PINEY CRUSE DIVERSION LEVEL II STUDY

Executive Summary

Prepared for:

Wyoming Water Development Commission

Submitted by:

EnTech, Inc.

Professional Engineers
1949 Sugarland Drive, Suite 205
Sheridan, WY 82801

In association with

WENCK

Responsive partner. Exceptional outcomes.

May, 2016
PINEY CRUSE DIVERSION LEVEL II STUDY

Executive Summary

Prepared for:

Wyoming Water Development Commission

Submitted by:

EnTech Inc.

In association with

WENCK

May, 2016
TABLE OF CONTENTS

1. INTRODUCTION ................................................................. 1
2. EXISTING SYSTEM DESCRIPTION AND INVENTORY ........................................... 2
   2.1. Structure Inventory and Assessment .................................................. 3
   2.1.1 South Piney Creek Diversion and Related Structures ...................... 3
   2.1.2 North Piney Creek Diversion and Related Structures ...................... 4
   2.1.3 North Piney Ditch Section ....................................................... 4
3. REHABILITATION AND MANAGEMENT PLAN .................................................. 4
   3.1. Structural Alternatives ............................................................ 4
   3.2 Alternative NPJD – North Piney Creek Joint Diversion Alternative
       In Conjunction with PDWSC .......................................................... 5
4. RECOMMENDED ALTERNATIVES AND PROJECT FINANCING .................................. 7
   4.1 Recommended Alternatives .......................................................... 7
   4.2 South Piney Creek Diversion Alternatives ........................................ 8
   4.3 North Piney Creek Diversion Alternatives ........................................ 8
5. PATH FORWARD ................................................................. 10

LIST OF TABLES

<table>
<thead>
<tr>
<th>NO.</th>
<th>TITLE</th>
<th>PAGE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SUMMARY OF STRUCTURES EVALUATED</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>PROJECT FINANCING – SOUTH PINEY CREEK DIVERSION</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>COMPARISON OF NORTH PINEY CREEK DIVERSION ALTERNATIVES</td>
<td>9</td>
</tr>
</tbody>
</table>

LIST OF FIGURES

<table>
<thead>
<tr>
<th>NO.</th>
<th>TITLE</th>
<th>PAGE NO. OR FOLLOWING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VICINITY MAP ...........................................</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>AREAS WITH EROSION-RELATED PROBLEMS AS IDENTIFIED IN 2000 PRAIRIE DOG WATERSHED MASTER PLAN, LEVEL I STUDY</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>LOCATION OF THREE COMPONENTS BEING EVALUATED</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>LOCATION MAP FOR LEVEL III IMPROVEMENTS PROJECT</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>DISTRICT BOUNDARIES AND FACILITIES</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>HISTORICAL DIVERSIONS AT DISTRICT’S NORTH PINEY CREEK DIVERSION</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>ALTERNATIVE NPJD - NORTH PINEY CREEK JOINT DIVERSION ALTERNATIVE</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>HISTORICAL MAXIMUM DIVERSIONS FROM NORTH PINEY CRUSE AND PDWSC DITCHES PER BOARD OF CONTROL RECORDS</td>
<td>6</td>
</tr>
<tr>
<td>9</td>
<td>ALTERNATIVE NPJD PLAN AND PROFILE</td>
<td>7</td>
</tr>
</tbody>
</table>
1. INTRODUCTION

The Piney and Cruse Creek Ditch Company (Ditch Company) of Sheridan County, Wyoming owns certain improvements that are utilized by shareholders of the Ditch Company to divert and convey irrigation water to their respective lands located in southern Sheridan County. In 2000, EnTech, Inc. Professional Engineers of Sheridan (EnTech) completed a watershed master plan for the Wyoming Water Development Commission (WWDC) entitled the Prairie Dog Creek Watershed Master Plan Level I Study. This Level I study identified three irrigation water conveyance ditches in the area of Tunnel Hill immediately north of the community of Story as significant sources of erosion-related problems within the Prairie Dog Creek basin. The ditch owned by the Ditch Company is known as the Piney Cruse Ditch, whereas the other ditches are owned by two other ditch companies that convey Piney Creek water into the Prairie Dog Creek basin, namely:

1. the Prairie Dog Ditch, owned by Prairie Dog Water Supply Company (PDWSC); and
2. the Mead-Coffeen Ditch, owned by the Meade Creek Ditch Company (MCDC).

