Official Submission to OWRD

April 2018

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**AGRICULTURAL  
WATER MANAGEMENT AND   
CONSERVATION PLAN**

**Executive Summary**

The Hermiston Irrigation District (HID or District) is submitting this Agricultural Water Management and Conservation Plan (WMCP or Plan) in accordance with OAR Chapter 690 Division 86 and the Reclamation Reform Act of 1982.

The Reclamation Reform Act, Section 210 states that each district that has entered into a repayment contract or water service contract pursuant to federal reclamation law shall develop a water conservation plan which shall contain definite goals, appropriate water conservation measures, and a time schedule for meeting the water conservation objectives.

This Plan will examine existing water management practices, evaluate alternative water management strategies, implement appropriate water conservation measures, review water resource planning and provide support for water use applications.

This Plan was developed to satisfy the three principals: the water users, the State of Oregon, and the Federal government. This Plan follows the guidelines and criteria established by Oregon Water Resources Department (OWRD) and the United States Bureau of Reclamation (USBR).

**General Description**

**History**

Congress passed the Reclamation Act in 1902 to boost development of the arid West. In 1903 the USBR began investigating the possibility of irrigating lands along the lower Umatilla River by gravity flow. During 1903 and 1904 the Umatilla River and its tributaries were surveyed and the most feasible reservoir sites were mapped. Subsequent investigations were made to find a reservoir site on the irrigable lands east of the Umatilla River. These studies resulted in the establishment of the Umatilla Project and identification of the Cold Springs Reservoir site.

The original Umatilla Project was authorized in 1905. Most facilities were constructed between 1906 and 1927 to supply water to a total of about 30,000 acres. HID is one of the four districts that make up the Umatilla Project. HID was originally designed to supply water through a network of canals and pipelines to nearly 25,000 acres. The sources of water were the Umatilla River and Cold Springs Reservoir. Construction of HID’s facilities began in 1906. The first water delivery from Cold Springs Reservoir was made on March 8, 1908.

In 1988, Congress passed the Umatilla Basin Project Act authorizing a series of water exchange systems. Water from the plentiful Columbia River would irrigate project lands in exchange for leaving an equal amount of water in the Umatilla River for the purpose of instream flow enhancement. Reclamation phased in construction of the facilities, bringing the water exchange to life in 1993. BPA provides the electricity to pump the exchange water; rate payers pay the pumping costs.

These activities also resulted in Umatilla River channel modifications, construction of fish ladders, fish traps and fish screens, and the construction of water exchange facilities (Phase I and Phase II) to deliver irrigation replacement water from the Columbia River. The exchange remains successful today in irrigating crops while improving the Umatilla River fish habitat.

In 1997 the USBR performed Safety-of-Dams work on Cold Springs Dam. This work included building a new spillway, modifying the toe, and installing monitoring wells.

**Climate**

The Hermiston area has a temperate, mild and semiarid climate. The Canadian Rocky Mountains partly shield the area from strong arctic winds, so winters are generally not too severe, though cold. In summer, winds from over the Pacific Ocean are partially blocked by the Cascade Mountains. Days are hot, but nights are typically cool. Being in the rain shadow of the Cascade Mountains, precipitation is light during the summer.

Average annual precipitation is about 10.5 inches, with only about 1.12 inches falling during the months of June, July and August. Fall rains typically begin in October, with light snow during December, January and February. March, April and May see rain showers. Thunder storms during the summer months are often accompanied by heavy rains and lightning. However, these storms are infrequent, brief, and with typically narrow storm paths, thus preventing any significant amounts of overall soil moisture. Many times, the lightning is unaccompanied by rain. Summertime high temperatures typically exceed 90°F and can regularly exceed 100°F.

**Soils**

HID has soils that formed in eolian (wind deposited) sand, loess (wind deposited fines), alluvium (water deposited materials) and lacustrine (material originally deposited at the bottom of a lake) sediment on terraces of the Columbia River. Along the southern edge of HID soils are deep, well to excessively drained, formed by eolian sand, gravelly alluvium, and lacustrine sediments. Along the norther end of HID, soils range from deep to shallow, are well to excessively drained, formed by eolian and loess with occasional rock outcrops. Through the middle of HID, soils are deep, excessively drained, formed by eolian sand and gravelly alluvium.

There are six primary soil series found within the HID as indicated in the USDA published Soil Survey of Umatilla County Area, Oregon; Adkins, Burbank, Quincy, Sagehill, Starbuck, and Winchester. For these soil series permeability rates are moderate to high ranging from 2.0 to 20.0 inches per hour and soil moisture holding capacities are moderate to low ranging from 0.21 to 0.04 inches per inch. As a rule, runoff is slow and the hazard of water erosion is slight, but the hazard of soil blowing is very high if the surface is cultivated and left bare.

Elevations across the HID range from 400 to 620 feet (MSL). The majority of the area is relatively flat with slopes of 0 to 5 percent. Some areas have slopes of up to 25 percent. The areas of steeper slopes are typically in permanent pasture.

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| --- | --- | --- | --- |
| **WMCP Item** | | **Section** | **Page** |
| **Section 1: System Description – OAR 690-086-0240** | | |  |
|  | Summary of Water Rights | 1.1 | 4 |
|  | Sources of Water; Storage and Regulation Facilities; Exchange Program | 1.2 | 6 |
|  | Schematics of the System | 1.3 | 11 |
|  | Total Annual and Peak Diversions, Reservoir Storage, Reuse and Return Flows | 1.4 | 15 |
|  | Classification of User Accounts | 1.5 | 19 |
|  | Classification of Irrigations Systems | 1.6 | 19 |
|  | Commonly Grown Crops and Methods | 1.7 | 19 |
|  | Operations and Maintenance | 1.8 | 22 |
| **Section 2: Water Conservation Element – OAR 690-086-0250** | | |  |
|  | Progress Report on Previous Measures | 2.1 | 24 |
|  | District’s Water Measurement Program | 2.2 | 24 |
|  | Other Conservation Measures Currently Implemented | 2.3 | 25 |
|  | District Goals for Improving Water Conservation and Management | 2.4 | 26 |
|  | Opportunities for Improving Water Use Efficiency | 2.5 | 27 |
|  | Evaluation of Water Conservation Measures | 2.6 | 31 |
|  | Schedule for Implementation of the Conservation Measures | 2.7 | 35 |
|  | Program for Monitoring and Evaluation of Conservation Measures | 2.8 | 35 |
| **Section 3: Water Allocation/Curtailment Element – OAR 690-086-0260** | | |  |
|  | Frequency and Magnitude of Past Supply Deficiencies | 3.1 | 36 |
|  | Criteria for Implementation of Water Allocation /Curtailment Element | 3.2 | 36 |
|  | Procedure for Allocating Water During Shortages | 3.3 | 37 |
| **Section 4: Water Supply Element – OAR 690-086-0270** | | |  |
|  | Long Range Water Demand Projections | 4.1 | 38 |
|  | Projected Water Needs and Reliability of Water Rights | 4.2 | 38 |
|  | Potential Water Sources | 4.3 | 38 |
|  | Comparison of Potential Water Sources | 4.4 | 38 |
|  | Evaluation of the Effects of Long Range Water Needs | 4.5 | 39 |
| **Section 5: Additional Requirements – OAR 690-086-0225** | | |  |
|  | List of Affected Governments, Copy of Comments | 5.1 | 39 |
|  | Submittal of Updated Plan, Implementation Schedule | 5.2 | 39 |
| **Exhibits** | | |  |
|  | Certificate 89006 - Right to Use Waters of the Umatilla River and Cold Springs Reservoir (first three pages) | A | 46 pgs |
|  | Certificate 87137 - Right for Irrigation Storage in Cold Springs Reservoir | B | 2 pgs |
|  | Permit S-54846 – Permit for Irrigation of 277.3 acres from Cold Springs Reservoir | C | 3 pgs |
|  | Permit S-51439 – Permit to use waters of the Columbia River for Umatilla River Instream Flow Enhancement through an Exchange with Irrigation Water from the Umatilla River | D | 2 pgs |
|  | List of the Affected Local Governments and a Copy of Comments from said Entities | E | 1 pg |

**SECTION 1: SYSTEM DESCRIPTION - OAR 690-086-0240**

**Location**

Hermiston Irrigation District (HID) is located East of the Willamette Meridian (E.W.M.), in the State Oregon, County of Umatilla, and surrounding the City of Hermiston. The District lies within Township 4 North, Range 28; Township 4 North, Range 29; Township 5 North, Range 28; and Township 5 North, Range 29.

The irrigated lands are located in the Umatilla Basin and extend west from Cold Spring Reservoir, through the City of Hermiston, to the Umatilla River. HID is bordered on the north by Highway 730 and the south by Feedville Road. The land slopes west from Cold Springs Dam, which is at 615 feet above sea level. The A-Line Canal flows west from Cold Springs Reservoir until it reaches the Maxwell Canal near the Umatilla River. The Maxwell Canal can then pick-up the excess A-Line tail water and re-directs flows east, almost parallel to the A-Line.

**Section 1.1: Summary of Water Rights – OAR 690-086-0240(1)**

HID’s legal irrigation season is March 1 to November 1, year-round for stored water. The water rights for HID are held under the name of the USBR and include diversions at Feed Canal Diversion Dam to Cold Springs Reservoir and at Maxwell Diversion Dam from the Umatilla River.

This right was confirmed by decree of the Circuit Court of the State of Oregon for Umatilla County. The decree is on record in Salem, in the Order Record of the Water Resources Director, in Volume 3, Page 127, as modified in re: Water of Umatilla River, 88 OR 376. That decree was certificated under the name of the USBR on December 12, 2013 in Certificate Number 89006 for the right to use the waters of the Umatilla River and Cold Springs Reservoir for irrigation.

The maximum flows were based on 1/40th cubic feet per second (cfs) per acre for course textured soils and 1/80th cfs for fine textured soils. The water duty is allocated according to Certificate 89006.

HID operates and maintains Cold Springs Reservoir and Dam for the USBR. Water is held in Cold Springs Reservoir via Storage Certificate Number 87137.

HID also delivers 831.9 acre-feet to 277.3 acres of land under Permit No. S-54846 from Cold Springs Reservoir with a priority date of June 14, 2013 under the name of the USBR.

HID participates in the Bureau of Reclamation’s Umatilla Basin Project. Per Permit No. S-51439, HID has the right to use the waters of the Columbia River for Umatilla River instream flow enhancement through an exchange with irrigation water from the Umatilla River. The priority date of this Permit is February 14, 1991. The use is limited to not more than 240 cfs measured at the point of diversion for use by Hermiston and Stanfield Irrigation Districts.

HID was organized for the purpose of supplying irrigation water for farm crops. The water quality and district facilities are not suitable for domestic use, raising of fish, or for industrial or commercial use. Because of the types of crops grown within the HID and the period of water deliveries, presently no water is used for other uses such as frost protection and crop cooling.

The State of Oregon issued Certificate of Water Right Number 89006 confirming the right for the USBR to use waters of the Umatilla River, a tributary of the Columbia River as listed below. A copy of Certificate 89006 is attached to this Plan as Exhibit A:

**Certificate 89006**

**Issued to** United States Bureau of Reclamation, Pacific Northwest Region

**Source** Umatilla River at the Feed Diversion, Maxwell Diversion & Cold Springs Reservoir

**Priority** November 14, 1894 for 4.00 acres & February 25, 1904 for 4,003.37 acres from the Umatilla River through the Maxwell Canal; September 6, 1905 for 5,557.83 acres through the Feed Canal and Cold Springs Reservoir; and supplemental irrigation of 9,565.80 from the Umatilla River through the Feed Canal and Cold Springs Reservoir. The waters may be used jointly and interchangeably.

