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RESEARCH  
CENTER

**Flathead Indian Irrigation Project**  
*Mission H Canal Modernization*

**U.S. Bureau of Indian Affairs**  
**Branch of Irrigation & Power**

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## MISSION H CANAL MODERNIZATION

### *Existing Conditions*

Figure 1 on the next page shows the existing layout and conditions of the Mission H Canal. The Mission H Canal diverts water from Mission Creek to service approximately 270 acres in two separate areas over its total canal alignment of approximately 7.9 miles. According to tribal records, approximately 10 CFS on average is diverted into the Mission H Canal.

The Mission H Canal does not appear to be easily managed and experiences the following operational problems:

- The diversion structure is not easily accessible.
- The canal is very long for the amount of acreage it services.
- The canal runs along a winding hillside side and has experienced two canal breaks in the past 20 years.
  - The canal does not appear to be easily accessible.
  - The canal breaks had occurred near the National Bison Park.
- The irrigated fields are located in the first and last two miles of the Mission H Canal.
- There is a long section of canal where no turnouts appear to service any acreage or fields have been idle for several consecutive years. Many of the turnouts appear to be piped under the highway and railroad tracks in order to service fields near the Flathead River.
- There appears to be a significant amount of seepage from the canal.

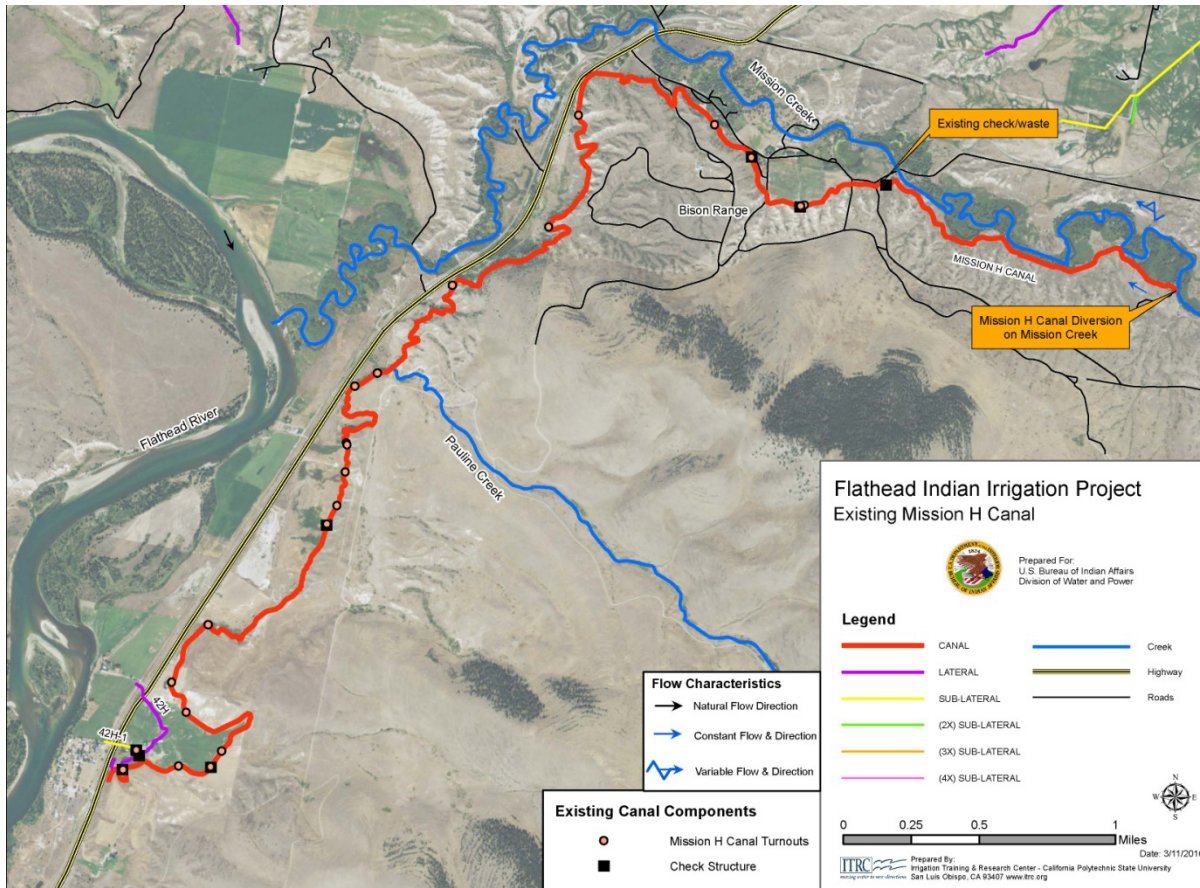


Figure 1. Existing conditions for the Mission H Canal

## Modernization Plan

The modernization changes to the Mission H Canal will focus on the following:

- Improving safety and easing management of the canal system for operators
- Reducing diversions from the river
- Improving water delivery service to farmers

**Figure 2** shows the modernization changes to the Mission H Canal system. The modernization changes will include the following:

1. The Mission H Canal will be broken into two separate areas that will each be serviced by a new VFD pump and pipeline.
  - a. The first pump and pipeline will be supplied from Mission Creek to service approximately 45 acres in the National Bison Range.
  - b. The second pump and pipeline will divert water from the Flathead River to service approximately 225 acres along Highway 212 near the tail end of the Mission H Canal.
2. Long portions of the Mission H Canal will be abandoned.
3. SCADA will be utilized to remotely monitor the pump operating characteristics.

