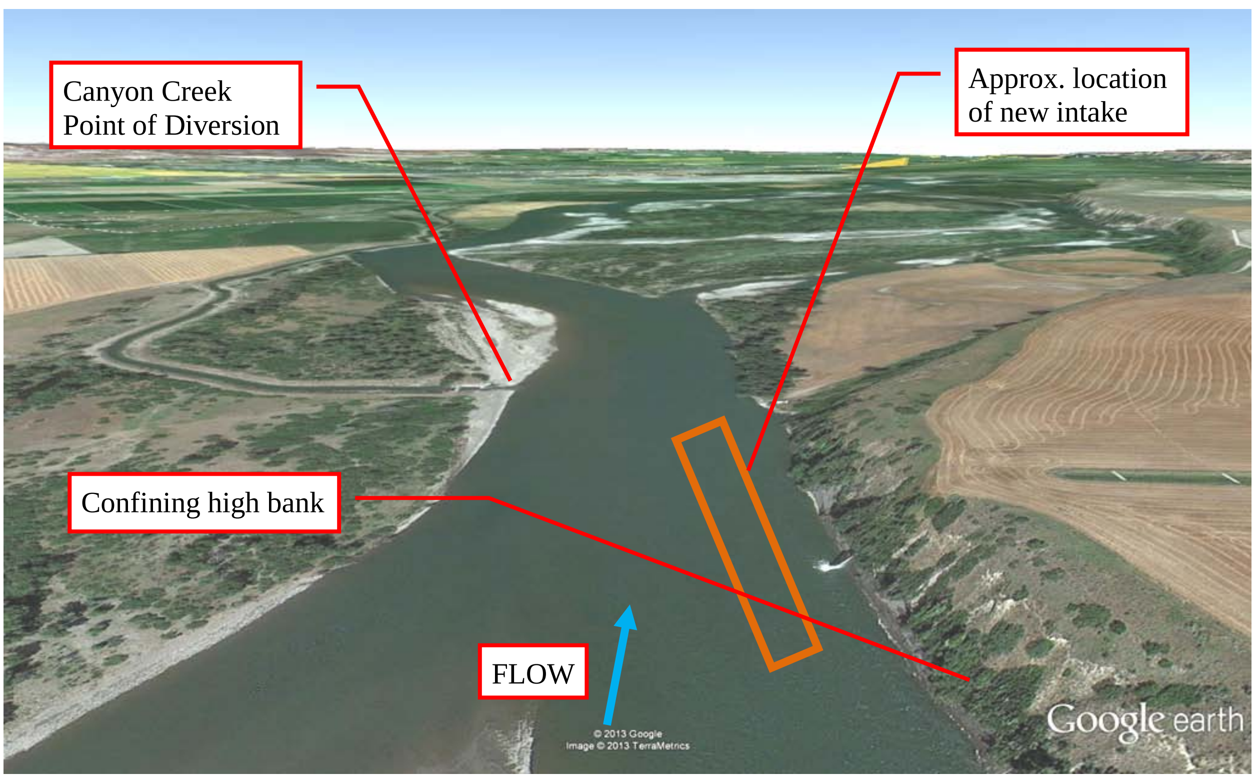

Figure 6: Perspective view of new intake location

The design, permitting and construction of the new intake and pipeline would be estimated to take approximately 1.5 years. Construction of the intake itself would need to take place during low flows in the river to prevent any issues with flooding but also prior to winter to avoid any complications associated with ice. The construction of the pipeline would also need to take place in the fall/winter in order to follow the Canyon Creek Ditch alignment to avoid any construction while the ditch is conveying water.

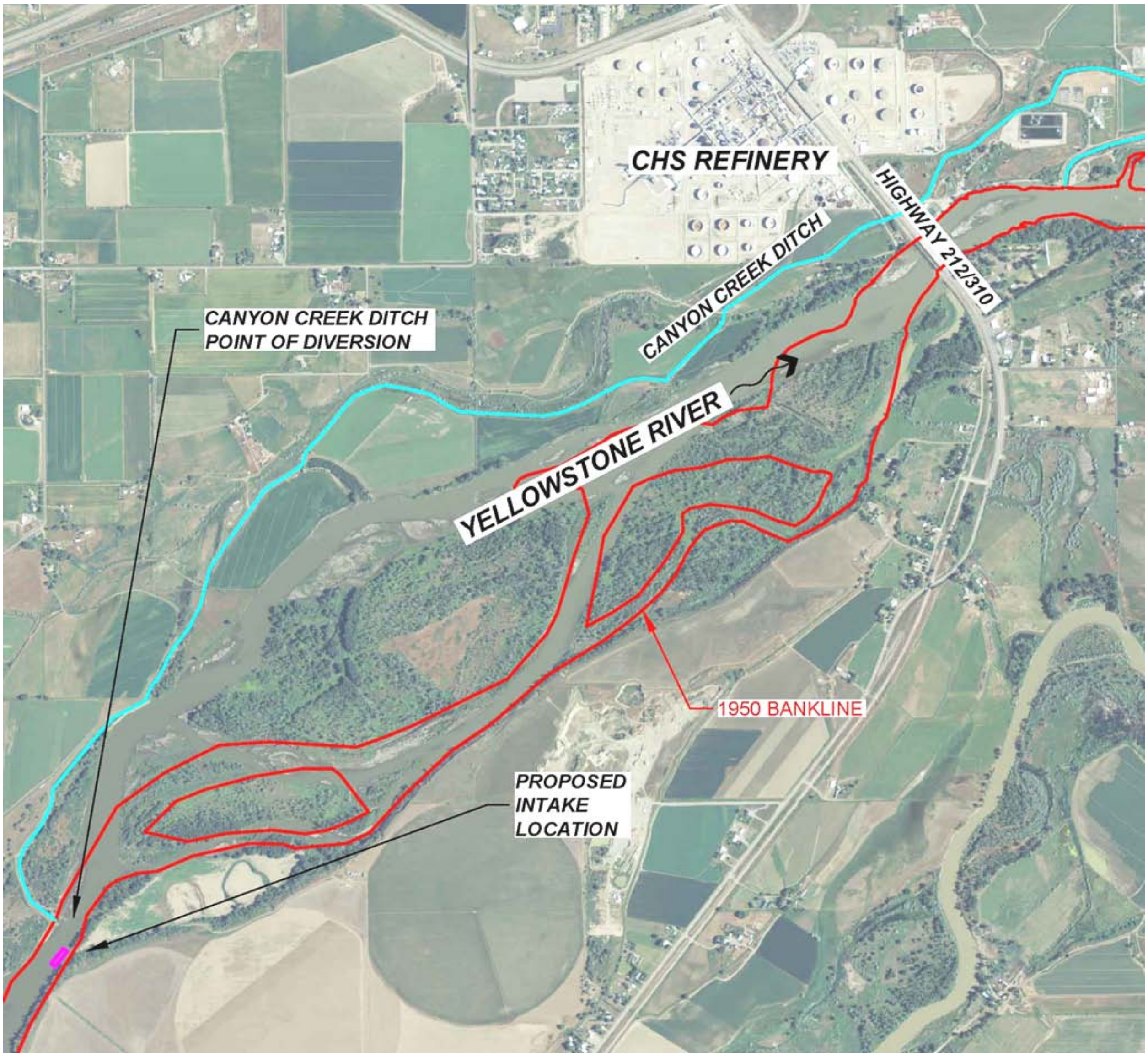

Figure 7: Location of proposed intake, adjacent to the Canyon Creek Ditch

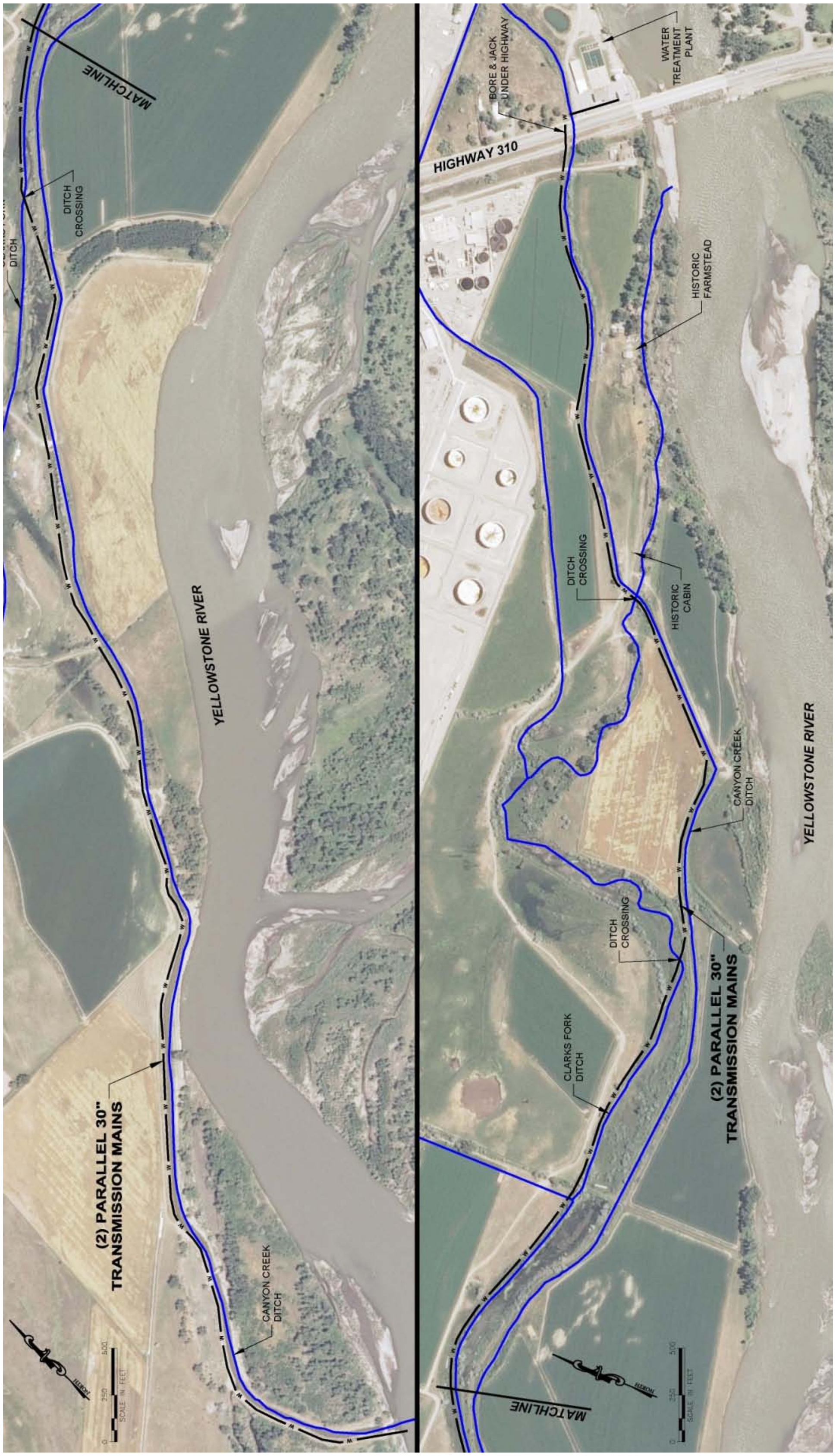

Figure 8: Intake Transmission Main Route

Lower Current Intake & Add Hot Water Heater

As part of this alternative, the current intake is to be left in service. Having two points from which the City can draw water is an immense advantage. If maintenance on one of the intakes is required, it can be taken offline, and the City will still have a means to draw raw water. If one intake is compromised due to icing or channel migration, the other intake may be used. In order to leave the current intake in service, the concrete structure and screens must be lowered. When the temporary rock weir is removed, the hydraulic analysis shows that the lowering of the water surface will severely compromise the function of the current intake if the screens and concrete are not lowered. There will also be risk posed to recreational traffic by a concrete monolith projecting from the river during most of the summer and fall when river recreation is at its peak. This will be a great liability and risk for the City.

The manufacturer of the current intake screens, Johnson Screens, was contacted to determine if other screen configurations are available that would allow the screens to be lowered. Johnson Screens has recently started manufacturing a "half screen" which is shown in the photos below.