**Rate** 0.10 cfs under priority date November 14, 1894 & 77.60 cfs under priority date February 25, 1904, or its equivalent in case of rotation, measured at the point of diversion from the source; and up to 50,000 ac-ft. of storage from Cold Springs Reservoir. The Watermaster may, at discretion, allow an increased diversion for actual seepage and evaporation, as determined by the Watermaster, but in no case is it to exceed 20 percent.

**Duty** 3,288.48 acres were perfected on lands comprised of loam or fine sand or fine textured soil at 3 ac-ft/acre (total of Primary and Supplemental) and 6,277.32 acres were perfected on lands comprised of course sand or loose gravel subsoil or loose coarse textured soil at 6 ac-ft/acre (total of Primary and Supplemental). Therefore, based upon the relative number of acres of each soil type, the total duty of water applied in any season to these lands shall be limited to 47,539.36 ac-ft.

**Legal Season** March 1 through November 1 from the Umatilla River; Year-round for stored water.

**Actual Season** April 1 through October 31

**Remarks** This certificate does not address the additional 1638.74 ac-ft of water allocated for storage in Cold Springs Reservoir that is available for future applications to use water. 831.90 ac-ft of which has already been allocated for use under Permit S-54846.

**Permit S-54846**

**Issued to** United States Bureau of Reclamation, Umatilla Field Office

**Source** Cold Springs Reservoir

**Priority** June 14, 2013

**Duty** 277.3 acres were perfected on lands at 3 ac-ft/acre. Therefore, the maximum volume is 831.9 acre-feet of water for the purpose of irrigation.

**Legal Season** March 1 through October 31

**Actual Season** April 1 through October 31

**Section 1.2: Sources of Water; Storage and Regulation Facilities; Exchange Program – OAR 690-086-0240(2)**

HID has two Points of Diversion from the Umatilla River. The Feed Diversion and the Maxwell Diversion. HID also receives water from the Columbia River as part of the Umatilla Basin Project Act of 1988. Cold Springs Reservoir is HID’s only storage facility and is used solely by HID.

**Diversion Facilities**

|  |  |
| --- | --- |
| **Feed Diversion** | |
| **Capacity** | Design: 350 cfs; Operational: 220 cfs |
| **Elevation** | 660 feet |
| **Location** | River Mile 28.7; 2 miles south of Echo |
| **# of Head Gates** | 8 |
| **Construction Date** | 1906-1907 |

|  |  |
| --- | --- |
| **Maxwell Diversion** | |
| **Capacity** | Design: 75 cfs; Operational: 50 cfs |
| **Elevation** | 535 feet |
| **Location** | River Mile 15.3; 1 mile south west of Hermiston |
| **# of Head Gates** | 2 |
| **Construction Date** | September - November 1912 & 1915 |

|  |  |
| --- | --- |
| **Columbia River Pumping Plant/Columbia-Cold Springs Canal** | |
| **Capacity** | 240 cfs |
| **Elevation** | 356 feet |
| **Location** | 8 miles upstream of McNary Dam |
| **# of Pumps** | 6 |
| **Construction Date** | 1993-1995 |

**Feed Canal Dam, Diversion & Canal**

The Feed Canal Diversion Dam is located on the Umatilla River 1.5 miles southeast of Echo, Oregon. The dam is a concrete, rock, and timber weir with an embankment wing, originally constructed in 1907, raises the level of the water in the riverbed 4 feet to provide diversion into the Feed Canal that extends to the Cold Springs Reservoir. This diversion operation is still in effect but was modified in the 1980s when new fish screens and gates were installed to meet Umatilla River instream target flows for fishery purposes.

Heading north and east from the Feed Canal Diversion to Cold Springs Reservoir, the 24.4-mile long Feed Canal is primarily an earthen ditch. The Feed Canal had an original design capacity of 350 cfs, but currently operates at safe active capacity of 220 cfs.

**Maxwell Dam, Diversion & Canal**

The Maxwell Diversion Dam and Canal divert water from the Umatilla River and convey it to lands in the East Division. The dam, located about 1 mile west of Hinkle, Oregon, is a concrete and timber-crib weir with an embankment wing and was completed in 1912. The dam permits diversion into the Maxwell Canal by raising the water surface 4 feet above the riverbed.

The Maxwell Canal leads generally north and east from the Maxwell Diversion Dam towards Cold Springs Reservoir. This is an earthen canal approximately 8 miles long. This canal was privately constructed in 1912 and then enlarged by the USBR in 1917. The Maxwell Canal is served by a combination of diversions from the Umatilla River at Maxwell Diversion and supplemented from Cold Springs Reservoir via two bypasses between the A-Line and Maxwell canals with a wasteway at the tail of the HID A-Line Canal. On average, about 4,000 acre-feet of water is annually diverted from the Umatilla River and about 8,000 acre-feet of irrigation water is annually delivered via the A-Line Canal (total of about 12,000 acre-feet).

**Columbia River Pumping Plant/Columbia-Cold Springs Canal**

**USBR Umatilla Basin Project**

From the early 1900s, diversions by private and USBR irrigation projects have depleted summer time Umatilla River flows. Some reaches of the river were often completely dewatered during the latter portions of the irrigation season. These flow conditions left inadequate water in the river for salmon and steelhead runs. This dewatering violated the provisions of the 1855 Treaty with the Confederated Tribes of the Umatilla Indian Reservation.

To address this situation, investigative studies were authorized under the Feasibility Studies Act of 1966. Under these studies minimum acceptable river flows for fish passage were determined together with supplemental water exchange requirements to support the existing irrigation development in the Umatilla River Basin. In 1986, the USBR published a report and feasibility study which was the basis for the Umatilla Basin Project authorized by Congress in Public Law #100-557, dated October 21, 1988. The basic proposal was to build facilities for the exchange of Columbia River water for Umatilla River water.

As authorized, the Umatilla Basin Water Exchange Facilities have been constructed to provide exchange water from the Columbia River to serve HID, Stanfield Irrigation District (SID), and West Extension Irrigation District (WEID). Water exchange facilities for WEID, known as “Phase I”, were constructed between April 1991 to April 1993.

Phase II exchange facilities for HID and SID were constructed between June 1993 to March 1998. These facilities include a Columbia River Pumping Station and discharge pipeline, Columbia-Cold Springs Canal, SID Booster Pumping Station and discharge pipeline, SID canal enlargements, and SID Relift Pumping Station and discharge pipeline.

The Columbia River Pumping Station is located on the southern shore of Lake Wallula, which is created by the McNary Dam impoundment of the Columbia River, approximately 10 miles upriver from McNary Dam. The pumping plant consists of four units of 52 cfs each and two units of 22 cfs each. The maximum pumping rate is 240 cfs with a total dynamic head of about 321 feet. Operation of the station was intended to be between April and October of each year.

Water is conveyed from the Columbia River Pumping Station to the Columbia-Cold Springs Canal via a 66-inch diameter, 4,300-foot long steel discharge pipeline. The normal lake elevation is 340 feet and the canal elevation at the outlet structure is 641 feet. The Columbia-Cold Springs Canal is a concrete lined canal approximately 4.44 miles (23,440 feet) long. There is an additional 1,100 feet of concrete lined turnout canal to Cold Springs Reservoir. The canal and turnout capacity are designed to handle the maximum Columbia River Pumping Station discharge.

The canal begins at the Columbia River Discharge Pipeline Outlet Structure and continues in a southwest direction to its termination at Cold Springs Pumping Station intake structure. At approximately 2,000 feet before it’s terminus the canal has a turnout to Cold Springs Reservoir. The turnout consists of a gated turnout structure with an overflow weir, the 1,100 feet of concrete canal with a measuring flume, a canal to pipe transition structure, 750 feet of pipeline, and a submerged baffled pipe outlet into Cold Springs Reservoir. This turnout provides HID exchange water. A normally closed turnout gate may be manually operated for diversions into the reservoir.

The Columbia-Cold Springs canal is designed to operate with a normal water surface elevation between 630.57 and 628.80 feet at the canal terminus. Water surface elevations above 629.41 feet waste into Cold Springs Reservoir through the turnout canal.

With Phase II, only those flows in excess of the minimum streamflow requirements (250 to 300 cfs during the period of normal diversions) are diverted from the Umatilla River. The residual flows required to fill Cold Springs Reservoir are provided by Columbia River pumping. The delivery rate and total volume of exchange water are limited by water rights and the availability of water in the Umatilla River. Any waste flow from the delivery of water to the SID into Cold Springs Reservoir is counted as part of HID’s exchange.

**Permit S-51439**

**Issued to** Bureau of Reclamation, Pacific Northwest Region

**Source** Columbia River

**Priority** February 14, 1991

**Duty** Use is limited to no more than 240 cfs measured at the point of diversion from the source. For HID, the total quantity diverted from the Columbia River for exchange together with diversion of direct flow from the Umatilla River during a complete year shall be no greater than the limits of their Oregon water rights.

**Storage Facilities**

|  |  |
| --- | --- |
| **Cold Springs Dam/Reservoir** | |
| **Active Capacity** | 38,646 acre-feet |
| **Crest Elevation** | 715 feet |
| **Crest Height** | 100 feet |
| **Crest Length** | 3,450 feet |
| **Use** | Irrigation, flood control, wildlife refuge, recreation |
| **Construction Date** | 1906-1908 |

**Cold Springs Dam and Reservoir**

The Cold Springs Dam is an earth-filled type structure that was constructed in 1907-1908. It has a structural height of 115 feet and a volume of 793,000 cubic yards. Cold Springs Dam and Reservoir is surrounded by the Cold Springs National Wildlife Refuge which is operated by the US Fish & Wildlife Service. It is located off-stream of the Umatilla River about six miles northeast of Hermiston, Oregon in Cold Springs Canyon.

The original capacity of the reservoir was 50,000 acre-feet. Siltation of the reservoir has decreased the safe active capacity to as little as 38,000 acre-feet. Historically the reservoir filled during the winter and early spring months by diversions from the Umatilla River passing through the Feed Canal. With the USBR’s construction of Phase II water exchange facilities, water can now be pumped from the Columbia River to help fill the reservoir. Stored water is certificated for irrigation use only.

Safety concerns prompted an inspection of the Cold Springs Dam in the early 1990s under the Reclamation Safety of Dams program. A corrective study was conducted and a modification report prepared. This report was given congressional consideration and received funding for structural modifications under the 1978 Safety of Dams Act and 1984 Amendments. Modifications were made in 1994-1995 that included construction of an interceptor trench and drain at the downstream toe of the embankment, a downstream stability berm, extension of the wing dikes, replacement of the spillway with an enlarged roller compacted concrete structure, and a new Feed Canal backflow prevention structure.

A few large exposures of basaltic lava bedrock (Columbia River basalt) can be seen on the valley sides downstream from the dam; alluvium and/or windblown silt cover hut throughout most of the area bedrock. The alluvium appears to be chiefly sand, but beds of gravel and numerous cobbles and boulders can be seen at various places. The alluvium is a thick, widespread deposit from a tremendous flood, which covered the area in late glacial times. In the spillway area bedrock is exposed only near the downstream end of the chute along the left wall. In this exposure the basalt is rather soft, crumbly and closely jointed. It is not highly resistant to erosion. Small exposures of basalt can be found at several places in the right hillside between the creek and spillway, but no rock was recognized on the right side of the spillway except at the downstream end. In a cliff along the right canyon wall about 300 feet left (east) of the spillway a considerable thickness of hard, fresh highly resistant basalt also occurs.