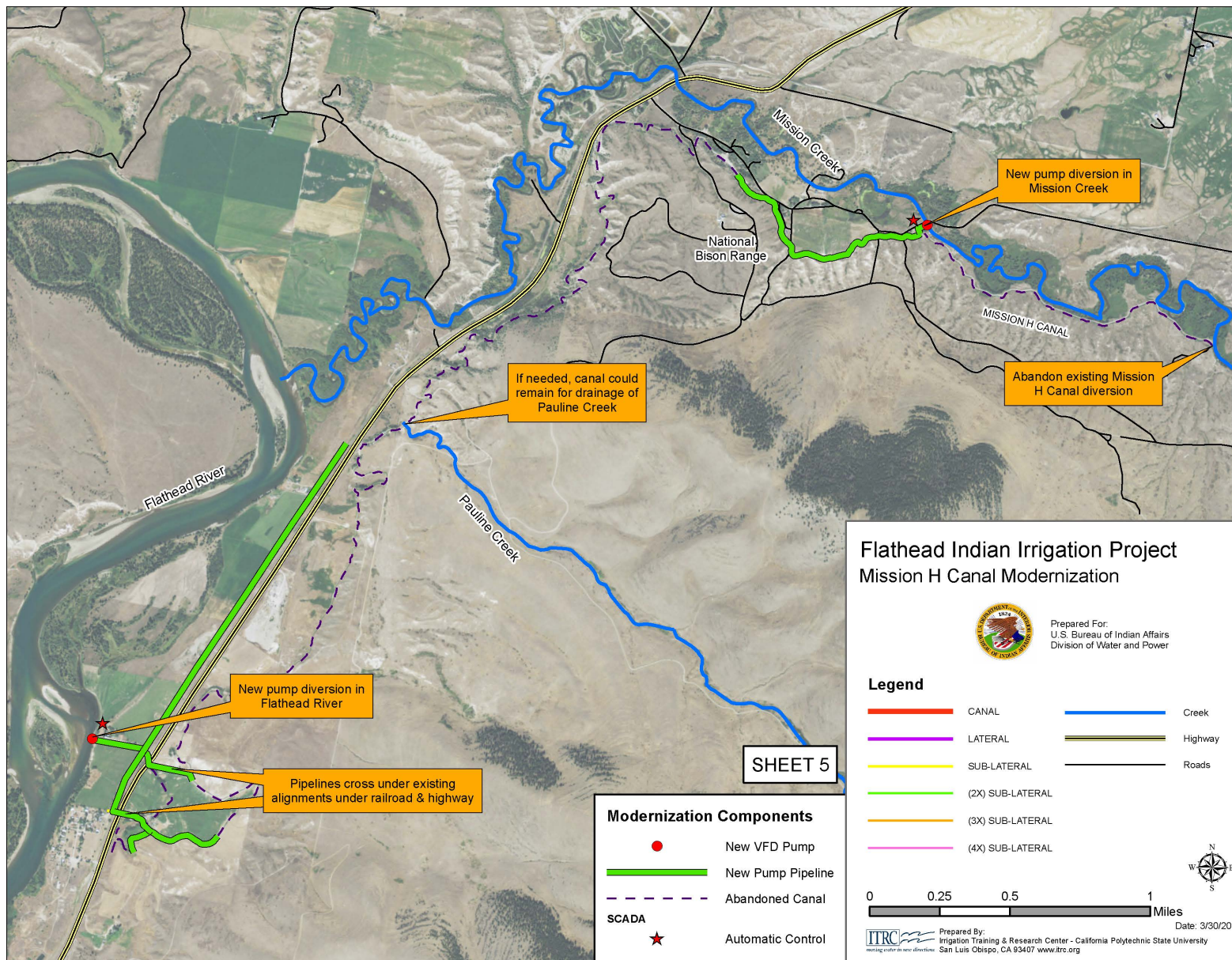
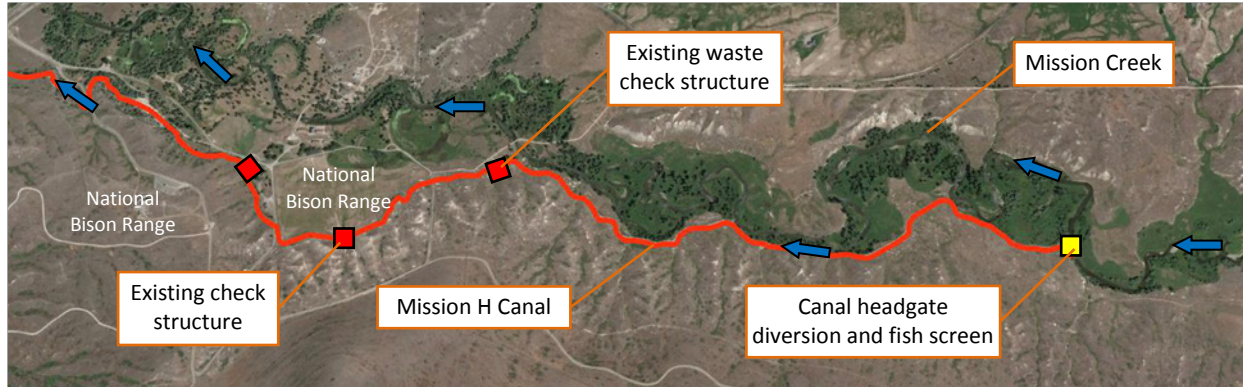


Figure 2. Overview of modernization changes to the Mission H Canal

### Mission Creek Pump

Figure 3 shows approximately the first two miles of the Mission H Canal. The first few turnouts service approximately 45 acres of the National Bison Range.



**Figure 3. First two miles of the Mission H Canal from the diversion on Mission Creek to the National Bison Range (existing)**

Figure 4 through Figure 6 show the Mission H Canal diversion, headgate, and fish screen. Approximately 10 CFS is diverted into the Mission H Canal on average from Mission Creek. From the photos, it appears the diversion dam is not capable of easily passing debris. The buildup of debris and varying in-stream flows in the creek most likely cause the flow rate in the Mission H Canal to constantly vary



**Figure 4. Existing Mission H Canal diversion on Mission Creek. Photos from HKM 2008 report (HG-55).**



**Figure 5. Existing Mission H Canal headgate. Photo from HKM 2008 report (HG-55).**



**Figure 6. Fish screen installed downstream of the Mission H Canal headgate. Photo from HKM 2008 report (HG-55).**

The first 1.5 miles of the Mission H Canal is only used for conveyance. The canal runs along a steep hillside and has experienced breaks in the past 20 years.