Figure 1 portrays the general vicinity of these three erosion-related areas, and Figure 2 portrays their locations with respect to North Piney Creek, Tunnel Hill and the Story community.

In 2005, EnTech completed a Level II study for the WWDC identifying deficiencies and recommending remedies for the improvements owned by the MCDC. That study also included a reconnaissance-level study of the facilities owned by the Ditch Company in the Story area, specifically in the area around Tunnel Hill. The 2005 Level II study reviewed alternatives for conveying the Ditch Company’s water in the area around Tunnel Hill along with the water owned by the MCDC. Members of the MCDC went on to form the Meade Creek Ditch Company Irrigation District and resolved their erosion-related problems independent of the Ditch Company with improvements constructed in 2006 and 2007. These improvements were funded, in part, using WWDC monies. Portions of the Prairie Dog Ditch’s erosion-related problems had previously been rectified in the mid-1990s, although large sections of the Prairie Dog Ditch in this vicinity continue to suffer from these problems to this day.

The 2014 Wyoming State Legislature appropriated $75,000 for the Piney Cruse Diversion Level II Study (the 2016 Level II Study), to be completed in 2016. In June 2014, a contract was signed between the WWDC and EnTech to perform the 2016 Level II Study. The scope of the 2016 Level II Study includes, among other items, an evaluation of three components of the Ditch Company’s existing irrigation water delivery system. These three components are:

1. the South Piney Creek Diversion and related structures,
2. the North Piney Creek Diversion and related structures, and
3. that section of the Piney Cruse Ditch which extends from the North Piney Creek Diversion to the Tunnel Hill cut, a/k/a Drop #1. This section of the Piney Cruse Ditch will henceforth be referred to as "the North Piney Ditch Section".

The locations of these three facilities are shown in Figure 3.

In December 2012, the State of Wyoming District Court in and for Sheridan County issued a decree establishing the Piney & Cruse Creek Ditch Company Irrigation District (District). The principal reason why the District was formed was to provide an opportunity to utilize monies available from the WWDC to fund improvements to the water facilities currently owned by the Ditch Company. The boundaries of the District are essentially the same as those served by the Ditch Company. In establishing the District, no assets of the Ditch Company were transferred to the District at that time, and none have been transferred as of the completion date of this 2016 Level II Study. As a result, the District has no fixed assets at this time.
FIG. 1
PINEY CRUSE DIVERSION LEVEL II STUDY
VICINITY MAP

GENERAL AREA OF EROSION-RELATED PROBLEMS INCURRED BY THREE DITCH COMPANIES CONVEYING IRRIGATION WATER THROUGH TUNNEL HILL
FIG. 2

PINEY CRUSE DIVERSION LEVEL II STUDY

AREAS WITH EROSION-RELATED PROBLEMS AS IDENTIFIED IN 2000 PRAIRIE DOG WATERSHED MASTER PLAN, LEVEL I STUDY

MCDC'S MEAD-COFFEEN DITCH EROSION-RELATED PROBLEMS (SITUATION RECTIFIED IN 2007)

DISTRICT'S PINEY CRUSE DITCH EROSION-RELATED PROBLEMS

PDWSC'S PRAIRIE DOG DITCH EROSION-RELATED PROBLEMS (SITUATION PARTIALLY RECTIFIED IN MID-1990s)
In addition to the $75,000 Level II appropriation, the 2014 Legislature also appropriated $855,000 of Level III funding to be used by the District for the “design and construction of water canal improvements and appurtenances”. The preliminary design of these “water canal improvements and appurtenances” was completed in April of 2015. The “water canal improvements and appurtenances” involve conveying irrigation water used by the Ditch Company’s members from the North Piney Ditch Section to a point downstream of both Drop #1 and a second drop hereinafter known as Drop #2. Drop #1 is an erosion cut through Tunnel Hill, created many decades ago as a result of the Ditch Company’s water eroding through Tunnel Hill as it spilled from the North Piney Ditch Section into the Prairie Dog Creek basin. Drop #2 is another erosion cut through a hillside immediately north of the crest of Tunnel Hill. Figure 4 portrays the locations of the two drops and currently proposed Level III improvements that are utilizing Level III funding (henceforth referred to as the “Level III Improvements Project”). Construction of the Level III improvements was originally scheduled for the fall of 2015 and winter of 2016. However, due to easement access issues, construction of the Level III improvements has not moved forward as originally planned.