Storage rights provided to HID are specifically stated on the following certificate, which is attached to this Plan as Exhibit B.

**Certificate 87137**

**Permit** N/A

**Source** Umatilla River via U.S.A. Feed Canal

**Priority** September 6, 1905

**Rate** N/A

**Use** Storage of 50,000 acre-feet for irrigation

**Legal Season**  Year round

**Actual Season** Year round

**Remarks** This is the storage right for the entire District. Cold Springs Reservoir and Dam are owned by the United States. HID operates the reservoir under contract with the USBR.

Hermiston Irrigation District performs the operation and maintenance of Cold Springs Reservoir and Dam for the USBR and delivers water to District patrons pursuant to Contract No. 14-06-W-67 (July 6, 1954) as may be supplemented or amended pursuant to federal law and policy, including but not limited to the Umatilla Basin Project Act of 1988, 102 Stat. 2791 through 2795.

**District Water Delivery Contracts, Agreements, and Interconnections**

HID is a USBR constructed project. Repayment of construction costs was difficult for the District. In 1926 there was a write-off due to excessively sandy soils that were difficult to irrigate. In 1954 there was a charge-off based on a land classification of 1947 that found only 3,967 irrigable acres (assuming gravity irrigation) compared to a previous finding of 11,030 acres in the district. An irrigation payment capacity analysis completed in 1988 found that full-time farmers did not have any unused payment capacity.

The 1954 repayment contract provides for an adjustable annual repayment, currently $3,872 per year for 103-year repayment period based on an irrigable area of 3,967 acres. The District has remained current with contract obligation since 1954. The remaining balance owed at the end of 2017 was $81,687. The HID pays no annual interest rate, therefore, the contract will be paid-off within 35 years.

In 1995 the USBR and HID entered into a Safety-of-Dams Repayment Contract, No. 5-07-10-W1075 for Safety-of-Dams work on the Cold Springs Dam that was performed by the USBR in 1997. This work included building a new spillway, modifying the toe, and installing monitoring wells. The repayment is currently assessed at $4.00 per acre per year. It is a 25-year contract with the option to negotiate a contract for the balance in 2020. The total expected remaining period to pay off the total amount is 13 years. The balance at the end of 2017 was $446,625.

HID also participates in the USBR Phase II water exchange but has not formally entered into an exchange agreement. The water exchange with HID has been handled by applying criteria developed by the local River Operations Group consortium of stakeholders. This criterion provides that HID will operate the Feed Canal so that no water would be diverted when instream live flows immediately downstream of the Feed Canal fall below the following criteria:

* 250 cfs plus any flows required to meet valid downstream senior water rights for which a call has been made for water between September 16 and 30 and between November 16 and June 15.
* 300 cfs plus any flows required to meet valid downstream water rights for which a call has been made for water between October 1 and November 15.

The Exchange Program is managed and administered by OWRD per the Umatilla Basin Plan.

**Section 1.3: Schematics of the System – OAR 690-086-0240(3)**

As mentioned above and shown in Figure 1, HID’s major diversion structures include the following:

* Feed Canal Dam and Diversion located on the Umatilla River, along with the Feed Canal route to Cold Spring Reservoir.
* Maxwell Dam and Diversion located on the Umatilla River, along with the Maxwell Diversion Canal that terminates at Knoll Spill, blends with water from the tail of the A-Line Canal and runs into the Maxwell Canal.
* Columbia River Pumping Plant located on the Columbia River, along with the Columbia-Cold Springs Canal route to Cold Springs Reservoir.

Cold Springs Reservoir is shown in Figure 2.

Figure 3 shows HID’s boundary, pipelines, ditches, and drainages including the following:

The A-Line Canal is fed directly from Cold Springs Reservoir. This line empties into the head end of the Maxwell Canal. There are six main laterals (B, G, H, I, L and R Lines) and twelve secondary laterals served directly off the A-Line. There are two spillways, the Strohm and D Bypasses, located along the A-Line Canal that are used to prevent over-flow and supplement the Maxwell Canal.

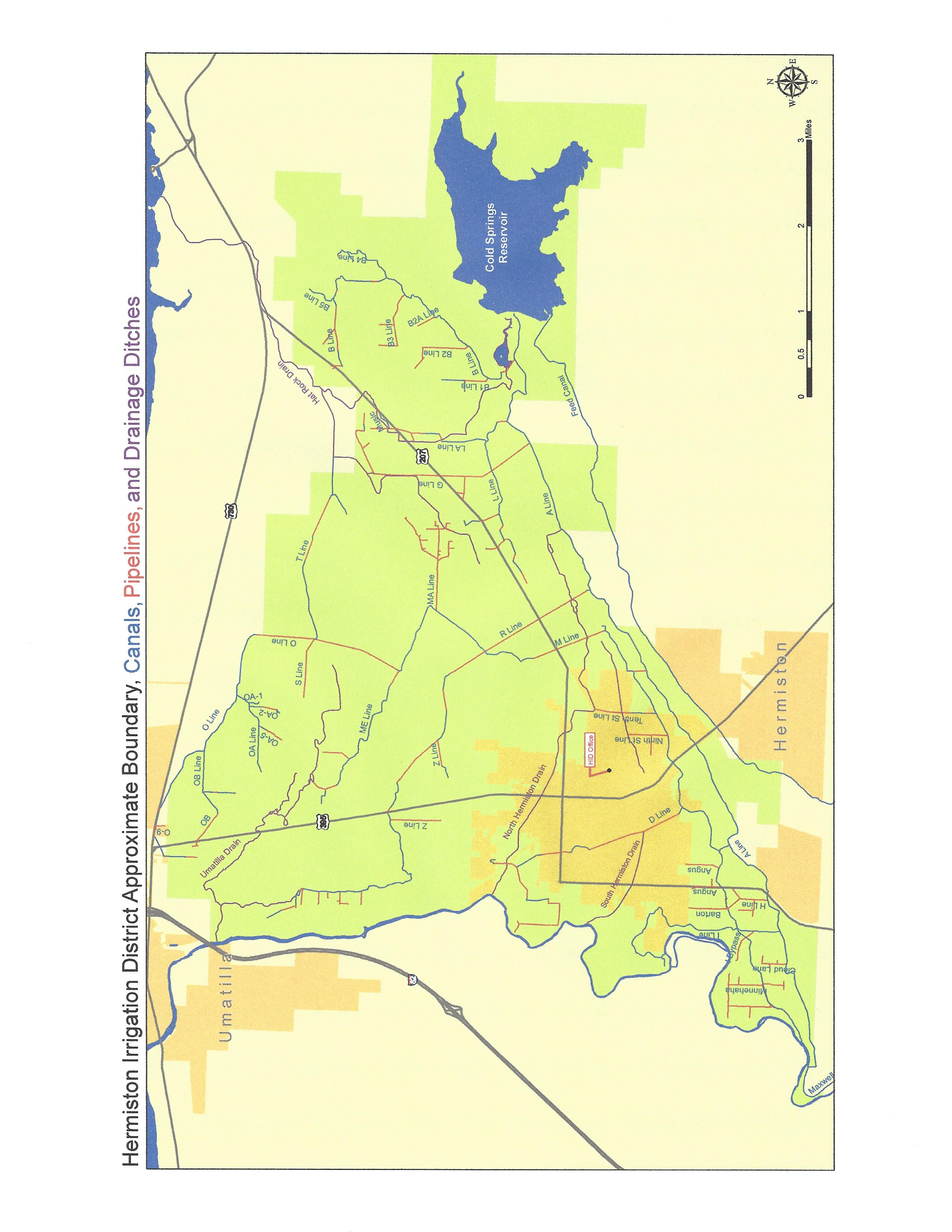
The Maxwell Canal is fed directly from the tail water of the A-Line Canal and the Umatilla River through the Maxwell Diversion. There are two main laterals (D and M Lines) served off of the Maxwell Canal. The Maxwell Canal terminates empties into the head end of M-Line.

There are five main drains in the HID system. The Cold Springs Drain starts near the head of the A-Line and runs north, then northeast to the Columbia River. The Hat Rock Drain start north of Punkin Center Road at the end of the L-Line and runs northeast terminating near Spearman and North Edwards Roads. The Hermiston North Drain starts near the middle of the A-Line and tail of the Maxwell and runs west to the Umatilla River. The Hermiston South Drain runs west through Hermiston to the Umatilla River. The Umatilla Drain extends across the northern portion of the HID running westerly to the Umatilla River.

**Figure 1**

****

**Figure 2**

**Figure 3**

**Section 1.4: Total Annual and Peak Diversions, Reservoir Storage, Reuse and Return Flows – OAR 069-086-0240(4)**

HID developed a water budget accounting for diversions, storage, conveyance losses, uses and outflows using prior year averages from November 2016 through October 2017 and 5-year prior averages from November 2013 through October 2017.

As indicated, there are three diversions supplying surface water to HID; the Feed Canal Diversion, Maxwell Canal Diversion, and the Phase II Canal. The Feed Canal and Phase II Canal discharge into the Cold Springs Reservoir. The Feed and Maxwell Canal Diversions take water from the Umatilla River. The prior year average flow of the Umatilla River into the Columbia River was 797 cfs, with a peak of 6,800 cfs and a minimum of 49 cfs. Recorded extremes are 19,800 cfs on January 30th, 1965 to no flow at times. The peak for the previous 5 years is 7,870 cfs on March 11, 2014. During the period when water is diverted into the Feed Canal, the Umatilla River’s natural flow reaching the Columbia River averages nearly 300 cfs in November, over 430 cfs in December, and over 1,600 cfs from January through May. The target minimum flow in the Umatilla River, for anadromous fish, during this period is 250 cfs.

Daily flow records were obtained from the USBR Hydromet archives for the Feed, Maxwell and Phase II Canals. Feed Canal diversions from the Umatilla River, deliveries to Cold Springs Reservoir, and total losses for the same time period are reflected in the tables below.

From November 1, 2016 through October 31, 2017 a total of 34,762 ac-ft of water was diverted from the Umatilla River into the Feed Canal with 29,367 ac-ft reaching the Cold Springs Reservoir. A total of 5,393 ac-ft was lost through seepage and evaporation from the Feed Canal, nearly 15.5 percent of the total diversion.