Figure 7 and Figure 8 show the existing waste check structure in the Mission H Canal located approximately 1.3 miles downstream from the canal diversion. Excess flows spill back to Mission Creek.





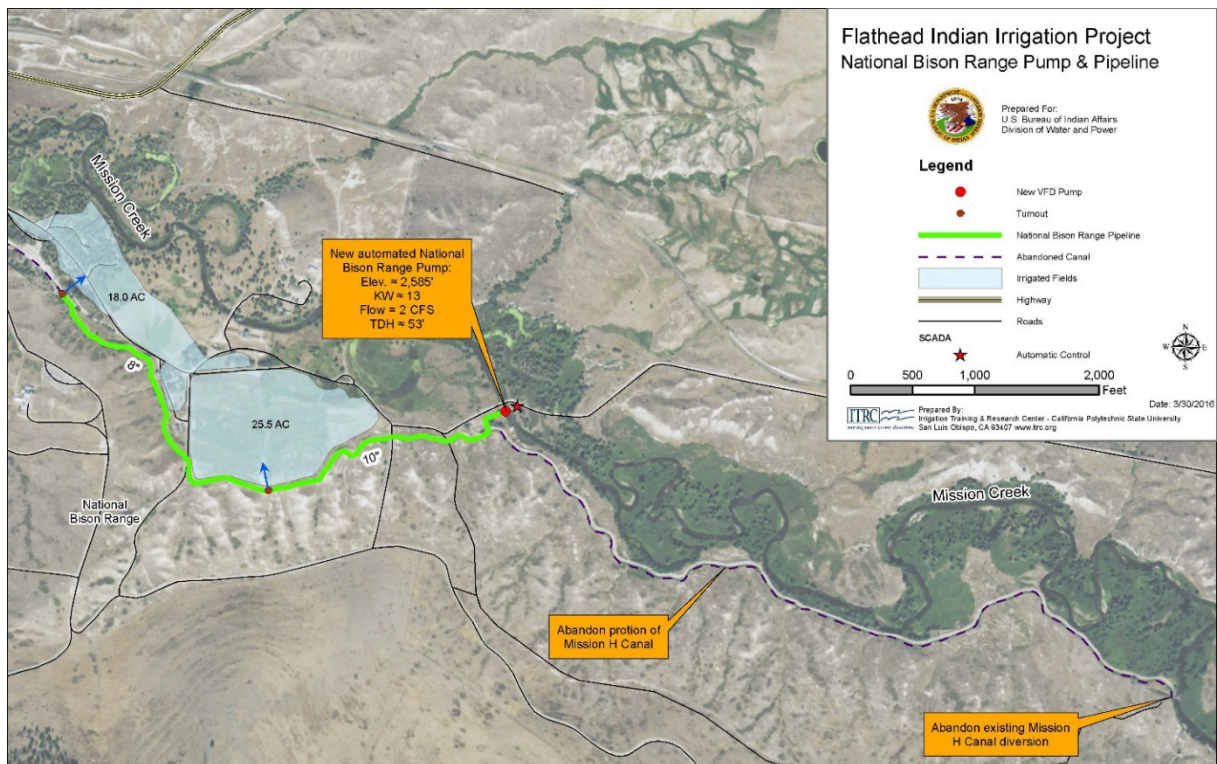
**Figure 7. Mission H Canal at the existing waste check structure located approximately 1.3 miles downstream from the canal diversion**



**Figure 8. Existing check waste in the Mission H Canal approximately 1.3 miles downstream from the canal diversion. Photos from HKM 2008 report (CW-29).**

## **Bison Range Pump Design**

Figure 9 and Figure 10 show the conceptual layout of a new pump and pipeline to deliver water to the National Bison Range.