2. EXISTING SYSTEM DESCRIPTION AND INVENTORY

While it is obvious that there are differences between the Ditch Company and the District, in many ways it is difficult to differentiate between the two entities when examining the existing conditions and providing recommendations on various alternatives and associated funding. As a result, for purposes of simplicity, henceforth in this 2016 Level II Study the term “District” will be used throughout to define the project sponsor and entity providing irrigation water when, in actuality, at times the more correct term may be “Ditch Company”.

The District is located in southern Sheridan County, with all lands within its boundaries located north of Story. The District’s boundaries and main irrigation ditch (the Piney Cruse Ditch) are depicted in Figure 5. As shown in both Figures 3 and 5, the Piney Cruse Ditch originates at a diversion point located on South Piney Creek. From there, a “crossover” ditch extends through the community of Story, conveying water from South Piney Creek to North Piney Creek. No major diversions take place in the crossover ditch through Story, although there are approximately 31 small property owners who take minor amounts of water from the crossover ditch in this area for purposes such as lawn and garden watering. There also three other property owners that pump water from the North Piney Ditch Section up to their properties on the top of Tunnel Hill. The group members possess no direct flow right to divert from the crossover ditch. Instead, they own shares of Kearney Lake Reservoir water which is conveyed to and through their properties via the crossover ditch or the North Piney Ditch Section. The District imposes a nominal fee to convey this water.

Once water conveyed via the crossover ditch enters North Piney Creek, it commingles with water in this creek and flows downstream to a second diversion point, at which point it is diverted easterly into the North Piney Ditch Section. The North Piney Ditch Section is approximately 1,400 feet long. At the end of the North Piney Ditch Section, water then flows north through Drop #1, then along another section of the Piney Cruse Ditch until it enters Drop #2. Between Drop #1 and Drop #2 is located the first irrigation point of diversion, which pressurizes a water system on the Phillips Ranch. Water then cascades down Drop #2 until it enters another section of the Piney Cruse Ditch, which is much less steep than either Drop #1’s or Drop #2’s channels and, therefore, does not have the erosion problems associated with the two drops.
FIG. 3
PINEY CRUSE DIVERSION LEVEL II STUDY
LOCATION OF THREE COMPONENTS BEING EVALUATED (SHOWN IN RED)
Once at the end of Drop #2, irrigation water in the Piney Cruse Ditch flows in generally a northerly direction for delivery to the District’s other water users.

Figure 6 shows the peak-day flows diverted for the Piney Cruse Ditch from 1980-2015, as recorded by the Wyoming State Board of Control (BOC) at the North Piney Creek Diversion. As can be seen, there has been a general downward trend over time in the annual peak-day diversions. According to District officials, the flow in Piney Cruse Ditch downstream of Drop #1 cannot exceed 20 cfs without overtopping, thus the limitation on the amount of flow up to this 20-cfs rate over the past several years.

![Figure 6 – Historical Diversions at District’s North Piney Creek Diversion (Source: Wyoming State Board of Control)](image)

2.1 Structure Inventory and Assessment

2.1.1 South Piney Creek Diversion and Related Structures

The South Piney Creek Diversion Dam diverts water out of South Piney Creek into the Story crossover ditch. The diversion dam is located in the SE¼SW¼ of Section 13, T53N, R83W. The diversion dam’s crest consists generally of large boulders extending into the stream channel for a distance of approximately 23 feet. Due to the large variation in flow rates in South Piney Creek throughout the year, the large boulders are either moved by the creek’s force or District personnel (during low flow, in order to increase the water surface elevation in the creek to enable water to flow into the crossover ditch). Overall, the structure is somewhat primitive in nature, although it has generally met the need to divert South Piney Creek water into the crossover ditch.