**Peak and Average Monthly Feed Canal Diversions from Umatilla River, Deliveries to Cold Springs Reservoir, and Total Losses for November 2016 through October 2017**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Diversions from Umatilla River to Feed Canal (FCEO)** | | | **Deliveries from Feed Canal to Cold Springs Reservoir (FCSO)** | | | **Total** |
| **Month** | **Peak**  **(cfs)** | **Average**  **(cfs)** | **Total**  **(ac-ft)** | **Peak**  **(cfs)** | **Average**  **(cfs)** | **Total**  **(ac-ft)** | **Losses**  **(ac-ft)** |
| **November** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **December** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **January** | 169 | 19 | 1181 | 139 | 17 | 1035 | 145 |
| **February** | 214 | 134 | 7728 | 167 | 106 | 6101 | 1627 |
| **March** | 210 | 194 | 11933 | 173 | 157 | 9650 | 2283 |
| **April** | 193 | 170 | 10094 | 179 | 151 | 8981 | 1113 |
| **May** | 194 | 161 | 3826 | 173 | 140 | 3600 | 226 |
| **June** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **July** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **August** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **September** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **October** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  |  |  |  |  |  |  |  |
| **Totals** | **214** | **136** | **34,762** | **179** | **114** | **29,367** | **5,393** |
|  |  |  |  |  |  |  |  |

Phase II deliveries to Cold Springs Reservoir from the Columbia River for November 1, 2016 through October 31, 2017 are shown in the table below. (Phase II deliveries are based on formulas described in the Umatilla Basin Project Operating Plan)

**Monthly Phase II Deliveries from the Columbia River to Cold Springs Reservoir for November 1, 2016 to October 2017**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Diversions** | | |
| **Month** | **Peak**  **(cfs)** | **Average**  **(cfs)** | **Total**  **(ac-ft)** |
| **November** | 0 | 0 | 0 |
| **December** | 0 | 0 | 0 |
| **January** | 0 | 0 | 0 |
| **February** | 0 | 0 | 0 |
| **March** | 0 | 0 | 0 |
| **April** | 0 | 0 | 0 |
| **May** | 56 | 11 | 659 |
| **June** | 75 | 51 | 3053 |
| **July** | 58 | 44 | 2715 |
| **August** | 87 | 63 | 3875 |
| **September** | 104 | 71 | 4226 |
| **October** | 37 | 12 | 722 |
| **Total** | **104** | **42** | **15,250** |

Maxwell Canal diversions from the Umatilla River from November 1, 2016 through October 31, 2017 are shown in the table below. A total of 4,861 ac-ft of water was diverted into the Maxwell Canal. The maximum diversion rate was 30 cfs while the average was 16 cfs.

**Monthly Maxwell Canal Diversions from the Umatilla River for November 1, 2016 through October 31, 2017**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Diversions** | | |
| **Month** | **Peak**  **(cfs)** | **Average**  **(cfs)** | **Total**  **(ac-ft)** |
| **November** | 0 | 0 | 0 |
| **December** | 0 | 0 | 0 |
| **January** | 0 | 0 | 0 |
| **February** | 0 | 0 | 0 |
| **March** | 0 | 0 | 0 |
| **April** | 0 | 0 | 0 |
| **May** | 28 | 15 | 928 |
| **June** | 30 | 26 | 1532 |
| **July** | 21 | 14 | 834 |
| **August** | 24 | 14 | 880 |
| **September** | 21 | 11 | 687 |
| **October** | 0 | 0 | 0 |
| **Total** | **30** | **16** | **4,861** |

Two additional sources of water are precipitation and subsurface flows from outside the district. Subsurface flows into the district come from seepage out of the Feed Canal and from irrigated lands to the south of the district. There is no way to measure these subsurface flows, but an estimate of the combined annual total would be 1,400 ac-ft. These additional waters from precipitation and subsurface flows are not directly available for irrigation but could contribute to the water usage within the district.

**Monthly A-Line Canal Inflows at the Head, Spills at the Tail, and the Net Deliveries for November 1, 2016 through October 31, 2017**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Inflows at the Head** | | | **Spills at the Tail** | | | **Net** |
| **Month** | **Peak**  **(cfs)** | **Average**  **(cfs)** | **Total**  **(ac-ft)** | **Peak**  **(cfs)** | **Average**  **(cfs)** | **Total**  **(ac-ft)** | **Delivery**  **(ac-ft)** |
| **November** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **December** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **January** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **February** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **March** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **April** | 93 | 37 | 2218 | 42 | 13 | 796 | 1422 |
| **May** | 114 | 97 | 5952 | 38 | 20 | 1256 | 4696 |
| **June** | 137 | 118 | 7014 | 24 | 14 | 804 | 6210 |
| **July** | 155 | 142 | 8745 | 21 | 12 | 740 | 8005 |
| **August** | 153 | 128 | 7867 | 22 | 16 | 953 | 6914 |
| **September** | 119 | 97 | 5828 | 24 | 16 | 927 | 4901 |
| **October** | 98 | 49 | 2325 | 22 | 10 | 586 | 1739 |
| **Totals** | **155** | **95** | **39,948** | **42** | **14** | **6,062** | **33,887** |

In addition to regulated flows in to and out of Cold Springs there are other flows continuously occurring. The watersheds above the reservoir produce varying rates of discharge into the reservoir. These flows are produced by precipitation events, snow melt, irrigation, and the subsurface flows fed by all three. There are basically three forms of natural discharges from the reservoir; evaporation from the reservoir surface, evapotranspiration from the trees around the reservoir, and seepage out of the bottom and sides of the reservoir including the dam. Presented in the table that follows are the total monthly deliveries to and withdrawals from Cold Springs, the recorded reservoir live storage at the end of each month, and the net non-regulated flows required to balance with measured amounts.

**Regulated Monthly Flows in to and out of Cold Springs Reservoir, the Recorded Reservoir Live Storage at the End of Each Month, and the Net Non-Regulated Flows November 1, 2016 through October 31, 2017**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Flows into Cold Springs Reservoir** | | |  | |
| **Month** | **Feed Canal (ac-ft)** | **Phase II Canal**  **(ac-ft)** | **Total**  **(ac-ft)** | **A-Line Outflow**  **(ac-ft)** | **CLS Live Storage**  **(ac-ft)** | **Net**  **Non-Regulated**  **Flows**  **(ac-ft)** |
| **November** | 0 | 0 | 0 | 0 | 2725 | 174 |
| **December** | 0 | 0 | 0 | 0 | 3356 | 631 |
| **January** | 1035 | 0 | 1035 | 0 | 4578 | 187 |
| **February** | 6101 | 0 | 6101 | 0 | 11144 | 465 |
| **March** | 9650 | 0 | 9650 | 0 | 21501 | 707 |
| **April** | 8981 | 0 | 8981 | -2218 | 28657 | 393 |
| **May** | 3600 | 659 | 4259 | -5952 | 25231 | -1733 |
| **June** | 0 | 3053 | 3053 | -7014 | 18759 | -2511 |
| **July** | 0 | 2715 | 2715 | -8745 | 11735 | -944 |
| **August** | 0 | 3875 | 3875 | -7867 | 7392 | -351 |
| **September** | 0 | 4226 | 4226 | -5828 | 5575 | -215 |
| **October** | 0 | 722 | 722 | -2325 | 4147 | 175 |
| **Totals** | **29,367** | **15,250** | **44,617** | **-39,948** |  | **-3022** |

The total difference between measured flows into and out of the reservoir was 4,669 ac-ft, 10.5 percent of the total measured inflow. The total of all non-regulated inflows and outflows to balance with the recorded reservoir live storage was a total net 3,022 ac-ft of outflow. Therefore, accounting for different starting and ending recorded storage volumes, the net loss is only 7 percent of the total measured inflow.

**Water Storage and Storage Withdrawals**

Cold Springs Reservoir is the surface water storage facility for HID. Though it is off-stream from the Umatilla River, it has a drainage area of 186 square-miles. There are two primary watersheds above the reservoir, the Cold Springs Canyon ad Despain Gulch. There is no record flow data for these watersheds. According to the USBR, the probable maximum (100 year) flood from this area would have a peak discharge of 37,400 cfs and produce a total volume of 61,000 ac-ft. Both the typical flow rates and average annual total volume of run-off are much less.

**District Return Flows and Reuse**

There are numerous locations where both surface water and shallow groundwater flow back into the Umatilla River. The majority of the water diverted through the Maxwell Diversion is sent back to the Umatilla River through the fish bypass. On average, 20% of the water diverted through the Feed Canal is absorbed into the ground and recharges wells in the surrounding areas. The primary problem associated with these return flows is the damage to the up-slope banks of involved canals. Some of the water in the Hat Rock Drain and in the pond at the end of the T-Line is pumped back for irrigation. Two points of interest were evaluated for reuse, the tail of the North Hermiston Drain and the Cold Springs Drain. However, there are private permits that allow users to use water from the drains. No estimate is included in this analysis as to exactly how much water is available, if any, for reuse because it cannot be reasonably documented by specific field data.

**Section 1.5: Classification of User Accounts – OAR 690-086-0240(5)**

User accounts are described in the following table. HID consists primarily of small tract irrigation. Over 80% of the assessed tax lots are smaller than 10 acres. Most of the HID lands are listed as part-time farms but the majority of the lands are urban or suburban and are irrigated pastures and/or lawns. This summary is based on District records for 2017.

|  |  |  |
| --- | --- | --- |
| **User Classification** | **Amount of Land in Acres** | **Number of Accounts** |
| Irrigation | 9,843 | 1,215 |

**Section 1.6: Classification of Irrigation Systems – OAR 690-086-0240(6)**

The percentages of irrigated cropland associated with these irrigation methods and systems in HID are estimated at:

|  |  |
| --- | --- |
| **Type of Irrigation System** | **Percent of Irrigated Acreage** |
| Flood | 25 % |
| Set-move and solid set sprinklers | 52 % |
| Center/Linear Pivot | 23 % |

**Section 1.7: Commonly Grown Crops and Methods – OAR 690-086-0240(7)**

For the ease of estimating gross irrigation water requirements, information on types of irrigation systems, crops commonly grown, and the estimated average and peak consumptive use of the crops are combined into this section on irrigation water requirements for the District.

**Commonly Grown Crops**

The District maintains a database containing ownership, crop, water right and assessment information for each acre served by the District. Many patrons change crop type in their field annually. The actual water use rate of any particular crop will depend on a number of factors including variety, planting date, irrigation scheduling, cultivation practices, soil type and weather. The general mix of crops within the District is shown in the following table:

|  |  |  |
| --- | --- | --- |
| **Crop** | **Acres** | **% of Total Area** |
| Pasture | 5,290 | 54% |
| Alfalfa | 1,720 | 17% |
| Corn | 1,010 | 10% |
| Melons | 700 | 7% |
| Potatoes | 355 | 4% |
| Urban & Landscape | 428 | 4% |
| Wheat | 210 | 2% |
| Orchards & Vineyards | 100 | 1% |
| Asparagus & Onions | 30 | 1% |
| **Total** | 9,843 | 100% |

**Estimates of Crop Consumptive Use**

For crop evapotranspiration (ET) and irrigation requirement (IR) analysis in this report, individual crop ET and IR data was taken from OSU Extension Misc. Publication 8530, 1999, “Oregon Crop Water Use and Irrigation Requirements”, Hermiston Area, for 5-10 years (i.e. average year condition) requirement. The analysis present herein represents most of the crops being grown in the district. A district wide weighted value, by crop and month, was arrived at and used throughout the analysis.

The maximum crop ET and IR typically occurs for most crops in July and August, when the average daily temperature is the highest, crop growth (foliage) and soil surface evaporation is the greatest, and precipitation is the least. The major water use crops in the District are pasture, alfalfa hay, corn, melons, potatoes and grass seed.

Crops such as alfalfa hay, grains, pasture can be deficit irrigated with a reduction in yield, where other crops simply cannot be deficit irrigated. Crops that farmers don’t and can’t deficit irrigate are corn, melons, potatoes, and some seed crops. Deficit irrigation on these crops produces crop failures or a non-marketable crop, not just a reduction in crop yield. All of these crops are grown in the District, generally in the crop rotation, and represent existing conditions. Growers will deficit irrigate or reduce field crop acres irrigated in order to optimize water provided to higher value cash crops.

An analysis based on District delivery is included to display crop water needs for a full season water supply as well as monthly needs. No attempt is made to isolate deficit water supply or adjust ET or IR for specific crops based on a deficit water supply. Adjusting ET and IR would be an unsupported guess at best. To accurately determine IR in the deficit situation would take a detailed farm/field survey and evaluation of irrigation water actually applied to those specific crops from June through October, and determination of actual acreage and yields from specific crops. This would take a multi-year study in order to evaluate during high and low climate (water supply) affected years.