Figure 9: Johnson Screens®: Half Intake Screen System

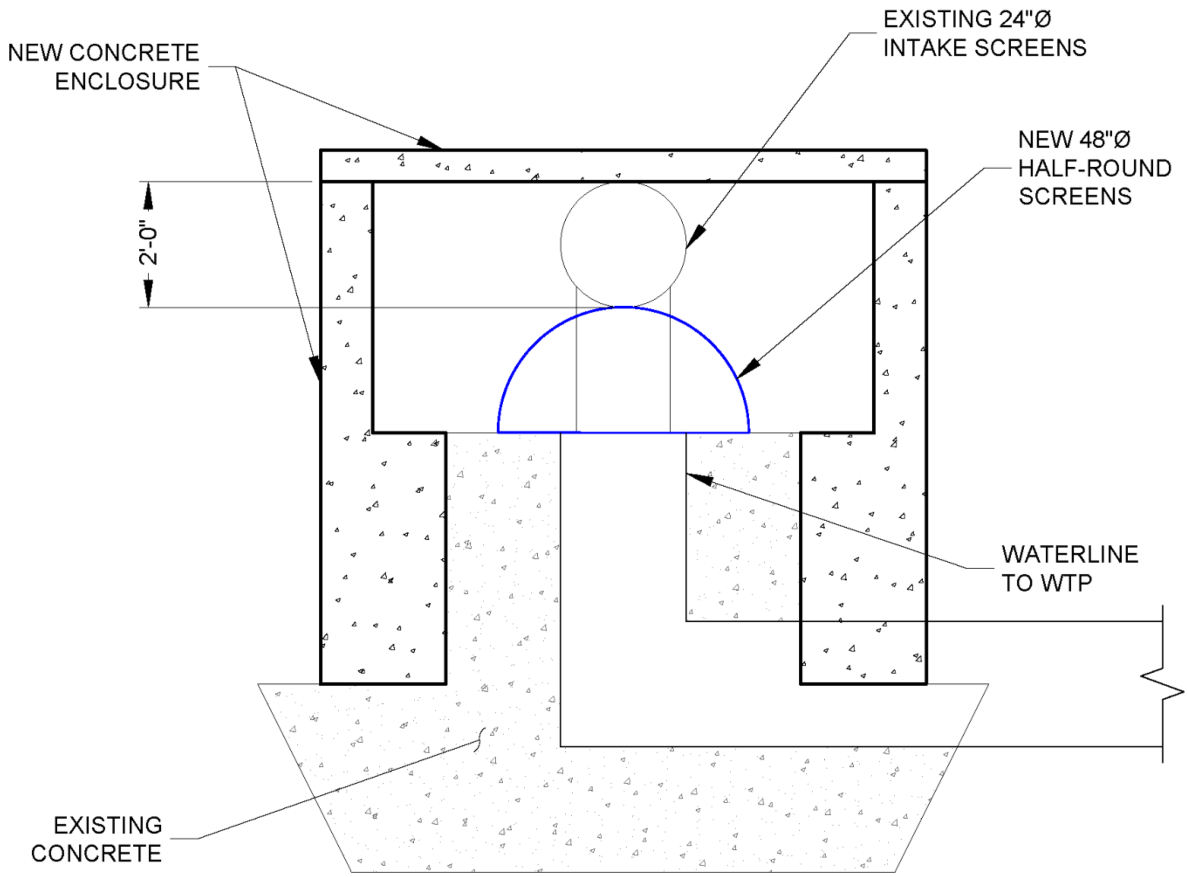

Figure 10: Install half screens in intake

In order to provide the same screen area as the existing 24" diameter round screens, 48" diameter half screens would be needed. A possible configuration is shown in Figure 10. The top of the screens would be lowered by two feet compared to the existing. The concrete encasement would have to be expanded in order to provide adequate free space around the screen. In addition, the deck air purge lines and the screen air purge lines would have to be adjusted to accommodate the screen.

Along with the safety concerns associated with the current intake, low flows and minimal submergence of the structure in the winter months leads to problems with ice – both being drawn into the intake pipes/pumps as well as clogging the screens as it accumulates. To alleviate this issue the installation of the originally proposed hot water heater will aid the function of the current intake during the winter months. The plumbing is already present within the intake structure itself, however it will be necessary to add a commercial hot water heater, pump, building, piping and electronic controls in order to utilize the existing hot water flush lines.

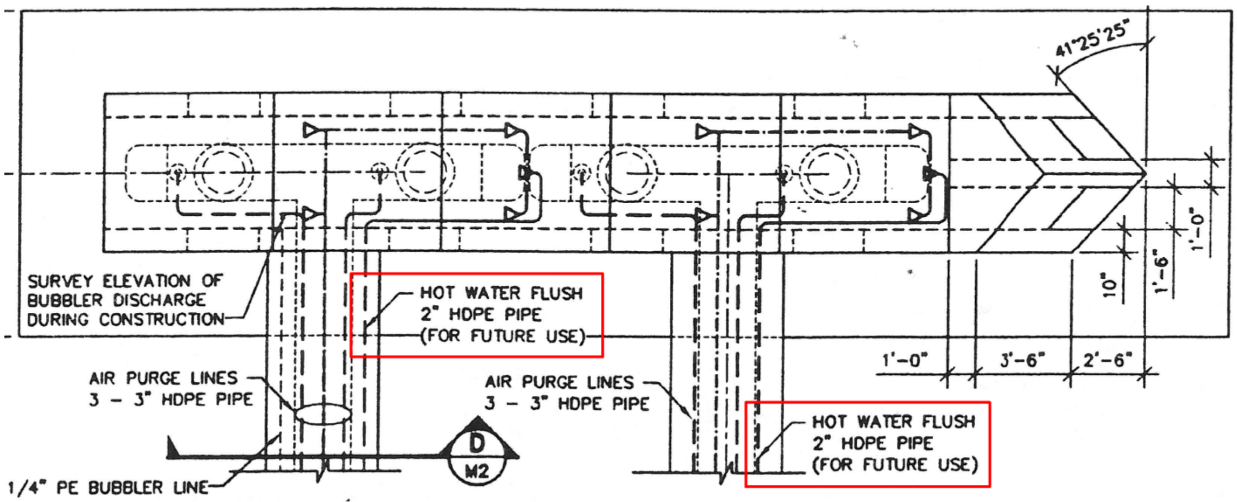

Figure 11: Excerpt from design plans showing hot water flush lines

Figure 12: Picture of current intake during construction showing hot water flush line

The construction of this alternative would entail dewatering and temporarily disabling the current intake. A short work bridge would be constructed from the sediment island to the north that would allow the intake to be dewatered. The construction would involve minimal concrete demolition and only minor rerouting of the plumbing.

Sediment Removal

As previously outlined in this report, significant changes to the river occurred during the flooding in spring and summer of 2011. One of these changes was that a large volume of sediment was deposited upstream and beneath the highway and railroad bridges. City personnel report that as much as eight feet of additional sediment was deposited beneath the bridges as a result of the flooding. Removal of the sediment is to help to restore the hydraulic capacity of the bridges.

Figure 13: Sediment deposition beneath railroad and highway bridges. Looking upstream.

Alternative 3: Infiltration gallery, lower current intake and add hot water heater, and remove sediment beneath bridges

Infiltration Gallery

The use of an infiltration gallery to collect groundwater which is adjacent to and in hydraulic connection with the Yellowstone River has been identified as an alternative which may meet the purpose and need of the project. Because of the hydraulic connectivity of the water to a surface water source, the required treatment for the water would be very similar to requirements for surface water pulled directly from the Yellowstone River. The full analysis of the different infiltration galleries and sites considered is included in the report entitled, *Groundwater Alternatives Analysis* completed by Western Groundwater Services, LLC which is included in Appendix F for reference.

An infiltration gallery installed utilizing the trench method at site #1 shown in Figure 14 nearly meets the design criteria of 20 MGD. The size of the infiltration gallery is very large, or rather very long—nearly a full mile of 36-inch diameter slotted pipe would be necessary. A figure illustrating a cross section of the proposed infiltration trench is shown in Figure 15.

This alternative does require further investigation and does not present any more certainty of supply than a screened intake placed in the river channel as it is dependent on offset distance from the river, and the river channel is subject to changes. This is shown in Table 3 which shows the estimated capacity of the infiltration gallery at various offsets from the river for the six locations considered in the WGS report. The proposed location is Site 1 which is highlighted in grey. For construction purposes it is desirable to be at least 50 feet from the river.