Once water leaves the South Piney Creek diversion, it flows into the crossover ditch, where it travels a distance of approximately 11,600 feet through the community of Story before entering North Piney Creek in the NW¼SW¼ of Section 8, T53N, R83W.
2.1.2 North Piney Creek Diversion and Related Structures

The North Piney Creek Diversion Dam is located within a braided portion of North Piney Creek. It is located approximately 1,000 feet downstream of the point where water in the crossover ditch from South Piney Creek enters North Piney Creek. The North Piney Creek Diversion Dam is located in the NW¼SW¼ of Section 8, T53N, R83W.

As opposed to the South Piney Creek Diversion, the North Piney Creek Diversion Dam has a concrete headwall. This headwall completely spans the channel braid during all but the highest flows. It is two feet thick and contains a notched opening approximately 11 feet wide, with the notched opening showing considerable wear, apparently from its many years of service. Two headgates are located at the diversion dam. Downstream of the dam along the North Piney Ditch Section are both an 8-foot wide measurement flume and a wasteway.

2.1.3 North Piney Ditch Section

As defined previously, the North Piney Ditch Section is that section of the Piney Cruse Ditch which extends from the North Piney Creek Diversion to Drop #1. This ditch section has a length of approximately 1,400 feet prior to entering Drop #1. It conveys water principally during the summer irrigation season, except for runoff flowing directly off of the southerly side of Tunnel Hill.

The North Piney Ditch Section generally consists of an unlined trapezoidal channel with a 9-foot bottom width, 1.5:1 sideslopes, a maximum depth of 5’, and a slope of approximately 0.55%. There is and has been considerable vegetation, (both living and fallen) along and – in some cases – in some ditch segments. In addition to the considerable vegetation in some ditch segments, the North Piney Ditch Section has accumulated sediment and other types of debris throughout its years of operation, as mentioned previously. There are also three pumps located along the North Piney Ditch Section which pump irrigation water from the ditch up to properties located on Tunnel Hill.

3. REHABILITATION AND MANAGEMENT PLAN

3.1. Structural Alternatives

Several structural alternatives were considered for each of the study’s three principal focus areas; i.e., the South Piney Creek Diversion, the North Piney Creek Diversion, and the North Piney Ditch Section. The set of alternatives that is preferred depends in part upon the Level III Improvements Project now attempting to be implemented, which will determine the best means for conveying District water through and immediately north of Tunnel Hill. This 2016 Level II Study and the Level III Improvements Project are mutually dependent, as the location for the Intake Structure #1 for Pipeline #1 associated with the Level III Improvements Project will be determined in that project, while those intake and pipeline locations are being selected keeping in mind the merits and viability of the alternatives discussed in this 2016 Level II Study.

Table 1 provides a summary of the various structures evaluated at each of the three principal focus areas, as well as estimate costs to implement them.
<table>
<thead>
<tr>
<th>Alternative</th>
<th>Description</th>
<th>Cost Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPD1</td>
<td>Install New Diversion Dam and Related Structures at Existing Location</td>
<td>$555,000</td>
</tr>
<tr>
<td>SPD2</td>
<td>Repair/Upgrade Existing Diversion Dam and Related Structures at Existing Location</td>
<td>$413,000</td>
</tr>
<tr>
<td>SPD3</td>
<td>Install New Cross-Vane Diversion Dam and Related Structures at Existing Location</td>
<td>No Cost – Alternative Rejected</td>
</tr>
<tr>
<td>SPD4</td>
<td>Do Nothing</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Description</th>
<th>Cost Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPD1</td>
<td>Install New Diversion Dam and Related Structures at Existing Location</td>
<td>$555,000</td>
</tr>
<tr>
<td>SPD2</td>
<td>Repair/Upgrade Existing Diversion Dam and Related Structures at Existing Location</td>
<td>$413,000</td>
</tr>
<tr>
<td>SPD3</td>
<td>Install New Cross-Vane Diversion Dam and Related Structures at Existing Location</td>
<td>No Cost – Alternative Rejected</td>
</tr>
<tr>
<td>SPD4</td>
<td>Do Nothing</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Description</th>
<th>Cost Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPD1</td>
<td>Relocate to Downstream Location Upstream of PDWSC Diversion Dam</td>
<td>No Cost – Alternative Rejected</td>
</tr>
<tr>
<td>NPD2</td>
<td>Install New Diversion Dam and Related Structures at Existing Location with SCADA System</td>
<td>$1,048,000</td>
</tr>
<tr>
<td>NPD3</td>
<td>Install New Diversion Dam and Related Structures at Existing Location without SCADA System</td>
<td>$901,000</td>
</tr>
<tr>
<td>NPD4</td>
<td>Install New Diversion Dam and Related Structures Similar to Existing Structures at Existing Locations</td>
<td>$600,000</td>
</tr>
<tr>
<td>NPD5</td>
<td>Install New Grouted Rock Diversion Dam at Existing Location</td>
<td>$680,000</td>
</tr>
<tr>
<td>NPD6</td>
<td>Repair/Upgrade Existing Diversion Dam and Related Structures in Lieu of Replacing Them</td>
<td>No Cost – Alternative Rejected (maintenance vs. capital construction)</td>
</tr>
<tr>
<td>NPD7</td>
<td>Do Nothing</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Description</th>
<th>Cost Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPDS1</td>
<td>Install Piping from North Piney Creek Diversion Dam to Tunnel Hill Inlet Structure</td>
<td>$476,000</td>
</tr>
<tr>
<td>NPDS2</td>
<td>Line Existing Ditch from North Piney Creek Diversion Dam to Tunnel Hill Inlet Structure</td>
<td>$251,000</td>
</tr>
<tr>
<td>NPDS3</td>
<td>Cleaning Existing Ditch from North Piney Creek Diversion Dam to Tunnel Hill Inlet Structure</td>
<td>$25,000 (maintenance vs. capital construction)</td>
</tr>
<tr>
<td>NPDS4</td>
<td>Do Nothing</td>
<td></td>
</tr>
</tbody>
</table>