Individual crop ET and IR for most crops grown in the District, and a full season weighted District-wide average, are displayed in the following table. Crop type, acres, crop ET and IR for average year are displayed and used for analysis. Further crop ET information for most common crops in the Hermiston area is available on the USBR AgriMet website or the OSU Hermiston Agricultural Research and Extension Center.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Crop** | **Acres** | **Crop ET 1** | **Effective Precipitation 2** | **Crop IR 3** |
| Pasture | 5,290 | 34.7 | 3.1 | 31.6 |
| Alfalfa | 1,720 | 43.6 | 2.0 | 41.6 |
| Corn | 1,010 | 27.8 | 1.4 | 26.4 |
| Melons | 700 | 17.0 | 2.2 | 14.8 |
| Potatoes | 355 | 28.4 | 1.8 | 26.6 |
| Grass | 428 | 18.5 | 2.6 | 15.9 |
| Grain | 210 | 24.7 | 2.2 | 22.5 |
| Orchards/Vineyards | 100 | 36.2 | 2.0 | 34.2 |
| Asparagus/Onions | 30 | 31.6 | 1.8 | 29.8 |
| **Totals/Averages** | 9,843 | 29.2 ac-in/ac | 2.1 in | 27.0 ac-in/ac |

1 Crop ET = Crop Evapotranspiration 20-year average per the USBR AgriMet site.

2 Effective precipitation is that amount that falls during the crop-growing season that reduces plant leaf and soil surface evaporation, infiltrates soil profile, remains in the plant root zone, and contributes to crop growth.

3 Crop IR = Crop ET minus effective precipitation, in acre-inches per acre.

**On-Farm Irrigation Methods**

When HID was first proposed in the early 1900’s, the only irrigation method was gravity flood irrigation. Today there are other irrigation methods available which are in general more efficient and suitable for sandy soils. Sprinkle irrigation has been used in the area since the early 1950’s, center pivot irrigation was introduced in the 1970’s, and drip irrigation in the 1980’s for melons. Today, all of these methods are still practiced throughout HID. The following numbers are estimates of the acres irrigated by these four methods on HID assessed lands. Due to conservation efforts of piping open ditches, there are few, if any, sand point or shallow wells being utilized by HID patrons. Those patrons have been converted to piped lines and sprinkle irrigation.

|  |  |  |
| --- | --- | --- |
| **Method** | **HID On-Farm Irrigation Methods** | |
| **Acres** | **Percent** |
| Gravity Flood | 2,460 | 25% |
| Sprinkle | 4,433 | 45% |
| Center Pivot | 2,260 | 23% |
| Drip | 690 | 7% |
| **Total** | 9,843 | 100% |

The application efficiency of a particular irrigation system will depend on a number of factors including the method of irrigation, the condition of the system, weather conditions, and how the system is operated. A properly designed and operated irrigation system of any type can have a high application efficiency. However, the difference in efficiency between two systems of the same type even between two irrigation events for the same system can be large. For the purpose of determining reasonable irrigation requirements the following average efficiencies were used: 50% for gravity, 70% for sprinklers, 90% for center pivots, and 95% for drip irrigation. There will be inevitable losses to deep percolation due to occasional over-irrigation and longer set times than needed; inadequate pattern distribution uniformity due to worn nozzles or inadequate operating pressure; wind drift losses; direct evaporation from plant and soil surfaces; and joint leaks.

**Section 1.8: Operation & Maintenance – OAR 690-086-0240(8)**

The mission of HID, as originally organized, was to supply irrigation water for farm crops. It is the desire of HID that this supply be timely and adequate for all and equitably distributed to all users.

**Organizational Structure**

HID is governed by a 5-person Board. Each Director is an elected official that serves a 3-year term. The Board conducts regular monthly meetings and is responsible for setting District policies. The Board of Directors hires the District Manager, who is in charge of day-to-day operations of the District. The District Manager is directly accountable to the Board of Directors. Employees of HID include, but are not limited to, a district manager, field manager, shop mechanic, ditch riders, maintenance crew members, customer service representative/water rights specialist and a bookkeeper. Complete job descriptions are available at the District office.

The Field Manager supervises the shop mechanic, maintenance crew and ditch riders. The District employs two (2) full-time ditch riders, two (2) relief riders who also perform maintenance, and one (1) full-time shop mechanic. All other employees are directly accountable to the District Manager.

District operations are divided into two sections, the east side and the west side. Under the guidance of the managers, the ditch riders are responsible for releasing water into the canals and pipelines, maintaining schedules, checking boards, monitoring operations, inspections, cleaning screens and maintaining delivery records.

**Distribution System**

HID’s water distribution system consist of a network of canals, pipelines, control structures, and drains. As stated in Section 1, the two main canals are the A-Line and the Maxwell. The A-Line Canal conveys water from the Cold Springs Reservoir to the southwest along the southern edge of HID and terminating with a tail discharge into the Maxwell Canal. The A-Line is concrete lined for approximately 55,200 feet and has one earthen section approximately 1,820 feet in length.

Structures are located along both the A-Line and Maxwell canals to check-up and divert water into laterals. These structures have slots to hold wooden planks to check-up water and slide-gates to control water discharge into laterals. These structures do not facilitate the measurement of flow rates. Also, there are points along both of these canals where water is diverted directly by individual users. Many of these individual’s withdrawal points involve the use of small pumps. The rest of these individual withdrawal points utilize slide-gates or valves to control the discharge into small canals or gravity flow pipes.

There are six main and twelve secondary laterals served directly off of the A-Line and two main laterals served off of the Maxwell. These laterals consist of sections of lined and earthen canals as well as pipelines. Some of the pipelines are still the original concrete pipe. In recent years, PVC pipe has been used to replace poor sections as well as sections of open-ditch. In total there are approximately 84,180 feet of lined canals, 114,410 feet of earthen canals, and 123,040 feet of gravity flow pipelines.

There are two HID owned and operated pump stations pressurizing pipeline networks to serve the Minnehaha and Barton sub-areas. Both of these sub-areas were originally served by open-ditches off the Maxwell Canal. The Barton Pump Station has one 75 hp pump and distribution pipeline network serving 149 acres, and was began as a private system which was then taken over by HID to serve additional users. The Minnehaha Pump Station was originally built in 1996 and has two 60 hp pumps and distribution pipeline network to serve approximately 192 acres. It was later expanded in 1997 to serve an additional 79 acres. HID maintains and operates both pump stations and apportions the power costs to the individual water users based on the water they use during each billing cycle.

**Operational and Maintenance Concerns**

Aquatic weeds and moss have become a major problem in the canal during mid and late summer as water temperature increases. Moss, aquatic weeds and algae drastically reduce canal efficiency and cause plugging of screens and inlets to pumps. Maintenance time and materials cost to the District to control moss, weeds and algae in the canals is a major concern. Moss and weeds must be controlled and/or removed, as it can cause canals to overflow if left uncontrolled. Both mechanical and chemical control methods are used. All chemical applications are in strict accordance with EPA requirements and HID’s National Pollutant Discharge Elimination System (NPDES) Permit.

**Inspections**

The District performs daily, monthly and annual inspections for safety and to prevent down time during the irrigation season. Key inspections include:

The USBR and HID perform periodic inspections of Cold Springs Dam and Reservoir for structural integrity and flood flow passage. Readings from the monitoring wells and piezometers around Cold Springs Dam are taken monthly to monitor for seepage. The USBR and HID also perform inspections on the A-Line Canal, Maxwell Canal, Feed Canal, Maxwell Diversion, and Feed Diversion. These inspections are performed on a two or three-year schedule based on the adjacent level of urbanization and the overall condition of the canal, alternating between watered-up and dewatered conditions. The USBR provides a written report of these inspections and repairs are made as needed according to their recommendations.

HID performs inspections on the remaining laterals, sub-laterals and facilities within the District. Any canal in operation is inspected daily by an HID field crew member. HID’s system relies heavily on gravity feed. A few pumps are located throughout the District as well as rotating screens. These are also checked daily by the ditch riders while in operation.

**Off-Season Maintenance and Repair**

Most maintenance is performed on the distribution system during the non-irrigation season, usually October through March. Any new construction, excess vegetation removal, reshaping canals, sediment removal, repair of diversion structures, repair/replacement of concrete canal panels, etc. are done during this time. Any maintenance or repairs that need to be made to the Feed Canal need to be completed by November 1st of each year.

**SECTION 2: WATER CONSERVATION ELEMENT – OAR 690-086-0250**

**Section 2.1: Progress Report on Previous Measures – OAR 690-086-0250(1)**

The following table provides a list of water management or conservation projects that have been completed since 2000.

**Open Canals and Laterals Converted to Pipe**

|  |  |
| --- | --- |
| **Piping Projects** | **Description** |
| B-4 Line (2012) | Replaced open ditch with 2,200 feet of PVC pipe, not only reducing losses in that area, but also improving health and safety issues related to the proximity to a CAFO and pooling waters that were creating a breeding ground for mosquitoes and potential spread of West Nile Virus. |
| H Line (2000) | Installed 3,400 feet of PVC pipe to replace open canal resulting in water savings and eliminating flood irrigation in this area. |
| I Line (2008) | Installed 13,700 feet of open canal with PVC pipe converting 420 acres to sprinkle irrigation and also reducing the hazard of open ditches and allowing for better water availability in a residential area. |
| G-Line  (2003) | Installed 2,820 feet of PVC pipe to complete piping of this line resulting in large water savings and eliminating flood irrigation in this area. |
| L-Line Phase I (2006) | Installed 4,200 feet of PVC pipe and a meter resulting in a large water savings. |
| L-Line Phase II (2007) | Converted open canal and leaky, broken cement pipe, replacing it with 17,300 feet of PVC pipe to complete the piping of the main canal and six laterals. Resulting in a large water savings and eliminating flood irrigation in this area. Improving water delivery and efficiency for more than 350 patrons. |
| LA-Line  (2010) | Install 7,600 feet of PVC pipe to convert open canal to piped line. Converting 335 acres from flood to sprinkle irrigation within the Stage Gulch Critical Ground Water Area. |
| T-Line  (2008) | Installed 4,200 feet of PVC pipe to replace open canal resulting in water savings and eliminating flood irrigation in this area. |
|  | **For a total of 10.7 miles of newly piped laterals** |

**Section 2.2: District’s Water Measurement Program – OAR 690-086-0250(2)**

Diversion flow measurement and annual reporting to OWRD and USBR meet OAR 690 Division 85 requirements. Major flow measurement points are included on the District schematic in Figure 1 and are available on the USBR’s Pacific Northwest Region Hydromet site. The location of these sites and the continuous recording devices used meet state and federal requirements.

<https://www.usbr.gov/pn/hydromet/rtindex/umatilla.html>

**Reservoirs and Major Diversions**

As mentioned in the beginning of this document, there are three diversions supplying surface water to HID; the Feed Canal Diversion, Maxwell Diversion, and the Phase II Canal. The Umatilla River diversions and two main canals are measured and recorded on the USBR Hydromet System.