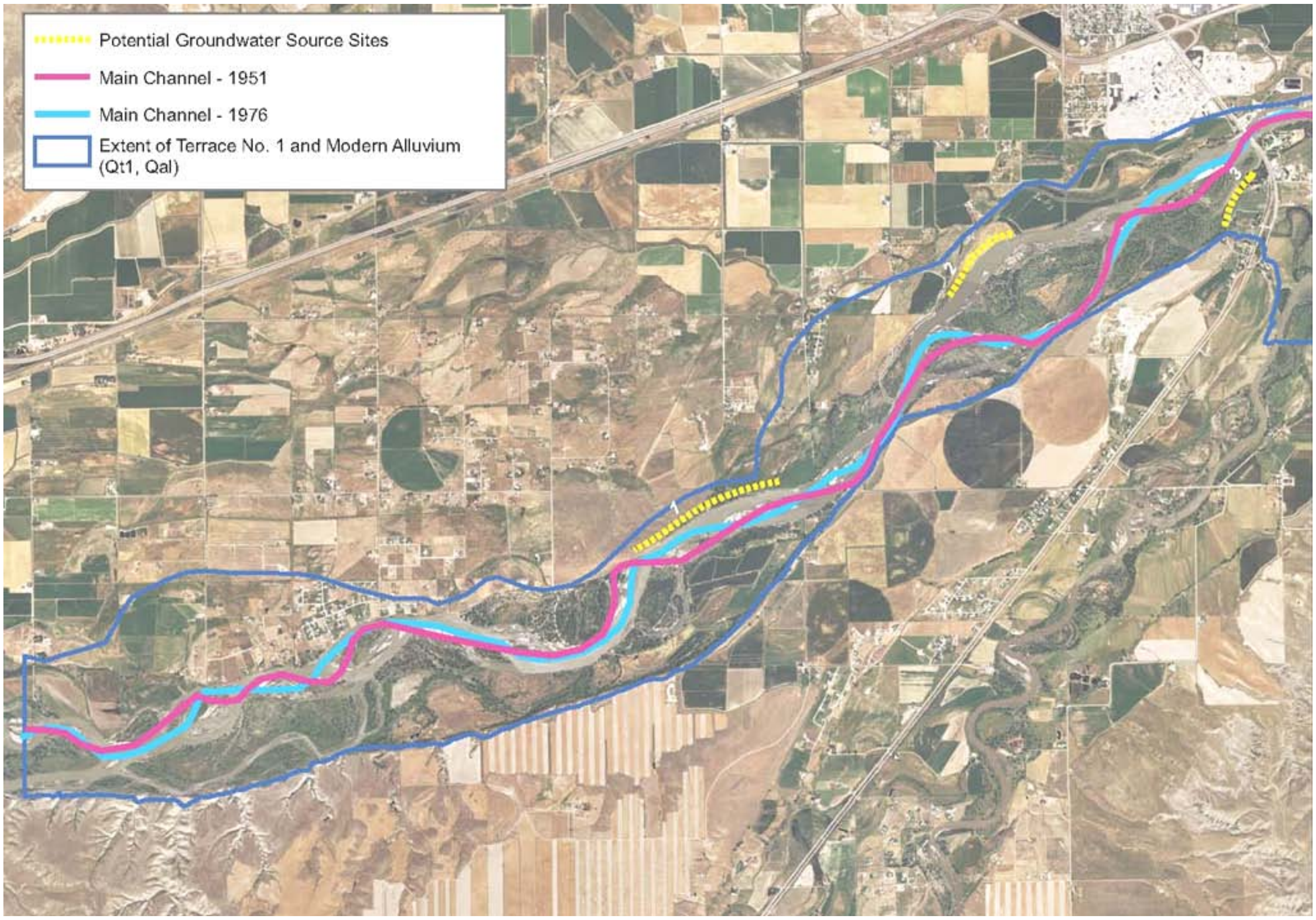

Figure 14: Infiltration Gallery Location Map

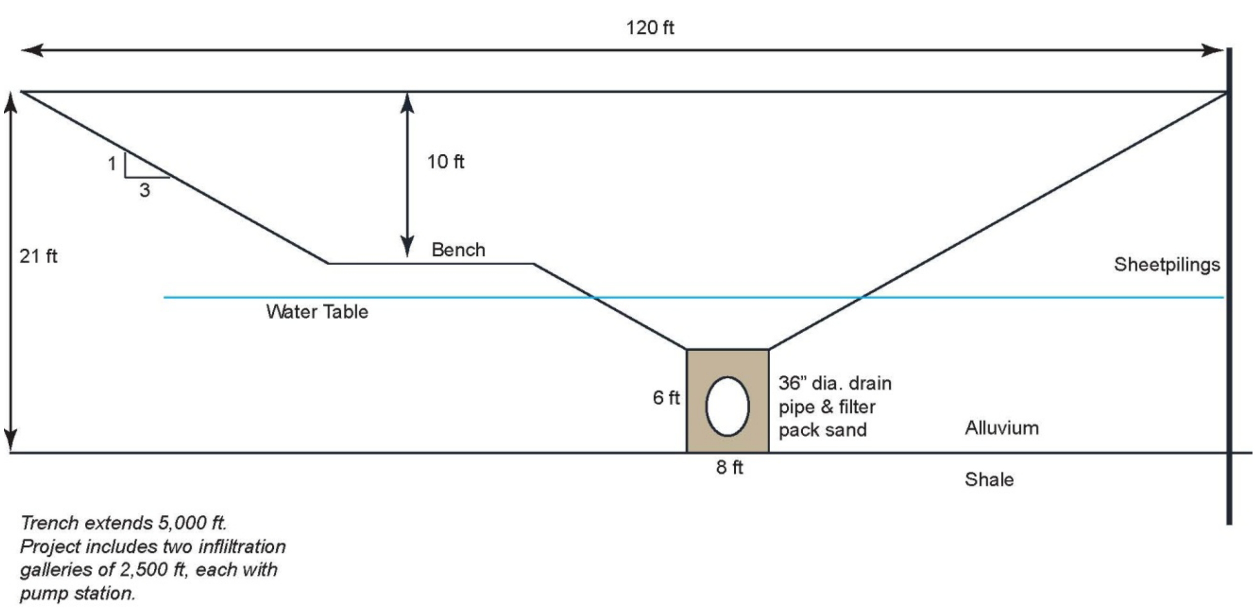

Figure 15: Example Infiltration Gallery Trench Construction

Table 3: Infiltration Gallery Estimated Capacity

Site No.	Length (ft)	Capacity (MGD) by Offset Distance from River(ft)				
		8.2	24.6	57.4	106.6	205.1
1	5000	45.5	31.8	**19.5**	12.6	7.6
2	2800	25.5	17.8	**10.9**	7.0	4.3
3	1950	17.7	12.4	**7.6**	4.9	3.0
4	2870	26.1	18.2	**11.2**	7.2	4.4
5	3070	27.9	19.5	**12.0**	7.7	4.7
6	3950	35.9	25.1	**15.4**	9.9	6.0

Other concerns related to the use of an infiltration gallery include:

- Sedimentation buildup within the drain pipe,
- Potential plugging due to algae, and
- Cost of installation in addition to a transmission line to connect to the City

The infiltration gallery would be constructed during times of low flow in the river to avoid any concerns with flooding or excessive dewatering due to the high flows in the river. This alternative would require additional time for further analysis to be completed prior to design. In terms of length of time necessary for implementation it is estimated that this alternative would take two years to complete. This would include additional investigation, design, permitting, land acquisition and construction.

Lower Current Intake & Add Hot Water Heater

This portion of the alternative is the same as described in Alternative 2.

Sediment Removal

This portion of the alternative is the same as described in Alternative 2.

Alternative 4: Lower current intake and add hot water heater, install W-weir, replace intake pumps, and remove sediment beneath bridges

This alternative is a combination of multiple alternatives outlined in the Alternatives Analysis to create a project to meet the stated purpose and need. The main component of the alternative is the construction of a W-weir across the river at the location of the current intake to control the river laterally and vertically. The weir is integral to creating an alternative which can meet the purpose and need of the project. The Alternatives Analysis (see Appendix C) investigated constructing a new intake adjacent to the existing structure but is was determined that without a W-weir, the purpose and need of the project could not be met. The new intake was eliminated and a W-weir included for this analysis. The W-weir and the other components of this alternative are explained in further detail in the following paragraphs.

Lower Current Intake & Add Hot Water Heater

This portion of the alternative is the same as described in Alternative 2.

Install W-Weir

In order to address the instability of the river and long term reliability a river spanning structure to control the river both laterally and vertically at the intake locations is also necessary. A W-weir was proposed by R. Mark Wilson of USFWS in a letter included in the HKM, Inc. 2002 feasibility study and is included in Appendix D (HKM, Inc. 2002).

> "[A W-Weir] is a grade control structure that decreases near-bank shear stress, velocity and stream power, but increases the energy in the center of the channel. The structure will establish grade control, reduce bank erosion, create a stable width/depth ratio, maintain channel capacity, while maintaining sediment transport capacity, and sediment competence…Various rock weirs installed across larger rivers for fish habitat, grade control, and bank protection often create an unnatural and uniform 'line of rocks' that detracts from visual values. [W-weirs have two sides which are] vanes directed from the bankfull bank upstream toward the bed with similar departure angles. From the bed at ¼ and ¾ channel width, the crest of the weir rises in the downstream direction to the center of the bankfull channel creating two thalwegs" (Rosgen 2006).

A schematic of a W-weir is shown in Figure 16 below.

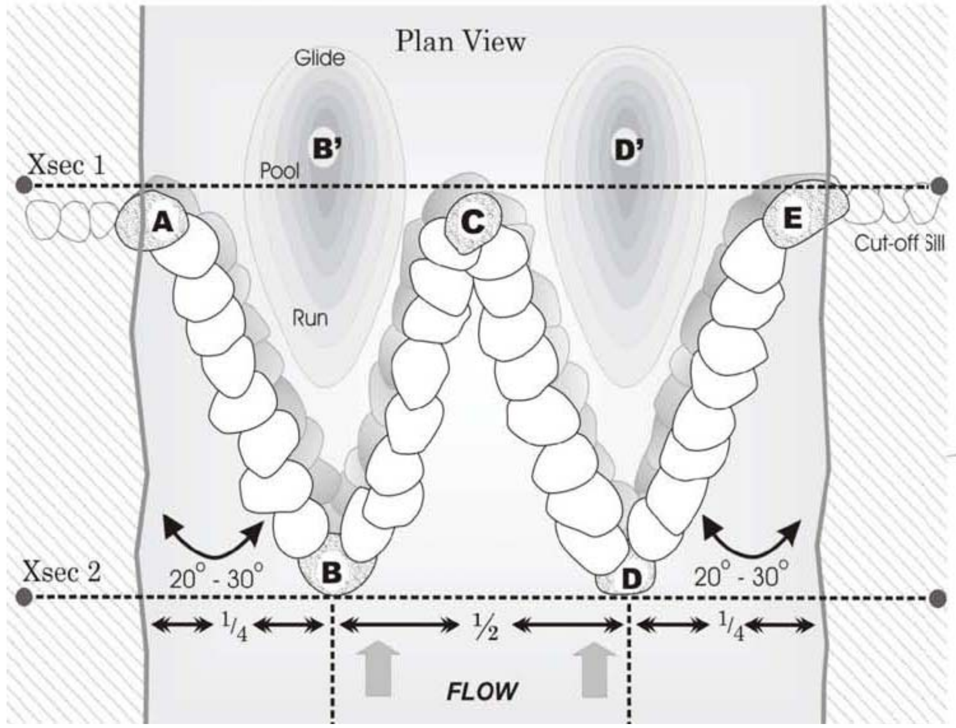

Figure 16: Schematic of W-weir (Rosgen 2006)

Two alternatives were investigated for the construction of a W-weir: a rock alternative and a grouted rock alternative. The primary concerns with the rock alternative are long-term stability, scour, ice jams, fish passage, boat passage, and ease of construction. A grouted rock weir alternative will be more durable, will ensure a longer term of stability, and will have a more predicable hydraulic response since it would be effectively impervious.

The purpose of the W-weir installation at this site is to provide adequate water surface elevation over the existing WTP intake at the design low flow of 450 cfs as well as to direct the thalweg of the channel. This will require setting the elevation of the controlling rocks (see points B and D, Figure 16 above) to an elevation in which the water surface at low flow still provides adequate water depth to the intake. The proposed weir location is shown below in Figure 17 and is located immediately downstream of the existing intake.

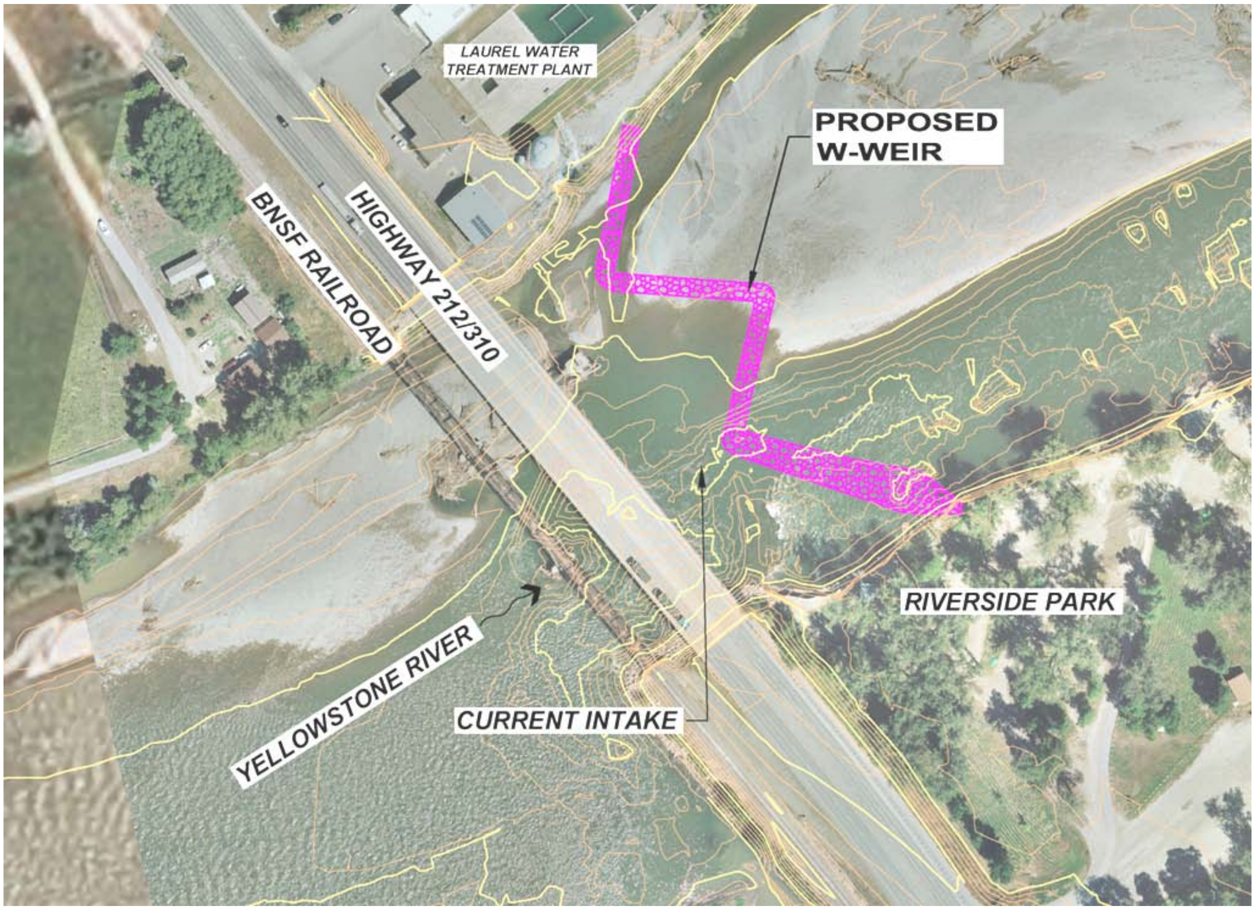

Figure 17: Proposed W-weir, plan view

The construction of the weir would vary depending upon the materials utilized. If the grouted rock system is utilized, proper dewatering is integral to installation. This would likely require staged construction. Due to the installation of the footer rocks and the necessity to be at or below bedrock depths, dewatering will be necessary in some locations to install the grout properly and ensure a quality product. It is anticipated the north section of the W-weir will be constructed first. During this construction, the bulk of the flow will be concentrated to the

Figure 18: Proposed W-weir, perspective view

south. Some dewatering work will be required, but as the flow is already concentrated to the south, this will likely consist of earthen berms to redirect flows rather than a cofferdam. Once the north section of the W-weir is installed, the south section will need to be dewatered due to deep flow depths. Dewatering methods can vary, but may incorporate a cofferdam or similar system. This cofferdam may be located either directly upstream of the diversion or above the railroad bridge. To properly install this cofferdam and due to the size of the operation, it is anticipated that a work bridge will be necessary for installation. Some stream work will be necessary to then direct flows to the north. Once construction of the south portion of the W-weir is complete, the cofferdam will be removed.