3.2 Alternative NPJD - North Piney Creek Joint Diversion Alternative In Conjunction with PDWSC

With this alternative, the existing North Piney Creek Diversion Dam and the North Piney Ditch Section would be entirely abandoned, and both District water and PDWSC water would be jointly diverted out of North Piney Creek via the PDWSC’s existing diversion dam. It takes advantage of the fact that the existing PDWSC Ditch comes within twenty feet of the North Piney Ditch Section at the point that it currently flows into Drop #1. The PDWSC’s existing ditch...
would convey both Piney Cruse and PDWSC water for approximately 250 feet, at which point a structure would be constructed off of the PDWSC Ditch that would divert Piney Cruse water into a new pipeline (Pipeline #1J) for conveyance through Tunnel Hill and beneath Drop #1. From that point, PDWSC water would be conveyed east via its existing ditch as it has historically done.

Alternative NPJD was initially discussed between board members of the District and PDWSC board in May of 2014, but was rejected at that time by the PDWSC board members. However, since that time, further discussions have been held between these parties, and these discussions have resulted in a belief that this concept warrants further investigation.

Alternative NPJD is depicted in Figure 7. It varies substantially from previous alternatives involving the North Piney Creek Diversion Dam and the North Piney Ditch Section, because there would no longer be a need for:

- a North Piney Diversion Dam that would divert irrigation water for solely District water; nor
- the North Piney Ditch Section in its entirety.

The PDWSC ditch’s conveyance capacity was measured as part of this study. It has a maximum estimated capacity of 210 cfs between the point of diversion and the proposed Piney Cruse Ditch diversion, assuming a minimum freeboard of six inches between the water surface elevation and the bottom chord of the bridge.

Figure 8 is a chart depicting historical North Piney Creek diversions into the North Piney Ditch Section and PDWSC Ditch from the two respective diversions, as measured by the BOC since 2000. Note that the sum of the two ditches’ flows over the past few years is roughly equal to solely the PDWSC Ditch’s flows in the early 2000s. This summation underscores the fact that, with time, diversions into both ditches from North Piney Creek are decreasing.

![Figure 8](image-url)
Pipeline #1 (shown in Figure 4) is part of the Level III Improvements Project, to be constructed through Tunnel Hill for delivery of water to the north side of this hill, eliminating the need for water to flow via the existing Drop #1 route. For Alternative NPJD, Pipeline #1J would be constructed beneath the flow line of Drop #1. (See Figure 9.) At the end of Pipeline #1J, an energy dissipation structure (EDS #1J) would be constructed, which would be within and have an overflow elevation of approximately the same elevation as the Piney Cruse Ditch at this spot. Irrigation water would then flow over the top of EDS #1J and downstream for the District’s water users.