**Figure 9. New pump and pipeline to service the National Bison Range**

The major components of the pump and pipeline design include:

1. A rock dam will be installed in Mission Creek just downstream of the new VFD pump in order to raise the upstream water level enough in the creek to provide the necessary submergence for the pump.
2. A new VFD equipped pump (see Table 1 for pump characteristics) will be installed in Mission Creek just upstream of the N Road bridge crossing. The assumptions listed in the sketches and the table are that it will be a low pressure system, and will not provide enough pressure for sprinklers or drip.
3. A cylindrical screen, such as sold by Lakos (Plum Creek screen), Morrill Industries, or Intake Screens Inc. would be used in the Creek, upstream of the pump intake to remove trash and prevent the intake of fish. It must be installed so that creek water continuously moves past it, to carry away the trash.
4. A new 10" pipeline will run up the hillside to the Mission H Canal (see Table 2 for the pipeline summary). The pipeline will then follow the existing alignment of the canal to service the existing turnouts for the National Bison Range.
5. The Mission H Canal diversion and the first 1.3 miles of the Mission H Canal will be abandoned. The Mission H Canal will also be abandoned after the last turnout to the National Bison Range.
6. SCADA will be used to remotely monitor the operating characteristics of the VFD pump (on/off, flow, speed, temperature, etc.).



Figure 10. Location of new pump in Mission Creek to service the Nation Bison Range

Table 1. Approximate pump characteristics for the National Bison Range Pump

Pump	Elevation <sup>1</sup> (ft.)	Gross Electric KW	Max Flow (CFS)	Total-Dynamic Head (TDH in ft.)
Bison Range Pump in Mission Creek	2,585	13	2	53

<sup>1</sup> Elevation at last turnout ≈ 2,604'; elevation at highest point ≈ 2,610'

Table 2. Pipe characteristics for the National Bison Range Pump Pipeline

PVC Pipe Size <sup>1</sup> (in)	Approx. Pipe Length (ft.)
8	2,700
10	2,300

<sup>1</sup> Pipe is PIP PVC with pressure rating of 100 psi.