**USBR Flow Measurement Sites Within Hermiston Irrigation District**

|  |  |  |
| --- | --- | --- |
| **Location** | **Gauge Number** | **Data Date** |
| Umatilla Project Feed Canal near Echo, OR | FCEO | 1970-present |
| Umatilla Project Feed Canal (Terminus) near Hermiston, OR | FCSO | 1993-present |
| Maxwell Diversion near Hinkle | MAFO | 2010-present |
| Maxwell Canal near Hermiston, OR | MAXO | 1970-1991, 1993-present |
| US A Line Canal at Cold Springs Reservoir | CSAO | 1978-1991, 1993-present |
| A Line Canal (Terminus) near Hermiston, OR | ALTO | 2000-present |
| Cold Springs Recharge Canal near Hermiston, OR | CSRO (1) | 1996-present |

**Conveyance and Distribution Canals and Return Flows**

There is an obvious lack of water control within HID. Most canal structures are old and lack any means of measuring or accurately regulating water flows. The USBR measures flows at the head and tail of the Feed Canal, at the head of the Maxwell Canal, and at the head and tail of the A-Line. There are no mechanical measurement devices along the laterals and turn-outs, but HID is working with the USBR to remedy this situation. There is no data available on the rates nor the total volume of return flows.

**Delivery for Farm Use**

The District develops and implements a water delivery schedule for each turn-out. These schedules are set for a week with water delivery occurring twenty-four hours a day. An irrigator’s water comes at the same time on the same day of the week every week. The majority of these lines are not metered, and the ditch rider uses the height of the water in the weir to estimate flow.

**Section 2.3: Other Conservation Measures Currently Implemented – OAR 690-086-0250(3)**

The District’s principal goal is to increase water conveyance and use efficiency through improved management techniques, where possible, physical improvements where necessary and feasible, and to make the conserved water available to enhance agricultural uses within the District. In order to achieve this goal, the District proposes to pursue the critical water conservation measures and additional water conservation measures outlined in the following chapters.

Additional opportunities exist that do not require extensive physical improvements or economic investment, but would still produce significant increases in system efficiencies. These opportunities focus primarily on water management. Although they do no require the financial commitments of the outlined physical improvements, they do require the commitment of the water users to conserve water and be receptive to changes in District policies designed to encourage water conservation.

These additional opportunities include water measurement and accounting system, facilitation of water rights transfers to encourage the best use of the water available, irrigation system scheduling, and promotion of the Water Conservation and Management Plan.

To promote these efforts, HID hosts outreach seminars, participates in local, basin and state-wide planning meetings, attends local workshops, and publishes grant, loan and best practices information in their newsletter, on their website and social media page.

**Section 2.4: District Goals for Improving Water Conservation and Management – OAR 690-086-0250(4)**

**Overall goals include**

HID’s overall goals are to improve safety, enhance water control, decrease seepage losses, and continue to improve water accountability. Implement technology to enhance data collection and retrieval that will improve District operations.

Oregon’s “Conservation Plan” statues call for both short and long-term goals of water suppliers to improve water management. For HID, these goals include ensuring the adequate and equitable supply of water to all users. Secondarily, these goals would involve the efficient delivery and application of water throughout the District. And once the water needs of the District are satisfied, these goals could include the use of excess waters to meet other beneficial needs.

The short-term goal of the HID is to install mechanical measurement devices in order to account for and conserve water during the course of the irrigation season so as to have adequate reserves to extend the period of water deliveries.

As with most canal delivery systems throughout the world, water deliveries of HID are not completely equitable. Users near the head of the system have fewer difficulties obtaining the water than those near the tail. A longer-term goal of HID is to improve their control of water to achieve a more equitable distribution.

It is understood that the diversion, conveyance, and application of water for irrigation cannot be done practically without losses. A long-term goal of HID is to reduce losses to practically achievable levels. Other beneficial uses of conserved water as a result of these conservation efforts could then be considered.

The District has recognized the pursuit of all of the following goals will be expensive and time consuming; however, the District is committed to pursuing what they can physically and financially. The cumulative effect of all of these goals would improve District operations, water accountability, increase water conservation, and improve watershed enhancement in the Umatilla Basin.

**The following actions are planned to fulfill these goals**

**Immediate – Less than one year**

* Continue working to improve District maps and records. This includes water rights, infrastructure, easements, private systems, drainage systems and patron data
* Convert hard-copy paper records to electronically stored documents
* Rebuild the earthen Feed Canal with soil, bentonite, compaction and reshaping
* Design and implement a Panel Replacement Program for the A-Line Canal
* Develop and implement a Rodent Control Program
* Conduct public meetings to educate patrons, provide information and gather input on the Plan
* Promote the conversion from flood to sprinkle irrigation on-farm
* On-farm irrigation scheduling assistance

**Short-Term – 1-5 years**

* Install measuring devices on laterals coming off of the A-Line and Maxwell Canals
* Repair or replace inadequate control structures
* Develop measurement and control plans
* Provide additional training and education for District personnel
* Replace selected open-ditch laterals with buried pipelines
* Provide water user workshops and additional information for District patrons

**Long-Term – 5-10 years**

* Repair selected sections of canals and pipelines
* Pipe selected laterals
* Gate tower walk way replacement

**Section 2.5: Opportunities for Improving Water Use Efficiency – OAR 690-086-0250(5)**

Based on previous studies on canal losses and seepage, HID has identified that the greatest opportunities to increase water use and efficiency would be to repair/replace lining in the A-Line Canal and Maxwell Canal, and replace open laterals and sub-laterals with buried pipelines.

**Losses**

Ponded seepage tests were conducted by IRZ on seven sections of HID canals in 1998. Temporary dams were constructed, the canals filled behind those dams, and the water level monitored for several days. Knowing the cross-sectional dimensions and lengths of each section tested and accounting for evaporation losses and precipitation gains, the time rates of water level changes were used to calculate seepage rates.

**Summary of Calculated Seepage Rates for Sections of HID Canals Tested During September and October of 1998**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Canal** | **Section** | **Canal**  **Type** | **Section Length**  **(feet)** | **Seepage Rate**  **(cfs/1000ft)** |
| A-Line | T.O. B to Canal Rd. | Lined | 12,750 | 0.010 |
| B-Line | Near Tail | Earthen | 1,160 | 0.014 |
| I-Line | Highland Ext. to Tail | Earthen/Lined | 1,710 | 0.092 |
| OB-Line | Head to 810 feet | Earthen | 810 | 0.026 |
| OB-Line | Next 880 feet | Earthen | 880 | 0.030 |
| T-Line | Head to 4,900 feet | Lined | 4,900 | 0.042 |
| Maxwell | Diversion to Spill | Earthen | 12,370 | 0.033 |

During the summer of 1994 similar ponded seepage tests were conducted on a number of farm ditches within HID. The average seepage rate for these farm ditches was 0.067 cfs (30 gpm) per 1,000 feet of ditch.

In addition to canals, some of the HID distribution system consists of pipelines. Many of these pipelines are old jointed concrete pipe. There have been no attempts to measure leakage from pipelines, but leakage is assumed to occur as evidenced by occasional wet spots. An average leakage rate of 0.002 cfs (1 gpm) per 1,000 feet is assumed.

The total rate and resulting volume of seepage/leakage losses is a function of average loss rates and the total lengths of lines. The lengths of district lines were determined from available maps. The conditions of district lines were determined through an inspection of all lines and an average seepage rate was assigned to each type and condition of line based on seepage tests. Presented in the table below are the lengths of different types of District lines, the assigned average seepage rates, and the resulting total seepage rates.

The lengths of farm ditches cannot be determined from existing maps. The use of farm ditches is primarily associated with gravity irrigated lands. As indicated previously, there are an estimated 4,000 acres of gravity irrigated lands. Assuming 200 feet of farm ditch for every acre of gravity irrigated land, there would be 800,000 feet of farm ditches within the HID. Since, on average, one-seventh of the land is irrigated each day, only an average of 114,300 feet of farm ditches will be carrying water at a time. Therefore, based on the average seepage rate, the average total seepage rate from farm ditches will be 7.66 cfs.

The seepage rates determined for the HID canals seem low. One possible reason for these low rates is that the tests were conducted at the end of the irrigation season when the moisture levels in the soils along canals are high. Another possible reason is that drainage into the canals from areas above several of the tested sections off-set seepage losses. Regardless of the reasons, the seepage rates measured and assigned are probably conservative.

**Total Length, Average Seepage Rate, Total Seepage Rate of Different Line Types within HID**

|  |  |  |  |
| --- | --- | --- | --- |
| **Line Type** | **Length**  **(feet)** | **Average Seepage Rate**  **(cfs/1000ft)** | **Total Seepage Rate**  **(cfs)** |
| Main Canals; Lined in Good Condition | 9,800 | 0.010 | 0.32 |
| Main Canals; Lined in Fair Condition | 21,770 | 0.025 | 0.33 |
| Main Canals; Lined in Poor Condition | 25,450 | 0.040 | 0.30 |
| Main Canals; Earthen | 40,920 | 0.050 | 2.24 |
| Laterals; Lined in Good Condition | 3,600 | 0.010 | 0.25 |
| Laterals; Lined in Fair Condition | 16,580 | 0.025 | 0.71 |
| Laterals; Lined in Poor Condition | 6,980 | 0.040 | 0.68 |
| Laterals; Earthen | 73,490 | 0.050 | 4.22 |
| Pipelines | 123,040 | 0.002 | 0.35 |
| **Totals** | **321,630** |  | **9.40** |

Using the determined total HID Canal and farm ditch losses (allowing for higher loss rates during the first month of the season) and the actual days of operation the total monthly seepage losses were calculated. Presented in the table below are the calculated total monthly HID canal and farm ditch seepage losses.

**Total Monthly Average of HID Days of Operation, Canal and Farm Ditch Seepage Losses for the Previous 5-Years (2013-2017)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Month** | **5-Year Average Monthly Operation**  **(days)** | **5-Year Average HID Canal**  **Losses**  **(ac-ft)** | **5-Year Average Farm Ditch Losses**  **(ac-ft)** |
| November | 0 | 0 | 0 |
| December | 0 | 0 | 0 |
| January | 0 | 0 | 0 |
| February | 0 | 0 | 0 |
| March | 2 | 0 | 0 |
| April | 26 | 487 | 397 |
| May | 31 | 577 | 470 |
| June | 30 | 558 | 455 |
| July | 31 | 577 | 471 |
| August | 31 | 577 | 470 |
| September | 27 | 502 | 409 |
| October | 9 | 160 | 130 |
|  |  |  |  |
| **Totals** | **187** | **3,437** | **2,802** |

**Spills**

There are two points along the A-Line Canal where water can be spilled or diverted. These spills are to ensure that the A-Line does not overflow and/or to augment flows in the Maxwell Canal. Only at the tail of the A-Line is there a continuous spill and this also augments the flow into the Maxwell Canal. As a rule, spills from the A-Line are not losses.

Just downstream of where the A-Line tail flow spills into the Maxwell Canal there is a structure in the Maxwell Canal, known as Knoll Spill, which can spill excess water directly back into the Umatilla River. This spill is to ensure that the Maxwell Canal does not overflow. Spills here are not common and when they do occur water is simply returned to the Umatilla River approximately three miles downstream of the Maxwell Diversion. Excess water reaching the tail of the Maxwell Canal is diverted down the M-Line.

The District provides a system of collection and reuse of a large portion of operational spills. Most Laterals terminate at farm turnouts. There are three exceptions; the L-Line can spill into the Hat Rock Drain, the I-Line spills back into the Umatilla River, and the T-Line spills into a pond. Water spilled into the Hat Rock Drain and into the pond at the end of the T-Line does not flow out of the district as surface flow. Some of the water in the Hat Rock Drain and in the pond at the end of the T-Line is pumped back for irrigation while the rest is lost to seepage and evaporation. Since the I-Line was piped in 2008 the average flow spilling back into the Umatilla River is minimal.