For the rock weir with no grout, no cofferdams are assumed to be needed. It is anticipated that the rock structure can be built in ‘wet conditions’. Some channel work and temporary modifications will be likely necessary to aid in construction.

Recreational use will also be incorporated into the design of the structure, with allowable passage for boating traffic. A ‘notch’ or similar system in the weir will be constructed in the weir to allow safe travel.

Ice jamming and sedimentation are also significant considerations. The W-weir is designed so that sediment transport capacity is maintained (see the quote above from Rosgen). However, there are a few cases in Montana (as noted in correspondence from Jeff Ryan of DEQ, see Appendix D) where the installation of a rock weir has caused sedimentation problems upstream.

<u>Replace Intake Pumps with Dry Pit Submersible Pumps</u>

This alternative proposes removing the existing vertical turbine pumps, reconfiguring all of the piping in the lower level of the pump building, and installing new dry pit submersible pumps capable of pumping water to the WTP or to the refinery. Based on the dimensions of the lower level, by relocating the main manifold slightly to the south it will be possible to install the same pumping capacity that currently exists using the vertical turbines as well as leave room for the future pumps. The replacement of the existing pumps will eliminate concerns of cavitation of the pumps when flows in the river are at their lowest.

<u>Sediment Removal</u>

This portion of the alternative is the same as described in Alternative 2.

Alternatives Analyzed and Dismissed

In the detailed Alternatives Analysis completed and included in Appendix C of this report there were numerous alternatives considered which were not carried forward for analysis in this EA. For details related to those alternatives which were dismissed, the aforementioned report should be referenced.

SECTION 4 - AFFECTED ENVIRONMENTS AND POTENTIAL IMPACTS OF THE ALTERNATIVES CONSIDERED

4.1 GEOLOGY AND SOILS

"The project area lies in an unglaciated portion of the Missouri Plateau of the northern part of the Great Plains Province. Sedimentary rocks, consisting primarily of sandstone underlie the site. River gravel, with depths from two to more than ten feet, overlay the bedrock in the river channel, and on the terraces above the river channel. The Yellowstone River has cut into the bedrock more deeply on the south side of the river than on the north." *(HKM, Inc., 2002).*

The soils outside of the river channel are predominantly composed of sandy to clayey loam to a depth of more than 5 feet, according to the NRCS Soil Survey of Yellowstone County. Haverson-Hysham loams, 0 to 1 percent slopes (Map Unit Hh) are present in the floodplain on the south side of the river. Hysham-Laurel silty clay loams, 0 to 2 percent (Map Unit Hy) and Haverson loams, 0 to 1 percent (Map Unit Ha) are present in the floodplain on the north side of the river. Alluvial land, mixed (Map Unit Al) is a mix of gravelly sand and loam and is shown on the north and south river banks. Riverbed substrates vary in size from silts to cobbles.

<u>Alternative 1: No Action</u>

The No Action alternative would have no affect on the geology and soils outside of the river as no construction would take place. It is possible that emergency measures would need to be taken by the City during times of low flow to ensure that water is flowing to the intake. These measures could include creating temporary dikes to guide the flow to the intake. This type of measure would disturb the natural geology and sediment movement within the river.

<u>Alternative 2: Proposed Action – New Intake, Lower Current Intake and Add Hot Water Heater, Sediment Removal</u>

Alternative 2 will have minimal impact on the area geology and soils. The installation of a new intake and the modification of the current intake will have no affect on the river's geology and natural sediment movement once construction is complete. During construction there is the potential for bedrock disruption as a result of the installation of the temporary cofferdams and associated dewatering at both intake sites. These impacts will be minimized to the greatest extent possible.

The transmission main will be installed within or adjacent to the easement for the Canyon Creek Ditch. There will be minimal impacts to area soils during construction and no long term impacts as a result of installation and use of the transmission main. The removal of sediment beneath the bridge is intended to restore the hydraulic capacity of the bridges and reduce scour potential of the riverbed, but once removed there is no further action proposed within the river.

<u>Alternative 3: Infiltration Gallery, Lower Current Intake and Add Hot Water Heater, Remove Sediment</u>

Alternative 3 requires that a substantial amount of excavation take place where the infiltration gallery is proposed to be installed. There will also be a placement of a significant amount of engineered fill to enhance the infiltration capabilities of the soils surrounding the infiltration pipe itself. The transmission main will be installed within or adjacent to the easement for the Canyon Creek Ditch. There will be minimal impacts to area soils during construction and no long term impacts as a result of installation and use of the transmission main.

During construction there is the potential for bedrock disruption as a result of the installation of the temporary cofferdam and associated dewatering at the current intake site. The removal of sediment beneath the bridge is intended to restore the hydraulic capacity of the bridges and reduce scour potential of the riverbed, but once removed there is no further action proposed within the river.

<u>Alternative 4: Lower Current Intake and Add Hot Water Heater, Construct W-Weir, Replace Intake Pumps, and Remove Sediment</u>

The construction of a W-weir within the river channel will have little impact on the geology of the river if a rock weir with no grout is installed. However if a grouted rock weir is installed the footer rocks of the weir must be "keyed-in" into the bedrock of the riverbed – necessitating disturbance of the bedrock and river geology. The weir would be a permanent structure. No further disturbance to the bedrock outside of the river channel would occur.

The use of a W-weir would also have some effect on sedimentation within the river channel, though it would be designed with the intent to limit sedimentation issues.

During construction there is the potential for bedrock disruption as a result of the installation of the temporary cofferdam and associated dewatering at the current intake site. The removal of sediment beneath the bridge is intended to restore the hydraulic capacity of the bridges and reduce scour potential of the riverbed, but once removed there is no further action proposed within the river.

Mitigation: The mitigation required for either Alternative 2, 3 or 4 is the implementation of Best Management Practices during and after construction. The majority of construction for both alternatives is subsurface and erosion control will be the primary concern.

4.2 LAND USE AND PLANNING

4.2.1 Zoning

The project lies within the zoning jurisdiction of Yellowstone County and the City of Laurel. The zoning along the north river bank in the vicinity of the project is Heavy Industrial, Agricultural/Open, or not zoned. The zoning along the south river bank is made up of public land (Riverside Park) and Residential 15000 (upstream of railroad bridge).

Alternative 1: No Action

No construction is proposed therefore there will be no impacts to zoning.

Alternative 2: Proposed Action – New Intake, Lower Current Intake and Add Hot Water Heater, Sediment Removal

Alternative 3: Infiltration Gallery, Lower Current Intake and Add Hot Water Heater, Remove Sediment

Alternative 4: Lower Current Intake and Add Hot Water Heater, Construct W-Weir, Replace Intake Pumps, and Remove Sediment

All three of these alternatives include work within the river, and Alternatives 2 and 3 include work along the north side of the river for the transmission main between the new intake and the WTP. The alternatives will be compatible with adjacent land uses and will have no direct or indirect impacts to zoning.

4.2.2 Prime Farm Land

The Farmland Protection Policy Act was enacted in 1981 (P.L. 98-98) to minimize the unnecessary conversion of farmland to nonagricultural uses as a result of federal actions. In addition, the Act seeks to assure that federal programs are administered in a manner that will be compatible with state and local policies and programs that have been developed to protect farmland. The policy of the Natural Resources Conservation Service is to protect significant agricultural lands from conversions that are irreversible and result in the loss of an essential food and environmental resources. The Service has developed criteria for assessing the effects of federal actions on converting farmland to other uses, including a Farmland conversion Impact Rating form AD-1066 that documents a site-scoring evaluation process to assess its potential agricultural value.

A preliminary investigation indicates that prime farmland (if irrigated) and farmland of statewide importance are interspersed with areas that are not prime farmland in the vicinity of the project based on soil type. Based on land use, several of these areas are currently used for agriculture.

<u>Alternative 1: No Action</u>
No impacts to farmland would result from the No Action alternative. However, because the water supply may be compromised based on whether or not the intake remains submerged there may be impacts to prime farmland within the Laurel municipal water service area such as gardens or small agricultural sites. If water restrictions were needed, outdoor use of water would be limited.

<u>Alternative 2: Proposed Action – New Intake, Lower Current Intake and Add Hot Water Heater, Sediment Removal</u>
<u>Alternative 3: Infiltration Gallery, Lower Current Intake and Add Hot Water Heater, Remove Sediment</u>
<u>Alternative 4: Lower Current Intake and Add Hot Water Heater, Construct W-Weir, Replace Intake Pumps, and Remove Sediment</u>
Alternatives 2, 3 and 4 will provide for reliable water availability to the City of Laurel and do not involve construction in areas of prime farmland. No direct impacts are anticipated; however, improved reliability of municipal water results in beneficial

indirect impacts to prime farmland within the Laurel municipal water service area such as gardens or small agricultural sites. The transmission main included in Alternatives 2 & 3 will follow the Canyon Creek Ditch alignment and any impacts due to construction would be temporary and minor.

4.2.3 Floodplain Encroachment

The intent of Executive Order 11988 is to require Federal Agencies to take actions to minimize occupancy of and modifications to floodplains. Specifically, EO 11988 prohibits Federal agencies from funding construction in the 100-year floodplain unless there are no other practicable alternatives. By its very nature, the NEPA compliance process involves the same basic decision process to meet objectives found in the Eight-Step Decision-Making Process. The Eight-Step Decision-making process has been applied through implementation of the NEPA process followed as part of this EA.

The FIS for the Yellowstone River in Yellowstone County was recently updated. The effective date of the new FIS is 11/6/2013. The new study used a detailed analysis and provides base flood elevations and a defined floodway. FEMA estimated the 100-year recurrence interval flood to be 56,700 cubic feet per second (cfs) for the river at the project site, and it is considered to be the base flood. According to the study and the effective Flood Insurance Rate Map (FIRM) for the project area, the project lies within a designated 100-year floodplain and a designated floodway. Floodplain maps, created using the National Flood Hazard Layer GIS information from FEMA, are located in Appendix A for reference.

The project is located in Yellowstone County, Montana which is a participating community in the National Flood Insurance Program (NFIP). In accordance with the NFIP, any alternatives that raise the base flood elevation or affect the floodway limits will have to be approved through a Conditional Letter Of Map Revision (CLOMR) prior to construction and a Letter Of Map Revision (LOMR) after construction is completed. The CLOMR/LOMR applications will analyze and ensure the project does not increase the flood hazard for buildings in the affected area.

<u>Alternative 1: No Action</u>

No impacts to the floodplain would result.

Alternative 2: Proposed Action – New Intake, Lower Current Intake and Add Hot Water Heater, Sediment Removal

Alternative 2 is anticipated to minimally affect the base flood elevation due to the fact that it does involve the installation of an intake structure within the river. It is assumed that a CLOMR/LOMR will be needed.