### Lower Mission H Pump

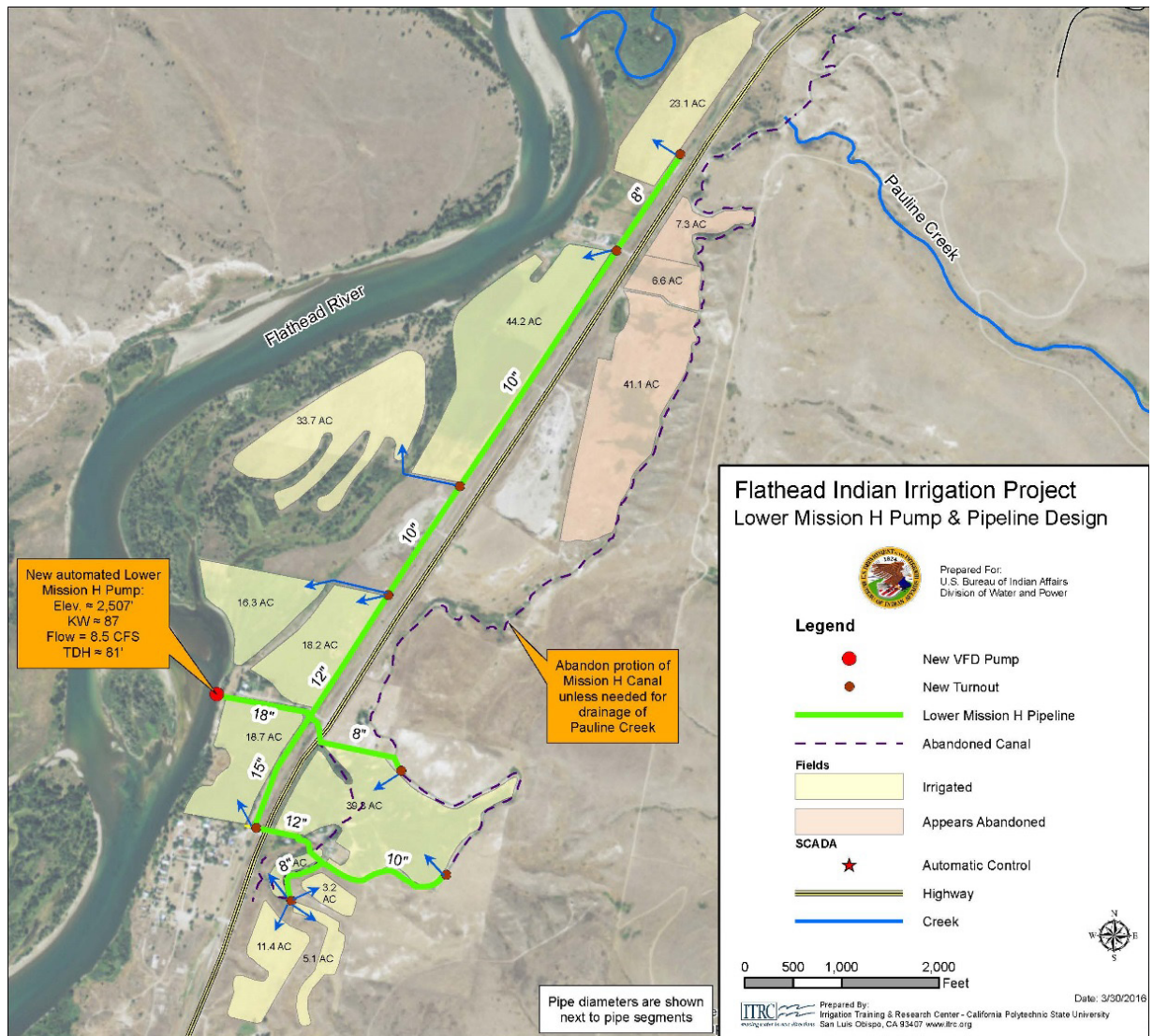
Figure 11 shows the existing conditions of the last three miles of the Mission H Canal. Many of the turnouts along the Mission H Canal service fields west of Highway 212. It is unknown how much if any flow discharges into the Mission H Canal from Pauline Creek.



Figure 11. Existing conditions near the end of the Mission H Canal

**Lower Mission H Pump and Pipeline Design**

Figure 12 and Figure 13 show the conceptual design for a new pump and pipelines to service the approximately 225 acres near the end of the Mission H Canal. Water will be pumped from the Flathead River using a VFD-equipped pump to three individual pipeline branches. Two of the pipeline branches that cross under Highway 212 will follow the existing alignment of Laterals 42H and 42H-1. The third pipeline will parallel Highway 212 and the existing railroad tracks to service the majority of the irrigated fields.



**Figure 12. Lower Mission H pump and pipeline design**



**Figure 13. Approximate location for the new Lower Mission H Pump**

Table 3 and Table 4 contain the summary of the pump and pipeline design characteristics for the Lower Mission H Pump and Pipeline system.

**Table 3. Approximate pump characteristics for the Lower Mission H Pump**

Pump	Elevation (ft.)	Gross Electric KW	Max Flow (CFS)	Total-Dynamic Head (TDH in ft.)
Lower Mission H Pump in Flathead River	2,585	87	8.5	81

**Table 4. Pipe characteristics for the Lower Mission Pump Pipelines**

PVC Pipe Size <sup>1</sup> (in)	Approx. Pipe Length (ft.)
8	3,100
10	5,700
12	2,300
15	1,300
18	1,000

<sup>1</sup> All pipe is PIP PVC. 80 psi for 15 in. 100 psi for other diameters.