Water deliveries at this time are sufficient to meet historic crop needs on average or better water years. The projects identified below will help increase efficiencies and address shortfalls in low water years.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Description of Water Efficiency Project** | **Annual Maintenance**  **Costs** | **Estimated Replacement**  **Costs** |
| A-Line Canal Lining | Replace cement lining in 12 miles of main line canal that runs 50-120 cfs. Current replacement plan is projected for 1 mile per year. Add telemetry at the head of each lateral. | $70,000 | $1,600,000 |
| B-Line | Pipe 4.0 miles of open ditch with 30-36” PVC |  | $800,000 |
| D-Line | Replace 0.75 miles of earthen ditch with 15” PVC pipe |  | $60,000 |
| D-Line (Butte) | Replace open ditch with 36”-48” pipe around the Hermiston Butte |  | $300,000 |
| M-Line | Replace 2.4 miles of earthen and partially lined ditch with 15”-21” PVC pipe |  | $240,000 |
| ME-Line | Replace 2.0 miles of earthen and partially lined ditch with 15”-21” PVC pipe |  | $200,000 |
| O-Line | Replace 4.0 miles of earthen ditch with 15”-21” PVC pipe |  | $400,000 |
| OA-Line | Replace 1.0 mile of earthen ditch with 15”-21” PVC pipe |  | $150,000 |
| OB-Line | Replace 1.0 mile of earthen ditch with 15”-21” PVC pipe |  | $150,000 |
| R-Line | Replace 2.7 miles of cement lining |  | $210,000 |
| T-Line | Replace 1.7 miles of earthen ditch with 15”-21” PVC Pipe |  | $180,000 |
| Maxwell Canal Lining | Replace cement liner in 5.0 miles of main line canal | $70,000 | $400,000 |
| Feed Canal | Mix soil with bentonite, shape and compact 25.0 miles of feeder canal | $10,000 | $60,000 |

**Financial Resources**

A major constraint to the improvement of water use efficiencies at both the district and farm levels is financial resources. The repair of canals and their structures, replacement of open-ditch laterals with buried pipelines, and conversion from gravity to sprinkle irrigation will have significant costs.

The costs associated with the conversion from gravity to sprinkle irrigation will primarily be bore by individual water users. However, to encourage the users to make this conversion HID may need to facilitate incentive programs. HID will continue to explore the availability of state and/or federal funds to make low interest loans, cost sharing, technical assistance, etc. available to water users. The costs associated with repairing and/or replacing district facilities will be bore by HID.

**Conserved Water Allocation**

At the District’s option, depending on funding source requirements for implementing water conservation projects, conserved water would be used first to lengthen the irrigation season. HID’s legal irrigation season according to its water right is March 1 through November 1. Currently an average irrigation season runs from the beginning of April through September and occasional to the middle of October. Any other conservation allocation requirements attached to funding will be honored if granted.

**Section 2.6: Evaluation of Water Conservation Measures–OAR 690-086-0250(6)**

Potential water management measures include improvements to HID facilities and operations as well as farm level improvements. Consideration must also be given to alternatives to financing viable conservation programs.

HID facilities in need of improvements include measurement and control structures as well as selected canal sections. Also, some of the canal laterals can be replaced with buried pipelines and drainage water pump back systems may be practical. These improvements are discussed below.

**Energy Audits**

Umatilla Electric Cooperative (UEC) occasionally provides energy audits to their customers in the Hermiston, Stanfield, and Umatilla areas free of charge. The program is voluntary by the landowners, and promoted by the District. Any recommended repairs or upgrading of electric motors, pumps, irrigation systems, or improvements in irrigation water management made by the customer is entirely voluntary. Where economical benefit could readily be seen and obtained by the customer, repairs, upgrades and replacements to pumps and irrigation systems are generally made immediately.

Ideally, the utility representative providing the energy audit provides adequate assistance to the customer so that they have also improved on-farm irrigation water management. Most likely the customer did improve on-farm water use by retrofitting center pivot systems to allow low pressure operations, adjusted irrigation application timing, etc. Unless provided by the landowner, no records exist and follow-up to determine the total of actual improvements would be costly to the District.

It has been determined that it is not financially feasible for the District to provide a similar district wide program at this time, however the District will, at the request of the landowner, review on-farm systems for efficiency.

**Pressurized Water Supplies**

It may be cost effective for some buried pipeline laterals to be pressurized. Pressurizing a lateral eliminates the need for each user having his/her own pump. This increases the overall efficiency of pumping water resulting in an overall conservation of energy and water. Although there are additional costs associated with the water in a pressurized lateral as all of the users are metered and pay the portion of the power costs relative to the amount of water they used. This requires one field member to spend one day a month reading the meters to accurately allocate the power costs and to verify that each water user stays within their allotted duty. Every lateral replaced with a buried pipeline should be evaluated for pressurization on the basis of cost effectiveness.

**Piping or Lining Earthen Canals**

One of the potentially most effective water conservation measures available to HID is the replacement of canal laterals with buried pipelines. This could significantly reduce both seepage and spillage losses along laterals. This will not be an appropriate measure for all laterals, but should be the goal for those for which it is.

In 2015 the District began developing a system for repairing canals and reducing losses. The District discovered that the seepage losses had significantly increased in the last seven years. It appeared that this was an effect overcleaning the canals by mechanical methods. After some research, the District decided to haul in bentonite, combine it with the soils along the ditch banks, reshape and compact the canals and ditch roads. The result of this method has been promising. The Feed Canal, for example, had recorded losses of up to 38% in 2014. In 2016 the losses had reduced to 22%.

**Repair of Canals**

Although seepage tests suggested that canal seepage losses are relatively low, some canal repair is needed to maintain adequate capacity. The A-Line from South Edwards Road, and especially Canal Road, to South Ott Road is in need of such repair. Along this stretch of canal the up-slope side is extensively broken and sloughing into the canal. This damage has been the result of high water levels therefore, any repair must also include drainage along the up-slope side. As a result of this information, HID has developed and implemented a panel replacement program by which panels along of canals are evaluate and replaced beginning with the most damaged.

One lateral not tested for seepage losses was the M-Line. However, inspection of this lateral suggests that repair may be warranted. The M-Line was originally concrete lined, but the lining is so badly broken and in places gone that it has become an earthen canal. Since this canal crosses areas that have typically sandy soils, it is assumed that seepage rates are higher than for canals tested. Seepage tests should be conducted on this lateral and losses calculated. Based on this test a determination of the cost effectiveness of repairing or replacing this canal should be made.

**Installation of Measurement Structures**

The flow into every District lateral should be measured. Therefore, flow measurement structures or devices need to be installed. For laterals that are and will continue to be open-ditches, some type of weir or flume structure will be most appropriate. Depending on the type and size of the lateral. For laterals that are or will be buried pipelines, in-line propeller meters can be used. Additionally, where users receive their water directly from a buried pipeline lateral or withdraw it through a private pump, individual farm turn-outs can be equipped with propeller meters. The measurement of flow rates may not directly produce water conservation, but without the ability to measure flows no meaningful conservation measure can be implemented or documented.

**Repair or Replacement of Control Structures**

Along with the ability to measure flows, the ability to regulate flows is also essential. Most lateral turn-outs have some type of slide gate to regulate flows. Typically, these gates are not in the best condition. Along open-ditch laterals, diversion structures are usually concrete boxes with notched openings closed with wooden planks. Both the concrete and the wooden planks are usually in poor condition.

All control structures must be water-tight and in good working condition. Initially, a survey needs to be carried out to identify every control structure. This survey should include the location, type, service area, and condition of each structure. Next, the determination must be made of whether the structure can be repaired or should be replaced. Finally, a prioritized schedule developed for the repair and/or replacement of all control structures.

**Modification of Colds Springs Reservoir**

Losses and gains associated with the Cold Springs Reservoir are difficult to accurately measure. The only practical action that could be implemented to reduce losses would be to remove trees from around the reservoir, thus, reducing their evapotranspiration losses. For the period from October 1998 through September 1999 these losses were estimated to be over 1,600 ac-ft. However, removing trees would probably result in heating the area and, thereby, increasing evaporation losses. Also, removal of the trees would have a detrimental impact on the area as a wildlife refuge. Therefore, this action is not considered viable nor is it recommended.

The 20 percent losses associated with the Feed Canal and the Cold Springs Reservoir are significant, but unavoidable. The practical improvement of delivery efficiencies will be achieved below Cold Springs Reservoir.

**Drainage Water Pump Back Systems**

One possible source of additional water is the drainage leaving the district. Particularly the Cold Springs and North Hermiston Drains have significant flows during the irrigation season. To evaluate the potential use of this water a period of testing is needed to determine both the quantity and quality of drainage water. If the flows are found adequate and without contamination then drainage water pump back systems could be utilized to serve tail portions of several laterals.

Along with improvements to the facilities, improvements to HID operations are necessary before actual water savings can be realized. Procedures will need to be developed and implemented to utilize the new measurement and improved control structures. In addition, two other potential changes should be considered. These changes are converting from a rotational to a demand delivery schedule and establishing an alternative rate structure.

**Conversion from a Rotational to a Demand Delivery Schedule**

As originally designed and constructed, HID delivered water for gravity irrigation. For this type of irrigation, water is best delivered on a rotational schedule. Under this type of schedule one irrigator along a lateral receives all of the water for a period of time. When he is finished the next in line then receives his share. Typically, a user receives his share once a week at the same time for the same duration.

A rotational schedule is not well suited to other methods of irrigation. Sprinkle, whether using lines, pivots, or drip irrigation is best served by a demand schedule. Under a demand schedule each user can receive his share continuously when he needs it. For HID to convert from a rotational to a demand delivery schedule, procedures will need to be developed that will enable the district to project and supply daily water needs. The challenge is to match daily deliveries to usage. Deliveries that exceed usage will result in spills while inadequate deliveries will produce conflicts.

Implementation of a demand delivery schedule will require a comprehensive monitoring plan and an understanding of required response times. Also, water users irrigating larger parcels can be required to notify the district of their weekly plans. It will take time to develop and implement a new delivery schedule.

**Alternative Rate Structure**

Existing water payments are based on acreage and are assessed on a calendar year basis. Except for the areas with pressurized systems where users indirectly pay for the water they receive through power costs, users do not pay for the water they receive. With adequate water measurement, a rate structure could be developed whereby assessments are partially tied to the amounts of water used. People value only that which costs them something. Unless water has a directly associated cost it will be difficult to encourage users to conserve it.

**On-Farm Improvements**

A complete water management plan must include farm level improvements. Though the district cannot mandate such improvements, it can encourage and help facilitate them. The two primary farm level improvements identified are the conversion from gravity to sprinkler irrigation and irrigation scheduling.

**Conversion from Gravity to Sprinkle Irrigation**

The estimated 4,000 acres of gravity irrigation within the district need to be converted to sprinkle (or drip) irrigation. This conversion could best be accomplished in areas served by laterals that are converted to pipelines and/or are pressurized.

The majority of flood irrigated acreage is pasture. Also, many of these acres would be only marginally suitable for other crops due to slope and soil limitations. In addition to the cost, these are constraints to the needed conversion.

**Irrigation Scheduling Assistance**

The district needs to encourage all water users to utilize available irrigation scheduling assistance. This will primarily mean educating users in how to access and utilize the assistance available to them. Some of this education can be accomplished through written matters mailed to users. Additionally, the district could provide irrigation scheduling workshops. Workshops should target different system types and sizes.