Alternative 3: Infiltration Gallery, Lower Current Intake and Add Hot Water Heater, Remove Sediment

Alternatives 3 would not involve new construction within the river channel however the infiltration gallery would likely be located within the floodway. It is assumed that a CLOMR/LOMR will be needed.

Alternative 4: Lower Current Intake and Add Hot Water Heater, Construct W-Weir, Replace Intake Pumps, and Remove Sediment

Alternative 4 would involve significant new construction within the river channel, including the addition of a permanent structure to control the lateral and vertical stability of the river – the W-weir. A CLOMR/LOMR will be needed.

4.3 PUBLIC HEALTH AND SAFETY

The City of Laurel water treatment plant intake structure, constructed in 2003, is located slightly downstream of the south center-span pier and is intended to remain submerged, even at low water. The intake provides water to the City of Laurel water system for domestic and fire suppression uses. Additional water is supplied to the CHS Oil Refinery for process water and fire suppression.

As a result of the flooding in 2011, significant bed scour occurred beneath the south spans of the railroad and highway bridges and extended downstream of the Exxon Silvertip Pipeline. The bed scour lowered the water surface elevation at the intake structure at all flow stages and especially at low flow. In addition, increased deposition occurred to the gravel bar on the north side of channel downstream of the bridges and intake structure and eroded the south riverbank. The channel migration left the new water treatment plant intake structure on the edge of the active low water flow and with a water surface well below pre-flood conditions, given comparable flow rates. In January 2012, City of Laurel personnel witnessed the lowest water surface elevations observed since the new intake was installed in 2003. The top of the intake was exposed to air, and ice began to build up on the intake structure. Additionally, slush ice flows in the river, which have never affected the intake because they occur at the water surface, began clogging the intake screens. These occurrences culminated in the City having to temporarily shut off the raw water supply to the CHS Oil Refinery on January 30, 2012 in order to meet domestic demands.

In August 2012, the City of Laurel was again faced with a potential water emergency as river levels dropped to an elevation that nearly exposed the top of the intake structure. The City responded by constructing a temporary rock diversion dike extending from the south riverbank in an attempt to constrict the river and raise the water surface elevation at the intake structure. This measure raised the water surface elevation at the intake, but in September 2012 declining flows completely exposed the top of the intake structure and were within an inch of the design low flow elevation needed for the intake to operate. Acting on the previously declared state of emergency, the City constructed a temporary rock weir across the entire low flow channel of the Yellowstone River. The weir successfully controlled the water surface elevation to maintain adequate depth over the intake structure.

The public health and safety component of this project is of paramount importance. The City is continuing to use an unpermitted rock weir to maintain adequate depth of water over the intake structure in violation of the Corps of Engineers regulations. The weir was constructed in an emergency situation without the time to consult permitting agencies. Consequently, the weir cannot be post-permitted by the Corps of Engineers. However, the City cannot remove the weir without jeopardizing the function of the intake structure during more than half of the year. Reliable access to the Yellowstone River, the sole source of water for the City of Laurel and CHS Refinery, is essential to protecting public health and safety.

<u>Alternative 1: No Action</u>

The No Action alternative would have direct negative impacts to public health and safety. The security of the water supply would be in question as the river continues to meander and down cut which can result in insufficient submergence of the intake and limited water supply. The need for an adequate water supply is necessary not only for potable water uses by the general public, but is also essential for fire suppression for the entire City. Additionally the CHS refinery relies on the current intake for not only its process water but also fire suppression. Considering the fact that the refinery is an industrial site with the potential for fire and explosions, the ability to provide them sufficient water for fire suppression is a major public safety issue.

In addition to the minimal submergence of the current intake as relates to capacity during the low flows in the late summer and fall, potential freezing of the intake screens would also be a concern in the winter months which can also compromise supply.

Finally, the existing elevation of the intake would continue to be a safety hazard for people recreating on the river.

<u>Alternative 2: Proposed Action – New Intake, Lower Current Intake and Add Hot Water Heater, Sediment Removal</u>

Alternative 2 would protect public health and safety by both ensuring reliable access to water diverted from the Yellowstone River for the design life of the project through the use of two separate submerged water intakes as well as by lowering the current intake to alleviate many of the safety concerns associated with only partial submergence of a structure within a river which is popular for a variety of recreational activities. This is accomplished by constructing a new intake in a more stable portion of the river upstream, lowering the current intake to eliminate a safety hazard, and finally keeping the current intake in service to be utilized as necessary for source water supply (as a backup to the new intake upstream). The beneficial impacts to public health and safety resulting from this alternative are significant and include reliably supplying potable water to the public, assuring sufficient fire suppression for the City, and also reliably supplying the refinery will adequate process water and fire suppression water.

<u>Alternative 3: Infiltration Gallery, Lower Current Intake and Add Hot Water Heater, Remove Sediment</u>

Alternative 3 would protect public health and safety by both ensuring reliable access to water diverted from the Yellowstone River for the design life of the project through the use of a two separate types of intake facilities. The main intake facility would be the infiltration gallery. The backup intake facility will be the current submerged water intake as which will be lowered to alleviate the safety concerns associated with a minimally or partially submerged structure within a river which is popular for a variety of recreational activities. The beneficial impacts to public health and safety resulting from this alternative are significant and include reliably supplying potable water to the public, assuring sufficient fire suppression for the City, and also reliably supplying the refinery will adequate process water and fire suppression water.

Alternative 4: Lower Current Intake and Add Hot Water Heater, Construct W-Weir, Replace Intake Pumps, and Remove Sediment

Alternative 4 would protect public health and safety by both ensuring reliable access to water diverted from the Yellowstone River for the design life of the project. This is accomplished by lowering the current intake to eliminate a safety hazard and allowing the City to keep the current intake in service, and finally by installing a permanent W-weir to maintain the necessary water elevation to keep the intake adequately submerged to supply the design flow of water to the City. The beneficial impacts to public health and safety resulting from this alternative are significant and include reliably supplying potable water to the public, assuring sufficient fire suppression for the City, and also reliably supplying the refinery will adequate process water and fire suppression water.

4.4 RECREATION

Impacts to recreation can be wide ranging due to the diversity of types of recreation. The Yellowstone River is used for many types of recreation including: motorized boating, typically with jet boats that require less than a foot of water depth to operate; non-motorized boating consisting of rafts, canoes, and kayaks; floating on inner tubes; and fishing from boat and from shore.

Other types of recreation indirectly affected by this project are too numerous to list but generally include any recreation that takes place within the City of Laurel municipal water service area, especially any activity that requires potable water.

Alternative 1: No Action

The No Action alternative will not address the concerns related to a minimally submerged structure in the river, or in times of low flow an exposed structure in the river which is low profile and difficult to see. It will continue to be a danger, particularly to boaters.

Alternative 2: Proposed Action – New Intake, Lower Current Intake and Add Hot Water Heater, Sediment Removal

Alternative 2 will have minor adverse impacts to river recreation by adding a submerged structure in a second location. However, the new structure will be placed at an appropriate depth to avoid any undue impact or danger. The lowering of the current intake structure would be a beneficial impact to recreation by increasing its submergence and therefore improving the safety of the structure as it would pose less of a hazard to river traffic.

Alternative 3: Infiltration Gallery, Lower Current Intake and Add Hot Water Heater, Remove Sediment

Alternative 3 would have no adverse impacts to recreation. The lowering of the current intake structure would be a beneficial impact to recreation by increasing its submergence and therefore improving the safety of the structure as it would pose less of a hazard to river traffic.

Alternative 4: Lower Current Intake and Add Hot Water Heater, Construct W-Weir, Replace Intake Pumps, and Remove Sediment

Alternative 4 has the potential to negatively impact recreation due to the fact that it adds a permanent structure across the river, the W-weir. However the weir will be designed to accommodate recreational traffic through the use of a 'notch' or similar system in the weir. The W-weir will ensure that the intake remains adequately submerged.

4.5 SOCIOECOMONIC ISSUES

The City of Laurel has a population of 6,718 residents according to the 2010 census. Of those residents, 7.0% are minorities, 15.9% are over the age of 65, and 11.5% have a household income below the poverty level. The median household income in Laurel is $40,906.

4.5.1 Environmental Justice

On February 11, 1994, President Clinton signed EO 12898, entitled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations". The EO directs federal agencies to focus attention on human health and environmental conditions in minority and/or low-income communities. Its goals are to achieve environmental justice, fostering non-discrimination in federal programs that substantially affect human health or the environment, and to give minority or low-income communities greater opportunities for public participation in and access to public information on matters relating to human health and the environment. Also to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low income populations in the United States.

Alternative 1: No Action
Alternative 2: Proposed Action – New Intake, Lower Current Intake and Add Hot Water Heater, Sediment Removal
Alternative 3: Infiltration Gallery, Lower Current Intake and Add Hot Water Heater, Remove Sediment
Alternative 4: Lower Current Intake and Add Hot Water Heater, Construct W-Weir, Replace Intake Pumps, and Remove Sediment
No adverse impacts.

4.5.2 Municipal Water Rates

Residents of Laurel pay for municipal water and sewer service through monthly water and sewer rates. A rate study was completed in August, 2011 to establish water and sewer rates appropriate to fund the operation and maintenance of the Laurel water and sewer systems. The rates for the City are based on water meter size. The typical size of a residential water meter is ¾" which is often referred to as a single equivalent dwelling unit, or EDU. The use of EDU's as a measurement tool allows the City to appropriately set rates for users who have larger water meters. For example, a ¾" meter is 1 EDU while a 1" meter is 1.79 EDUs based on the fact that the area of a 1" meter has 1.79 times the area of a ¾" meter.

The adopted water and sewer rates for a typical ¾" residential water service (1.00 EDU) are summarized in Table 4. Target rates are determined by the Montana Department of Commerce based on the median household income for water and wastewater systems, and they are used as a threshold to distinguish reasonable rates from burdensome rates. The current target rate for combined water and sewer is also included in Table 4.

Table 4: Current Average Water & Sewer Rates

Present Water & Sewer Rates Per EDU	
Water Rate	$44.63
Sewer Rate	$45.79
Combined Rate	**$90.42**
Median Household Income	$46,530
Monthly Target Rate (MDOC)	**$78.40**

As evidenced by the previous table, the residents of Laurel are paying 115% of the target rate for water and sewer service.

Alternative 1: No Action

The No Action alternative does not involve any new construction and therefore there would not be any affect to rates as a result of constructing new infrastructure. However, by not addressing the purpose and need of the project it is possible that the City would need to find ways to conserve more water. One method of encouraging water conservation is raising rates. There may also be future water shortages which require that emergency measures be taken to supply water and those measures could cost an unpredictable and unforeseeable amount of money to implement. Therefore there could be negative impacts to the rates as a result of No Action.

Alternative 2: Proposed Action – New Intake, Lower Current Intake and Add Hot Water Heater, Sediment Removal

The Proposed Action alternative has the potential to affect future water rates. Since the proposed action is in response the flood damages from 2011, in which there was a presidential emergency declaration, it will be funded, in part, by a FEMA Public Assistance Grant. For simplicity, potential future water rates are calculated assuming the project is constructed in 2016 (current costs inflated by 3% annually) and does not consider unrelated future water and sewer rate increases. The total cost of the Proposed Action was used as the cost for the future improvements. Table 5 summarizes a potential future increase in water rates assuming the City of Laurel finances said future improvements through a FEMA grant and the Montana State Revolving Fund (SRF) Loan Program. The Montana SRF Loan Program provides financing to Montana communities for infrastructure projects.