At this time, the PDWSC has no plans to improve their existing diversion facilities and headgates, in light of the fact that the joint diversion of water does not necessitate enlargement of them. It will be necessary for the District and the PDWSC to negotiate an agreement to utilize these facilities jointly, which will include costs to operate and maintain them between the diversion dam in North Piney Creek and Inlet Structure #1J. All proposed new facilities will be owned by the District.

4. RECOMMENDED ALTERNATIVES AND PROJECT FINANCING

In order to assist the District and various funding agencies in determining a fair and equitable financing plan for any of the alternatives identified in Section 3, it is necessary to conduct an economic analysis associated with such a proposed financing plan. This analysis and plan must be adequate to address the needs of not only the WWDC, but also any other possible funding agency requirements. Potential funding sources can have requirements and/or limitations on the types of projects eligible for assistance.

Potential funding sources for the improvements discussed in this 2016 Level II Study include the following:

- WWDC (through its Water Development Account No. II), with possible 67% grants and 33% loans, with terms of 4% for a period of 30 years;
- the National Resources Conservation Services’ (NRCS) Environmental Quality Incentives Program (EQIP);
- NRCS’ PL-566 Program;
- the Environmental Protection Agency’s Section 319 program (with grants available up to 60% of project costs), which would likely be only available if Alternative NPJD was implemented;
- the Wyoming Department of Agriculture’s Water Quality Grant Program; and
- various Wyoming Game & Fish Department and U.S. Fish & Wildlife Service Fisheries Enhancement Programs for projects that would benefit the area’s fisheries (for projects such as fish passages).

4.1 Recommended Alternatives

Although both the South Piney Creek Diversion and North Piney Creek Diversion facilities are included in this 2016 Level II Study, they are in many ways separate projects. This is because neither project’s implementation requires the other project to be implemented simultaneously. Additionally, comparison of alternatives for the North Piney Creek Diversion facilities also must consider the proposed Level III Improvements Project, because implementation of Alternative NPJD would totally eliminate the need for both the North Piney Diversion Dam and the North Piney Ditch Section. For this reason, alternative comparisons will be made separately for any South Piney Creek and North Piney Creek improvements. For the comparison of alternatives associated with any North Piney Creek improvements, a combination of the various North Piney Diversion Dam and North Piney Ditch Section improvements will be compared to Alternative NPJD.
4.2 South Piney Creek Diversion Alternatives

Table 1 provided a summary of the various project alternatives considered for the South Piney Creek Diversion Dam and related structures. Costs contained in that summary are based upon the Year 2017, on the assumption that the District will not move forward with any recommended improvements until it completes the proposed Level III Improvements Project (or integrates them into an overall North Piney Creek project as proposed with Alternative NPJD).

For the South Piney Creek Diversion Dam and related structures, it is recommended that the District should begin the process of implementing Alternative SPD1 – Install New Dam and Related Structures at Existing Location. While this alternative may be the most expensive of the three considered, it would provide the District with the best long-term, reliable solution to divert water into the crossover ditch. Table 2 provides financial information on Alternative SPD1.

TABLE 2 – PROJECT FINANCING – SOUTH PINEY CREEK DIVERSION

<table>
<thead>
<tr>
<th>Recommended Project</th>
<th>Total Cost (2017 $)</th>
<th>WWDC Grant (67%)</th>
<th>NRCS EQIP, WG&amp;FD, and USF&amp;WS Funding, or WWDC Loan (33%)</th>
<th>Annual Payment (if WWDC loan: 4% for 30 yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPD1</td>
<td>$555,000</td>
<td>$371,850</td>
<td>$183,150</td>
<td>$10,592</td>
</tr>
</tbody>
</table>

Funding for this project is recommended to be obtained from the WWDC (67% grant) and, to a lesser extent, from possibly the NRCS’ EQIP program. In addition, and for the fish passage portion of the project only, there is the possibility that a portion of the funding could come from one of the various programs offered by the WG&FD or USF&WS. The degree to which the NRCS can participate using EQIP monies in this project is currently unknown. It could range from the remaining 33% of the project costs to no funding at all. The NRCS could even potentially design the improvements at no cost to the District (using in-house staff), as was the case for the MCDC improvements discussed in the Introduction. If EQIP, WG&FD or USF&WS funding cannot be obtained, the 33% funding could come from a 4%, 30-year loan obtained from the WWDC.