**Alternatives to Finance Conservation Programs**

To facilitate improvements, the issue of financing will need to be addressed. Improvements at the district level can be paid for with existing district funds and/or USBR grants. For farm level improvements, the HID should investigate funds available from state and federal agencies and from local electric utilities to provide low-interest loans or cost sharing to individual landowners. Following is a partial list of potential fund providers:

United States Bureau of Reclamation (USBR)

Natural Resources Conservation Service (NRCS)

Oregon Watershed Enhancement Board (OWEB)

Umatilla Electric Cooperative (UEC)

Bonneville Power Administration (BPA) / Fish Enhancement Program

Oregon Department of Agriculture

Oregon Water Resources Program

Private Foundations

**Section 2.7: Description and Estimated Schedule for Implementation of the Conservation Measures – OAR 690-086-0250(7)**

The District strongly promotes local private groups and agencies in water conservation and management activities and programs, i.e. United States Department of Agriculture, Natural Resources Conservation Service, Oregon Watershed Enhancement Board, Umatilla County Soil and Water Conservation District, Oregon State University Agricultural Research and Extension Center, Special District Association of Oregon, power companies and consultants. HID constantly seeks out cost share programs and low interest loans that might assist patrons to improve farm practices.

Economically feasible water conservation projects are being aggressively pursued and implemented. Feasibility is based on sufficient detailed engineering evaluations to support accurate decisions. The implementation of all identified measures will take a number of years. A specific implementation schedule cannot be developed due to uncertainties in climate, funding and scheduling of tasks. However, the District is actively working with engineers to develop shovel ready projects and to install flow measurements devices on laterals at this time.

A list of immediate, short and long-term goals are listed in Section 2.4 all of which are expected enhance operations, maintenance and conservation efforts. It is the intention of this Manager that the tasks will generally be completed in those timeframes.

**Information and Education Program**

In addition to its online presence, the District provides information on conservation and best practices through its newsletter. The District Manager also does outreach presentations to special interest groups including water users, realtors, title companies, municipal groups, etc. HID also assists the Natural Resources Conservation Services, Oregon Watershed Enhancement Board, Soil and Water Conservation Districts, Oregon Farm Bureau, colleges and universities in sending out literature regarding financing programs, best practice, surveys and conservation information. Lastly, HID participates in the BOR’s Otto Otter program by delivering canal safety coloring books to each third-grade class in the Hermiston School District.

**Other Feasible Conservation Measures**

HID has water delivered through the Phase II system later in the season to reduce evaporation losses. HID regularly upgrades and replaces leaky gates and control structures to farm turnouts. HID requires landowners to install piped deliveries for sprinkle irrigation as a requirement of approval of land partitions.

**Section 2.8: Program for Monitoring and Evaluation of Conservation Measures – OAR 690-086-0250(8)**

Capital improvement projects are likely to be done with cooperative funding partnerships from state and/or federal agency programs. At the time of project funding, the method of evaluation will be consistent with the funding agency’s criteria.

**SECTION 3: WATER ALLOCATION/CURTAILMENT ELEMENT – OAR 690-086-0260**

**Section 3.1: Frequency and Magnitude of Past Supply Deficiencies – OAR 690-086-0260(1)**

The Umatilla Basin has seen its fair share of dry years. From 2001-2005 and 2010-2016 the Umatilla Basin has had very low precipitation. HID has been fortunate to take part in the Umatilla Basin Exchange Program with the USBR. Even if Cold Springs Reservoir does not fill by way of the Umatilla River, the District can have its water pumped into the Reservoir by way of the Columbia River using water exchange credits accumulated as the result of curtailing Umatilla River diversions when necessary to meet in-stream flow targets on the Umatilla River.

**Section 3.2: Criteria for Implementation of Water Allocation/Curtailment Element – OAR 690-086-02690(2)**

HID’s criteria for implementation of water allocation/curtailment could be triggered by drought, catastrophic failure or contamination.

**Drought Planning**

The Managers from the for local irrigation districts meet at least once a month, more often during low water years, to review current issues pertaining to irrigation water, (i.e. supply, diversion, snow survey and runoff forecast data, flow records, pending rules, etc.) The four districts, OWRD, USBR, ODF&W, the Confederated Tribes of the Umatilla Indian Reservation, Bonneville Power Association and anyone else involved the Umatilla River meet monthly for a River Operation Group Meeting to discuss river operations and maintenance issues.

Again, due to the availability of water through the Umatilla Basin Exchange Program a full duty of water is seldom an issue.

**Allocation/Curtailment Plan and Procedures**

**Curtailment**

* Delay turn-on date to conserve water for peak consumptive use period based on a shortened estimated season water delivery requirement or provide early season water
* Decrease operational spills to near zero
* Provide intensive information program to users on reducing on-farm water use
* Evaluate the potential for providing financial incentives to users for reduced delivery, based on availability of outside non-district resource funding
* Intensify aquatic weed control within and alongside of canals to reduce water use consumption
* Where applicable, evaluate potential for installing temporary or permanent critical water conservation measures in high water loss areas, i.e. pipelines, canal linings, etc.
* Provide comprehensive weekly analysis of water availability during irrigation delivery to ditch riders and patrons

**Allocation**

* Voluntary reductions are requested
* Implement a rotation schedule
* Water delivery to all users will be reduced unilaterally in accordance with projected percentage reduction in water supply
* Not irrigating during selected periods, i.e. during peak use period, or quit irrigating for the remainder of the season after a selected month/day
* During extreme drought condition or the last-and-worst case, under specific direction of the Board of Directors, water will be shut off when it is deemed impractical to maintain canal and lateral flow for deliveries to users for the remainder of the year

**Section 3.3: Procedure for Allocating Water During Shortages – OAR 690-086-0260(3)**

Only one year (1977) in the last fifty was Cold Springs Reservoir not full at the beginning of the irrigation season. There was insufficient flow in the Umatilla River that year because of drought. That year water allocations were uniformly reduced to all water users. The common problem is, with the identified inefficiencies, the stored water is depleted before the irrigation season is completed. When that point is reached the water is shut off. The District Manager makes the decision to shut off water based on many factors, such as water availability, demand, weather, etc.

In an emergency situation such as contamination the District Manager would make the call to discontinue delivery and shut down the system based on time of year, location, type of disaster, re-entry interval, etc. The District Manager would send out notices and cause the field crew to notify water users of the nature of the emergency, anticipated shut off time, protocols, etc.

**SECTION 4: WATER SUPPLY ELEMENT – OAR 690-086-0270**

**Section 4.1: Long Range Water Demand Projections – OAR 690-086-0270(1)**

The District will continue to investigate various sources of accurate information on events that effect crop water use or water supply. With respect to population changes and water demand, the City of Hermiston is one of the fastest growing communities in Eastern Oregon. Hermiston is expanding into the country and what was once farm land is now housing developments. HID continues to monitor these developments and does not anticipate needing additional water supplies. As a result of urbanization in the Hermiston area, the District is working to preserve agricultural lands by transferring water rights from lands as they are developed to other lands. In conjunction with these transfers, the District will likely explore alternatives for modification of the district boundary in future.

**Section 4.2: Projected Water Needs and Reliability of Water Rights – OAR 690-086-0270(2)**

HID anticipates that agricultural demands for water will remain relatively constant during the next twenty years. Urbanization may result in modest changes in water demands. However, the effect of these changes on the District’s available water supply is not expected to be significant and can be accommodated within the District’s water rights.

**Section 4.3: Potential Water Sources – OAR 690-086-0270(3)**

1. The USBR has done some RiverWare modeling on the potential of HID taking all of its water exclusively through the Phase II Columbia River System
2. The possible challenge of pump back systems on the return flows could be explored.

**Section 4.4: Comparison of Potential Water Sources – OAR 690-086-0270(4)**

1. Besides irrigation, the other beneficial use within the district is from wells to meet domestic, municipal, and industrial needs. The principle aquifers of the Lower Umatilla Basin occur in alluvial sands and gravels that overlie Columbia River basalt flows and in porous breccia zones within the basalt flows. The alluvial aquifer and the upper two or three basalt aquifers are the principal sources of domestic groundwater in the basin.

The majority of the HID is located over a natural basalt trough (the Hermiston Trough) filled with alluvial sands and gravels. The saturated portions of these sediments are characterized by low hydraulic gradients (typically less than 10 feet per mile) and high yields (up to 4,000 gpm). Aquifer tests have indicated hydraulic conductivities between 1,000 and 4,000 feet per day.

The recharge of this aquifer comes from the deep percolation of both precipitation and excess irrigation (percolation below the root zone) and from seepage from Cold Springs Reservoir and HID canals. Groundwater in this shallow aquifer is constantly flowing toward the Columbia and Umatilla Rivers. Some of this flow is discharged from the groundwater system to become stream flow in the previously identified drains while the rest will directly discharge into the rivers themselves. Under natural conditions, the average annual discharge from an aquifer is in equilibrium with the average annual recharge, the volume of water in storage is constant, and water levels in the aquifer are stable. Artificial recharge or discharge can disrupt this stability.

The existing information for the Hermiston trough suggests that groundwater levels are stable. Additional pumping capacity is probably available in this area but conservation measures by HID and/or a decreased use of the Feed Canal may adversely impact groundwater supplies.

1. There may be many challenges and concerns based on the effects of reducing the flow in the Umatilla River during critical periods.

**Section 4.5: Evaluation of the Effects of Long Range Water Needs OAR 690-086-0270(5)**

HID has not investigated options outside of its current operating plan. Within the five-year planning period of this WMCP, it is expected that current water service will meet current and future needs.

Urbanization of lands within the District is an issue, but so far not a major problem. However, the District is working with the City and County on issues to make sure that all deliveries can be maintained. The District attempts to ensure that delivery easements are recorded for each new partition, plat and building permit.

Other land use trends that affect the District are large parcels being split up into smaller parcels. This results in more water deliveries increasing cost overhead for the District. In subdivision of land, the District asks the land owner to transfer the water rights off the property if the lands can be served by City utilities.

**SECTION 5: ADDITIONAL REQUIREMENTS OAR 690-086-0225**

**Section 5.1: List of Affected Governments, Copy of Comments – OAR 690-086-0225(5)**

At least 30 days prior to submitting a draft plan to OWRD, each agricultural water supplier must make the draft plan available for review by each affected local government.

Consistent with these rules, HID provided the draft plan to Bureau of Reclamation, Confederated Tribes of the Umatilla Indian Reservation, Umatilla County Planning Department, City of Hermiston, City of Stanfield, City of Echo, and the Port of Umatilla for review 30 days prior to submitting a draft plan to OWRD. As a courtesy, the District also included Stanfield Irrigation District, Westland Irrigation District and West Extension Irrigation District.

**Section 5.2: Submittal of Updated Plan, Implementation Schedule – OAR 690-086-0225(6)**

The primary implementation activities identified in the WMCP involve capital improvement projects which can take significant time to implement given funding constraints and construction timelines. With respect to available current supplies, the District can generally meet existing needs.

However, the District does anticipate impacts from urbanization, conservation efforts, and projects will happen over the next five to ten years. HID proposes to update the WMCP in five years. An updated plan will be submitted to OWRD by April 1, 2023.

**Respectfully Submitted by:**

**Annette Kirkpatrick**

**District Manager**

**Hermiston Irrigation District**

**This Water Conservation Plan is to be used as a guide for potential future improvements within the district and does not obligate the district to any specific projects and/or time line.**