Table 5: Project Funding Scenario and Water Rates

Funding Scenario and Estimated Rates	New Intake, Lower Existing Intake, Remove Sediment
Total Project Cost	**$9,096,544**
FEMA grant (75% of Project Cost)	$6,822,408
SRF Loan	$2,274,136
Base SRF Loan (20 Years @ 3%)	**$2,274,136**
SRF Bond Reserve (1 year payment)	$152,822
Total Loan Amount	**$2,426,958**
Annual Loan Payment	$163,130
Annual Loan Coverage	$40,782
TOTAL ANNUAL CAPITAL DEBT SERVICE COST	**$203,912**
USER INCREASE IN COST/MONTH FOR PROJECT [1]	**$4.84**
Existing Average Water User Cost/Month/EDU	$44.63
Total Proposed Water Cost/Month/EDU	**$49.47**
Existing Sewer System Cost/Month/EDU	$45.79
Total Proposed Water & Sewer Cost/Month/EDU	**$95.26**
Combined Systems Target Rate	$78.40
PERCENT OF COMBINED TARGET RATE	**122%**

[1] *Table is based on an estimated 3509 EDU's*

Any alternatives that cause the City of Laurel to undertake improvements at local tax payer expense will raise water rates. Based on the above funding scenario the increase in the monthly rate would be approximately $4.84 which will raise the projected combined water and sewer rate to 122% of the target rate.

<u>Alternative 3: Infiltration Gallery, Lower Current Intake and Add Hot Water Heater, Remove Sediment</u>

Similar to Alternative 2, this alternative has the potential to impact rates but on a greater scale than Alternative 2. This is due to the fact that it is a more expensive alternative and therefore the impact to rates is greater.

Alternative 4: Lower Current Intake and Add Hot Water Heater, Construct W-Weir, Replace Intake Pumps, and Remove Sediment

This alternative has the potential to have the least impact to water rates of the three action alternatives when considering capital costs. This is due to the fact that there would be no need for the long transmission main present in Alternatives 2 and 3. Though there would be the added cost of the W-weir, that cost is significantly less than the transmission main needed for the other alternatives. The total estimated capital cost for this alternative is $4 million. However, long term operation and maintenance costs of this alternative are expected to be greater than those for alternatives 2 and 3. The W-weir will need maintenance on a regular basis as it would be expected to sustain some damage due to debris in runoff events as well as ice jams which can occur on the river in the winter months. It is not possible to say how often the maintenance would be necessary, or precisely how it would affect the water system customers; however it can be stated that this maintenance would be required more frequently than any anticipated maintenance associated with either Alternative 2 or 3.

4.6 AIR QUALITY AND CLIMATE

The project is located near the City of Laurel, MT where U.S. Highway 212/310 crosses the Yellowstone River. From the highway bridge, the project extends upstream along the north side of the river approximately three miles. The elevation of the area extends from 3,270 feet at the bridge to 3,295 feet at the new intake location. The average temperatures range from 26.5 degrees F in the winter to 72.8 degrees F in the summer and the average annual precipitation is 13.6 inches.

In the vicinity of the project, directly across the road from the water treatment plant, is the Cenex Harvest States (CHS) oil refinery. This refinery has the greatest effect of on air quality in the area. The Montana Department of Environmental Quality Air Compliance Program is responsible for administering those portions of the Clean Air Act (CAA) of Montana (Section 75-2-101 *et seq*., MCA) and companion regulations pertaining to compliance of air emissions from various types of facilities including delegated federal regulations.

Alternative 1: No Action

The No Action alternative does not propose any construction; therefore there are no impacts to air quality and climate.

Alternative 2: Proposed Action – New Intake, Lower Current Intake and Add Hot Water Heater, Sediment Removal

Alternative 4: Lower Current Intake and Add Hot Water Heater, Construct W-Weir, Replace Intake Pumps, and Remove Sediment

No long term adverse impacts to air quality or climate would result from these alternatives. There would be minor impacts to air quality during construction resulting from dust and the exhaust fumes from the equipment. These impacts would be temporary.

Alternative 3: Infiltration Gallery, Lower Current Intake and Add Hot Water Heater, Remove Sediment

No long term adverse impacts to air quality or climate would result from this alternative. There would be impacts to air quality during construction resulting from dust and the exhaust fumes from the equipment. Because this alternative requires the installation of a large infiltration pipe and engineered backfill in addition to the transmission main, the construction time will be longer and therefore the dust and exhaust fume impacts will be last longer than Alternative 2 or 4.

Mitigation: To mitigate for potential air quality impacts from fugitive dust and equipment emissions, vehicle engines would be kept in good repair and turned off while not in use, and the project area would be watered in dry conditions. The same measures would also be taken in the identified construction staging areas.

4.7 NOISE

The project site is in close proximity to U.S. Highway 212/310 and Interstate Highway 90. The eastern portion of the project is also next to an oil refinery which has a significant amount of associated noise related to vehicular traffic as well as rail traffic. The western portion of the project site is located next to the river in an area which is primarily agricultural with minimal related noise.

Alternative 1: No Action

No adverse impacts.

Alternative 2: Proposed Action – New Intake, Lower Current Intake and Add Hot Water Heater, Sediment Removal

Alternative 3: Infiltration Gallery, Lower Current Intake and Add Hot Water Heater, Remove Sediment

Alternative 4: Lower Current Intake and Add Hot Water Heater, Construct W-Weir, Replace Intake Pumps, and Remove Sediment

There will be no impact on noise once construction is complete. During construction of the project working hours will generally be limited to 7:00 am to 7:00 pm.

4.8 PUBLIC SERVICES AND UTILITIES

The project area is generally served by the City of Laurel. Associated water, sewer, storm water drainage and solid waste are all provided by the City for the areas of the project located within the City limits. Portions of the project are located outside of the City limits within Yellowstone County and residences in those areas are served by private wells and septic tanks.

There are a number of underground and overhead utility lines in the vicinity of the project (see Exhibit A-3 in Appendix A). The Exxon-Mobil Silvertip crude oil pipeline lies 750 feet downstream of the highway bridge and was ruptured as a result of river bank erosion and bed scour at Riverside Park. A new pipeline was installed shortly after the failure, and the old, damaged pipeline has been removed. Two 16-inch natural gas transmission mains operated by Williston Basin Interstate Pipeline also cross beneath the river and run through the park.

The western portion of the project site contains limited utilities and public services due to its more rural nature.

Alternative 1: No Action

The No Action alternative would have long term negative impacts related to public services provided by the City. The ability of the City to provide adequate water is compromised by the current water intake structure and movement of the river. If the issue is not addressed it is anticipated that the City will continue to have issues serving both the residential and industrial customers during times of low flow or if the main channel of the river moves further away from the intake structure.

Alternative 2: Proposed Action – New Intake, Lower Current Intake and Add Hot Water Heater, Sediment Removal
Alternative 3: Infiltration Gallery, Lower Current Intake and Add Hot Water Heater, Remove Sediment
Alternative 4: Lower Current Intake and Add Hot Water Heater, Construct W-Weir, Replace Intake Pumps, and Remove Sediment
No adverse impacts to public services or utilities. Beneficial impacts would result for the City's public services such as a reliable water supply and sufficient, secure capacity for fire suppression.

4.9 WATER QUALITY – WATER RESOURCES

The United States Army Corps of Engineers (USACE) is responsible for permitting and enforcement functions dealing with building in waters of the U.S. and discharging dredged or fill material into waters of the U.S. USACE regulations for building or working in navigable waters of the United States are authorized by the Rivers and Harbors Act of 1899. These regulations often go hand-in-hand with Section 404 of the Clean Water Act (CWA), which establishes the USACE permit program for discharging dredged or fill material. The regulations are often used together because building in navigable water of the United States also constitutes discharging dredged or fill material into water of the United States. In addition to regulating construction or work begin done in navigable water of the United States, USACE regulates discharging into wetlands through the "Section 404" permit program.

The Yellowstone River is the source of water supply for the City of Laurel. The current intake is a passive intake and has little to no effect on the water quality of the river. Part of the project site is located within the Yellowstone River and is subject to the requirements of the USACE and Section 404.

Alternative 1: No Action

The no Action alternative could have adverse impacts to the water quality of the Yellowstone River should it be necessary direct the river towards the current intake through the use of temporary weirs or other work within the river. This would cause additional sediment to be disturbed and would disrupt the natural flow of the river. Furthermore it will not be possible to remove the existing unpermitted weir if no action is taken.

Alternative 2: Proposed Action – New Intake, Lower Current Intake and Add Hot Water Heater, Sediment Removal

The alternative requires that construction take place in the river at two separate locations. The use of a cofferdam and dewatering will be necessary to install the new intake upstream of the current one. A second cofferdam and dewatering will be necessary to lower the current intake. Both of these construction sites would be temporary and will have no long term adverse affects on water quality or the water resource.

Alternative 3: Infiltration Gallery, Lower Current Intake and Add Hot Water Heater, Remove Sediment

The alternative requires that construction take place in the river at a single location. The use of a cofferdam and dewatering will be necessary to lower the current intake. The construction site would be temporary and will have no long term adverse affects on water quality or the water resource. The construction of the infiltration gallery will require a significant amount of excavation, imported fill, and disposal of native material. The use of the infiltration gallery will have no long term affect on the quality of water in the river.

Alternative 4: Lower Current Intake and Add Hot Water Heater, Construct W-Weir, Replace Intake Pumps, and Remove Sediment

This alternative requires the construction of a permanent structure within the river. The W-weir would require the use of cofferdams and dewatering for construction to take place. The cofferdams will be temporary and will not have long term adverse affects on water quality. However, the installation of the W-weir will result in a permanent structure which spans the river and is intended to stabilize the channel both laterally and vertically. The W-weir will be designed to maintain sediment flow in the river to avoid negative long term affects on the water quality within the river.

While the design of the W-weir would aim to mitigate any detrimental affects to the water quality and water resource, concerns have been raised regarding this alternative. Specifically that, "…Any structure across the river is going to slow flows and cause deposition upstream of the structure. We are already having serious problems with sediment deposition under the bridges." (Ken Frazer, Regiouanl Fisheries Manager, Montana Fish, Wildlife and Parks)

The previous comment illustrates that there may be long term affects on the water quality and water resource associated with the installation and maintenance of a W-weir that are difficult to predict.

Mitigation: Alternatives 2, 3 and 4 involve construction in or near the river which must be mitigated through the use of Best Management Practices to prevent erosion and runoff into the river during construction.

For Alternative 4 further mitigation measures during design to address the potential for sedimentation and slowing of flows which would negatively impact the existing upstream structures (bridges) would need to be included and all affected parties would need to have their concerns addressed regarding the water quality and the water resource.

4.10 BIOLOGICAL RESOURCES

4.10.1 Wetlands

Executive Order 11990, Protection of Wetlands, requires federal agencies to take action to minimize the destruction of wetlands, by considering both direct and indirect impacts to wetlands that may result from federally funded actions. Application of the Eight-Step Decision-Making process is required to ensure that federally funded projects are consistent with EO 11990 objectives. By its very nature, the NEPA compliance process involves the same basic decision process to meet the objectives found in the Eight-Step Decision-Making Process. The Eight-Step Decision-Making Process has been applied through implementation of the NEPA process followed as part of this EA.

Activities disturbing jurisdictional wetlands require a permit from the USACE. Two types of authorization are available from the USACE for activities regulated under Section 404 of the CWA: general permits, which are issued for a specific category of similar activities and include nationwide permits defined in 33 CFR Part 30, and individual permits issued after individual review of the project, project alternative, and proposed mitigation.

According to the U.S. Fish and Wildlife Service National Wetlands Inventory, there are freshwater emergent wetlands, classified as palustrine wetlands, and riverine wetlands along the project site. The riverine wetlands are located both within the permanently flooded channel as well as the seasonally flooded shoreline. The palustrine wetlands are located at numerous locations along the river and also along the Clarks Fork Ditch which runs along the north side of the river. The majority of the palustrine wetlands along the river are located on the south side of the river. The proposed project will be located on the north side of the river.

Alternative 1: No Action

No new construction would be completed as a part of this alternative and therefore no new areas of wetlands would be disturbed. However, due to the fact that the current intake is located in within the riverine wetland there is potential for that wetland to be disturbed should emergency measures need to be taken to ensure that the intake remains submerged to supply water to the City. The lateral movement of the river is unpredictable and the City has had to take emergency measures in the past to secure their water supply; it is possible that emergency measures would be needed again in the future thus continuing to disturb the riverine wetland.

Alternative 2: Proposed Action – New Intake, Lower Current Intake and Add Hot Water Heater, Sediment Removal

This alternative will impact the riverine wetlands during construction at the two separate intake locations; however it will not have long term effects on the riverine wetlands. Based on the proposed location of the transmission main connecting the new intake to the WTP it will have no impact on the palustrine wetlands.

Alternative 3: Infiltration Gallery, Lower Current Intake and Add Hot Water Heater, Remove Sediment

This alternative would only impact the riverine wetlands at the current intake location. It would not impact any wetlands at the proposed infiltration gallery site or along the proposed transmission main.

Alternative 4: Lower Current Intake and Add Hot Water Heater, Construct W-Weir, Replace Intake Pumps, and Remove Sediment

This alternative is not anticipated to impact riverine wetlands during construction. The long term impacts resulting from the construction of a W-weir would be addressed during design to avoid any long term impacts due to any predicted sedimentation.

Mitigation: During construction all permit requirements will be followed and efforts will be made to minimize disturbance to the wetland whenever possible.

Long term affects which would result from the construction of a W-weir would be addressed during design with appropriate mitigation measures to be built into the design.

4.10.2 Threatened or Endangered Species

The Endangered Species Act (ESA) of 1973 establishes a federal program to conserve, protect and restore threatened and endangered plants and animals and their habitats. ESA specifically charges federal agencies with the responsibility of using their authority to conserve threatened and endangered species. All federal agencies must insure any action they authorize, fund or carry out is not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction of critical habitat for these species.

There are several different information sources to determine the biological resources present in the region, including threatened or endangered species. The Montana Natural Heritage Program (MNHP) maintains lists of plant and animal species of concern. Typically these lists are organized by county so the presence of a plant or animal on the list generally means that species was found in the county at least once, not that it is likely to be found at the project site. A records search of the MNHP databases was performed and found 35 animal species of concern (only one of which has a ranking of S1 – at high risk), 4 plant species of concern, and no threatened or endangered species. A full list of the animal and plant species of concern is included in Appendix E for reference.

Breeding and non-breeding bald eagle activity occurs in the general project area along the Yellowstone River. Coordination with local Montana Fish, Wildlife and Parks (FWP) wildlife staff will be necessary to determine whether active eagle nesting occurs in this area prior to construction commencement.

Alternative 1: No Action

No adverse impacts.

Alternative 2: Proposed Action – New Intake, Lower Current Intake and Add Hot Water Heater, Sediment Removal

Alternative 3: Infiltration Gallery, Lower Current Intake and Add Hot Water Heater, Remove Sediment

Alternative 4: Lower Current Intake and Add Hot Water Heater, Construct W-Weir, Replace Intake Pumps, and Remove Sediment

The proposed improvement alternatives may result in temporary sedimentation during installation of the cofferdam and associated dewatering, along with subsequent removal of the cofferdam. Efforts will be made to adhere to best management practices to minimize any disturbance to aquatic species. To the maximum extent practicable, construction activities will be scheduled so as not to disrupt nesting birds during the breeding season (approximately April-August). If work is proposed to take place during the breeding season or at any other time which may result in take of migratory birds, their eggs, or active nests, all practicable measures will be taken to avoid and minimize take, such as maintaining adequate buffers, to protect the birds until the young have fledged. Active nests may not be removed. The W-weir could potentially have adverse impacts on aquatic organism passage through this reach of river. The W-weir would need to be designed to match the river dynamics to the extent practicable.

Mitigation

If an active nest(s) is(are) present, seasonal restrictions and construction/development distance buffers specified in the 2010 Montana Bald Eagle Management Guidelines: An Addendum to Montana Bald Eagle Management Plan will be considered.

Potential impacts to all species of concern include loss of habitat due to construction. If the W-weir becomes a barrier to aquatic organism migration than a net loss of river habitat would be realized. There will be no long term loss of habitat caused by the construction of the transmission main; it will be reseeded and restored to its original condition after construction is completed. Effects to the species of concern should be minimal.

4.11 CULTURAL RESOURCES

In addition to review under NEPA, consideration of impacts to cultural resources is mandated under Section 106 of the National Historic Preservation Act (NHPA) as implemented by 36 CRF 800. Requirements include the need to identify significant historic properties that may be impacted by the proposed action or alternatives within the project's area of potential effect. Historic properties are defined as archaeological sites, standing structures, or other historic resources listed in or determined eligible for listing in the NRHP 36 CFR 60.4. If adverse effects on historic, archaeological, or cultural properties are identified, then agencies must attempt to avoid, minimize, or mitigate the impacts to these resources.

4.11.1 Historic Properties

<u>Alternative 1: No Action</u>

<u>Alternative 4: Lower Current Intake and Add Hot Water Heater, Construct W-Weir, Replace Intake Pumps, and Remove Sediment</u>

No adverse impacts.

<u>Alternative 2: Proposed Action – New Intake, Lower Current Intake and Add Hot Water Heater, Sediment Removal</u>

<u>Alternative 3: Infiltration Gallery, Lower Current Intake and Add Hot Water Heater, Remove Sediment</u>

The cultural resources survey examined approximately 73 acres and identified four historic sites: two irrigation ditches (24YL0171 and 24YL0172) and two historic homesteads (24YL1991 and 24YL1992). Only one site, 24YL1992, is recommended eligible for National Register listing. The site will be avoided by placing the transmission main on the opposite side of the ditch from the recommended eligible historic farmstead. See Figure 20 below showing the locations of the historic farmsteads. Figure 21 and Figure 22 show photos of sites 24YL1991 and 24YL1992, respectively.

The proposed alignment of the transmission main requires crossing the historic Canyon Creek Ditch (site 24YL0171) in three separate locations and crossing the historic Clark Fork Ditch (site 24YL0172) in one location. The crossings are necessary to maintain distance from the Yellowstone River, for necessary installation space, and to avoid the newly identified historic sites. It is proposed to construct the crossings utilizing traditional open trench excavation when the ditches are not in use. Upon completion of construction the areas will be restored to their original condition.

The cultural resources survey report along with comments and concurrence from the MT SHPO are included in Appendix O for reference. There will be no long term adverse impacts due to construction or use of the transmission main or other project components.

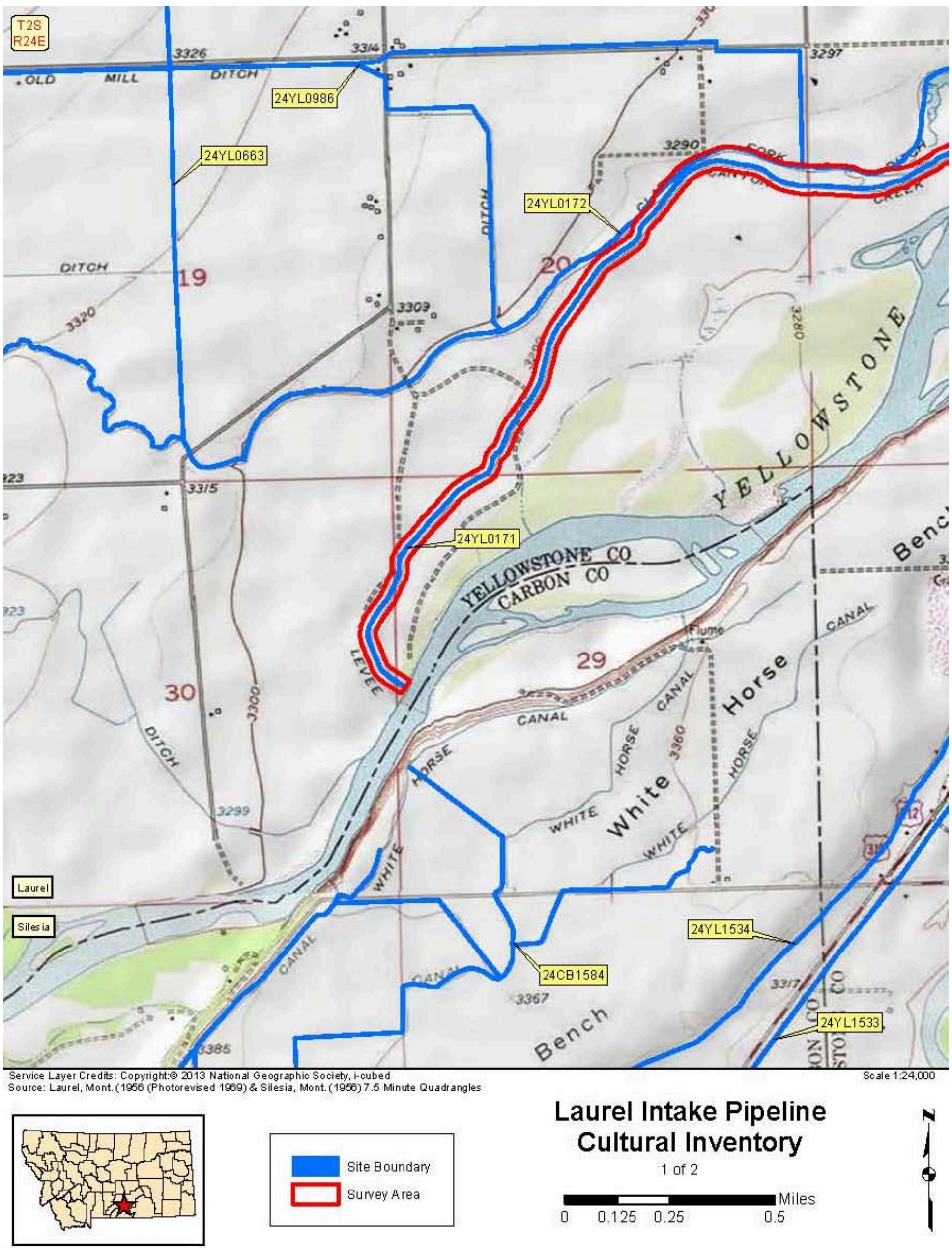

Figure 19: Cultural Sites Map, 1 of 2

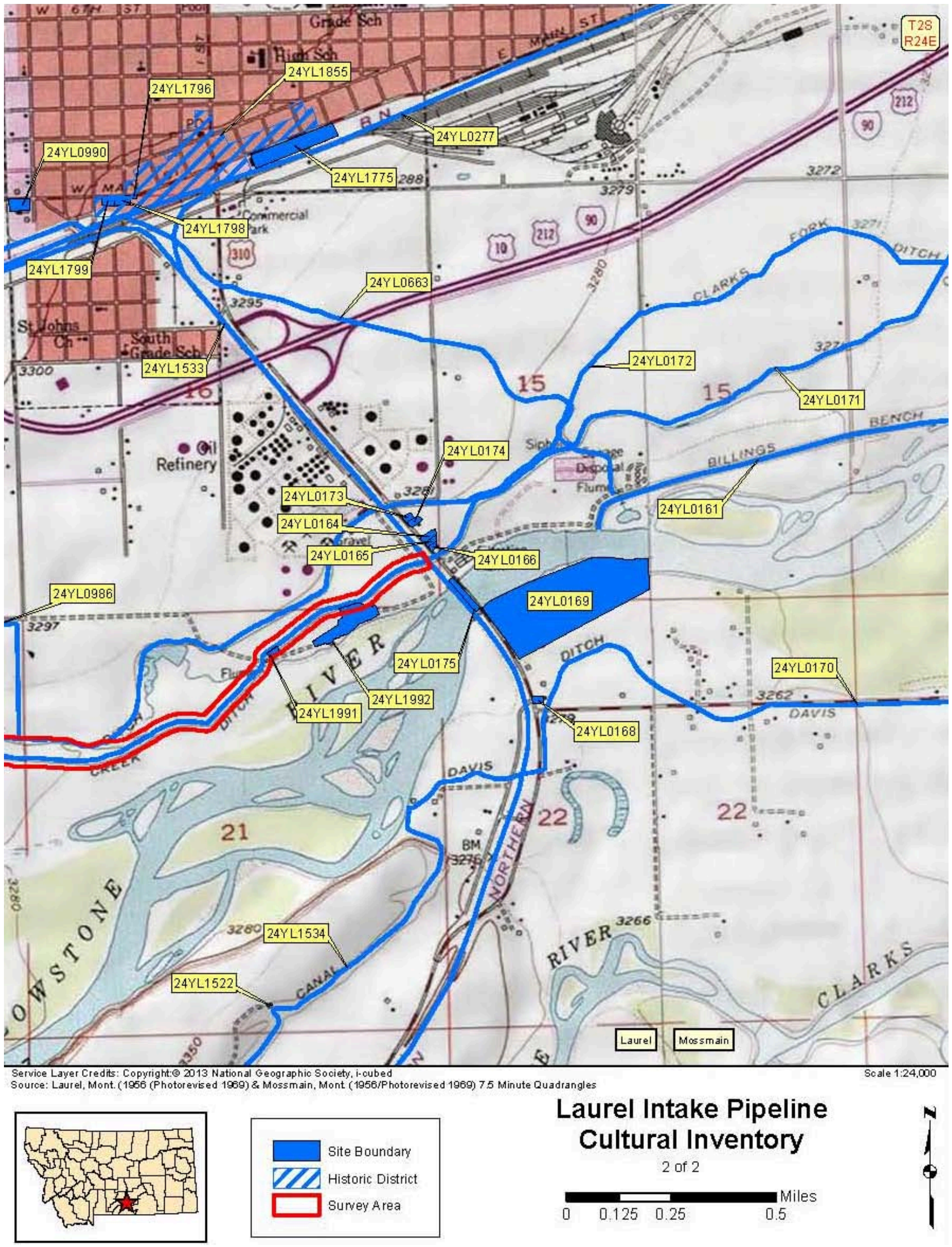

Figure 20: Cultural Sites Map, 2 of 2

Figure 21: Site 24YL1991

Figure 22: Site 24YL1992

4.11.2 Archeological Resources

Alternative 1: No Action

Alternative 2: Proposed Action – New Intake, Lower Current Intake and Add Hot Water Heater, Sediment Removal

Alternative 3: Infiltration Gallery, Lower Current Intake and Add Hot Water Heater, Remove Sediment

Alternative 4: Lower Current Intake and Add Hot Water Heater, Construct W-Weir, Replace Intake Pumps, and Remove Sediment

No adverse impacts.

4.12 CUMULATIVE IMPACTS

Cumulative impacts are those effects on the environment that result from the incremental effect of the action when added to past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time.

Alternative 1: No Action

The No Action alternative would have negative impacts in a number of the assessment categories. The cumulative impacts of this alternative are related to public health and safety and public services. By taking no action the City would continue to be impacted by the uncertainty related to lateral migration of the river, floods and droughts which could all potentially affect the submergence of the intake structure and its capacity. This could result in frequent or long term water restrictions, the need for emergency construction within the river, and possibly the inability to serve all of the City's customers – residential and industrial.

Alternative 2: Proposed Action – New Intake, Lower Current Intake and Add Hot Water Heater, Sediment Removal

The cumulative impacts for this alternative involve public health and safety as well as public services. However, unlike the no action alternative these cumulative impacts have a long term beneficial effect on the City's ability to provide water to their customers. No long term, negative cumulative impacts have been identified in the various assessment categories. In general the affects to the various environments considered are limited to the construction period and can be mitigated through the implementation of Best Management Practices as appropriate. Once construction is complete the proposed project is passive in nature.

Alternative 3: Infiltration Gallery, Lower Current Intake and Add Hot Water Heater, Remove Sediment

The cumulative impacts of this alternative are generally the same as Alternative 2 the Proposed Action Alternative, with the exception of municipal water rates. This alternative involves significantly more investigation and construction than the Proposed Action and thereby will cost more money to complete. The long term, cumulative effect of that cost would be the impact to user rates should loans be necessary to complete the project.

Alternative 4: Lower Current Intake and Add Hot Water Heater, Construct W-Weir, Replace Intake Pumps, and Remove Sediment

The cumulative negative impacts of this alternative are primarily related to the necessity of installing a W-weir along with the intake construction in order for the alternative to effectively meet the purpose and need stated. Without a structure present to control the lateral and vertical stability of the river, the alternative would NOT meet the purpose and need of the project.

The cumulative negative impacts associated with the W-weir include the following;

1. Geology and soils – the weir would require maintenance on a regular basis. The Yellowstone River is known to transport large amounts of sediment, trees, and other debris during runoff events and also have large ice jams in the winter months. All of these things have the potential to negatively impact the weir and result in needed maintenance.
2. Floodplain Encroachment – the presence of a weir will have an adverse effect on the Base Flood Elevation.
3. Recreation – the presence of a structure spanning the river will obviously impact recreation. While design of the weir would ensure that passage for boats was built into the structure, it would be more restrictive than the current situation.
4. Water Quality/Water Resources – the presence of a weir and the maintenance it will require has to potential to have long term affects on the water quality of the river. While the weir would be designed for sediment flow, it is still possible that it could impact upstream sedimentation of other unforeseen affects. The section of river up and downstream of the current intake has seen extensive lateral movement and sedimentation

over the past 50 years and it is difficult to predict precisely how a permanent structure across the river would affect water quality and the water resource.

5. Wetlands – any negative impacts to wetlands would be associated with sedimentation as outlined in item #4.
6. Threatened and Endangered Species – Potential impact to fisheries

In addition to the cumulative impacts discussed above, this alternative is unique to this environmental discussion in that the W-weir portion of the alternative has been discussed with regulatory agencies extensively for over a year. Throughout that discussion a number of specific concerns and comments from numerous environmental agencies were received. The W-weir is an essential part of Alternative 4 in order to meet the purpose and need of the project. For that reason excerpts of the comments received regarding the W-weir are included below for reference. (The comments in their entirety are included in Appendix D.)

- February 25, 2013: Alternatives Prescreening Analysis was distributed for review to project stakeholders and environmental agencies. <u>The W-weir was identified as the preferred (chosen) alternative in the analysis.</u> The following are selected quotes from the comments received:

  "Unfortunately, in my opinion, the use of weirs in large unstable river channels that carry substantial large woody debris and bedload with additional "ice jam" issues, provide too much uncertainty and risk to be considered…The bottom line is - these type of structures are very risky. In unstable systems that carry excessive bedload and large woody debris, coupled with the potential for ice jams, present considerable uncertainty and risk. Also, in consideration of long-term maintenance issues (grouted or un-grouted rock) and possible fish and boater passage problems, the use of weirs, or any in-stream river training structure, should probably not be considered."
  -*Jeff Ryan, Montana DEQ*

  "I was disappointed that all the alternatives that made the final list include some kind of weir across the entire river…Any structure across the river is going to slow flows and cause deposition upstream of the structure. We are already having serious problems with sediment deposition under the bridges. If a structure causes the river to aggrade in the vicinity of the bridges it will put more pressure on the river to migrate laterally which I would expect to greatly increase pressure against the railroad and roadway on the south side of the river. Another concern with constructing any type of weir in this section of the river would be ice jamming. This section of river is already prone to some serious ice jams. Building any structure across the river here could increase the potential of large ice jams forming which could potentially push the river out of its natural channel, flooding

the water treatment plant if not even more of Laurel…From both a permitting and a fisheries and recreational standpoint I do not feel alternative 3 is a feasible alternative. Putting another "dam" across the Yellowstone River is not acceptable."
-*Ken Frazer, Regional Fisheries Manager, Montana Fish, Wildlife and Parks*

"Assuming the W-weir is the City's preferred option, BNSF is still concerned with the potential impact this construction could have on our operations. Specifically, our concerns are with the potential increase in ice jamming severity and frequency, potential for additional sediment and debris accumulation within our bridge opening, and potential for unintended post-construction vertical/lateral stream instabilities issues."
-*Kasie Holle, Mgr. Structures Design, BNSF Railway*

"Please understand that cross-channel structures on the interstate and navigable Yellowstone River are among the least permittable types of structures, and from a permitting standpoint they should represent the last possible courses of action and not the preferred alternative, especially when there are alternatives that would result in less adverse impact on the Yellowstone River…We believe lowering the intake to regain the cover should be evaluated in more detail and in combination with an additional intake source."
-*Todd Tillinger, Montana Program Manager, USACE*

"We do suggest that weir type structures be avoided as a part of the solution to the water supply problem. We suggest further exploration and analysis of a combination of the alternatives be presented to see if a combination is practicable and less environmentally damaging."
-*Jim Berkley, Water Resources Engineer, USEPA*

In summary, the cumulative impacts of Alternative 4 are identified not only in this EA but have also been identified in other agency review. The beneficial impacts of this alternative are less than those of Alternatives 2 or 3 as they are seen only as relates to public health and safety. The negative impacts discussed outweigh the beneficial impacts.

4.13 SUMMARY

Table 6: Summary of Impacts

Assessment Category	**#1 – No Action Alternative**	**#2 – Proposed Alternative New Intake, Lower Current Intake & Hot Water Heater, Sediment Removal**	**#3 – Infiltration Gallery, Lower Current Intake & Hot Water Heater, Sediment Removal**	**#4 – Lower Current Intake & Hot Water Heater, W-weir, Lower Pumps, Sediment Removal**
Geology & Soils	Minor (4.1)	Minor (4.1)	Moderate (4.1)	Moderate/Major (4.1)
Land Use & Planning				
Zoning	No Impact	No Impact	No Impact	No Impact
Prime Farm Land	Minor (4.2.2)	No Impact	No Impact	No Impact
Floodplain Encroachment	No Impact	Minor (4.2.3)	No Impact	Moderate (4.2.3)
Public Health & Safety	Moderate/Major (4.3)	***Major Beneficial (4.3)***	***Major Beneficial (4.3)***	***Beneficial (4.3)***
Recreation	Impact (4.4)	***Moderate Beneficial (4.4)***	***Moderate Beneficial (4.4)***	Moderate (4.4)
Socio Economic Issues				
Environmental Justice	No Impact	No Impact	No Impact	No Impact
Municipal Water Rates	Moderate (4.5.2)	Moderate (4.5.2)	Moderate (4.5.2)	Moderate (4.5.2)
Air Quality & Climate	No Impact	Minor (4.6)	Minor (4.6)	Minor (4.6)
Noise	No Impact	Minor (4.7)	Minor (4.6)	Minor (4.7)
Public Services &Utilities	Major (4.8)	No Impact	No Impact	No Impact
Water Quality – Water Resources	Minor (4.9)	Minor (4.9)	Minor (4.9)	Moderate/Major (4.9)
Biological Resources				
Wetlands	Minor (4.10.1)	Minor (4.10.1)	Minor (4.10.1)	Moderate (4.10.1)
Threatened or Endangered Species	No Impact	Minor (4.10.2)	Minor (4.10.2)	Minor/Moderate (4.10.2)
Cultural Resources				
Historical Properties	No Impact	Minor (4.11.1)	Minor (4.11.1)	No Impact
Archeological Resources	No Impact	No Impact	No Impact	No Impact

Note: Impacts are assumed to be adverse unless specifically identified as beneficial.

SECTION 5 - AGENCY COORDINATION, PUBLIC INVOLVEMENT, PERMITS

Various agencies have been consulted and contacted before and during the preparation of this draft EA. See Appendix D for agency correspondence.

Federal Agencies

DHS/FEMA
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish & Wildlife Service

State, County, and Local Agencies

City of Laurel
Montana Department of Environmental Quality
Yellowstone County
Montana Department of Transportation
Montana Fish, Wildlife, & Parks
State Historic Preservation Office
Montana Department of Natural Resources & Conservation
Montana Natural Heritage Program

Public notices for the EA were posted in the Laurel Outlook on 7/23/2014, 7/30/2014, 8/6/2014, and 8/13/2014. The draft EA was available for review for a period of twenty five (25) days at the City of Laurel Town Hall. The draft EA was also available online at the following web addresses:

- http://www.fema.gov/plan/ehp/envdocuments/index.shtm
- www.greatwesteng.com....
- Laurel.mt.gov….

The public was invited to comment on the proposed action and the draft EA. At the end of the public comment period, FEMA will review the received comments, consider adjustments to the Final EA, and use the comments in the decision-making process before notifying the public of its final determination. A notarized copy of the public notice and public meeting agenda(s) are included in Appendix P for reference.

SECTION 6 - LIST OF PREPARERS

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- Great West Engineering, Inc.
  P.O. Box 4817, 2501 Belt View Drive, Helena, MT 59604
  (406) 449-8627

SECTION 7 - REFERENCES

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