4.3 North Piney Creek Diversion Alternatives

Table 1 provided a summary of the various project alternatives considered for the North Piney Creek Diversion Dam and related structures. The table did not, however, include information on Alternative NPJD.

Although the District may not need to move forward immediately with improvements to the North Piney Creek Diversion Dam, its related structures and the North Piney Ditch Section, it is imperative that the District address the situations at Drop #1 and Drop #2; i.e., implement the Level III Improvements Project. Unfortunately, due to right-of-way issues discussed previously, construction of the Level III Improvements Project has not been able to move forward. In order to address Drop #1 and Drop #2, the District needs to proceed forward with either:

1. the originally proposed Level III Improvements Project (by somehow securing the necessary right-of-way via negotiations or other legal means); or
2. implementation of Alternative NPJD, which provides an alternative method to deliver water up to and beneath Drop #1 by construction of Inlet Structure#1J, Pipeline #1J, and EDS #1J.

Review plans for the Level III Improvements Project were submitted to the District and WWDC staff in April of 2015. Included with that submittal was a cost estimate to perform these improvements. That cost estimate showed that the cost for improvements related to Drop #1 was $438,000, and the cost for improvements related to Drop #2 was $415,000.
Table 3 provides a cost comparison of the range of alternatives for addressing the North Piney Creek Diversion and related structures, the North Piney Ditch Section, and proceeding forward with either the original Level III Improvements Project or utilizing Alternative NPJD, which modifies the improvements proposed for Drop #1 in the original Level III Improvements Project. Note that this cost comparison includes in each alternative the cost to construct the Drop #2 improvements associated with the Level III Improvements Project. Also included in this table is the estimated annual cost to the District if solely a WWDC loan is used to finance the non-WWDC portion of the various alternatives. As indicated previously, it may be possible to secure funding from the following sources to offset the loan portion of the various alternatives:

- NRCS’ EQIP; and
- Section 319 funding (available for Alternative NPJD only).

Not shown in this cost comparison are the Do Nothing alternatives, as it is reasoned that they are not acceptable alternatives and hence do not warrant further consideration.

Table 3 concludes that the most cost-effective method for the District to address all of the needs relating to Drop #1, Drop #2, the North Piney Diversion Dam and the North Piney Ditch Section would be to implement Alternative N. Alternative N has an estimated cost of $1,018,000 and includes the following components:

- Alternative NPJD, which entails the District and the PDWSC jointly utilizing the existing PDWSC diversion dam and headgates, jointly utilizing approximately 315 lineal feet of the existing PDWSC Ditch, and constructing Inlet Structure #1J, Pipeline #1J and EDS #1J.
- The currently proposed portion of the Level III Improvements Project that constructs the Drop #2 structures.

Unfortunately, the $1,018,000 exceeds the amount of the $855,000 appropriation made by the 2014 Wyoming State Legislature to fund the Level III Improvements Project. As a result, it will be necessary to re-approach the Legislature to obtain the necessary additional funding.

Although implementation of Alternative N does not provide the District with a new diversion dam and headgate, elimination of the need for the North Piney Diversion Dam, its related facilities, and the North Piney Ditch Section provides not only a capital construction cost advantage, but also shedding of the long-term operational responsibilities for these facilities. With the PDWSC’s diversion dam, headgates and ditch now being in acceptable condition, there is reason to believe that they can continue to operate sufficiently for many years. In the long run, the fact that both the District and PDWSC can both one day participate in the cost to eventually replace these facilities should provide a more cost-effective option than continuing to operate with separate facilities.

5. PATH FORWARD

The following steps provide a path forward for the District.

1. Negotiate an agreement with the PDWSC to allow use by the District of its diversion dam, headgates and the PDWSC Ditch from the diversion dam to proposed Inlet Structure #1J.

2. Submit a petition to the BOC for a change in point of diversion, and obtain BOC for this change.

3. Request the WWDC to allow use of some of the remaining funds from the 2014 Legislature’s $855,000 appropriation (that were originally earmarked for the Level III Improvements Project) to perform the design of Alternative NPJD. As indicated above, the current $855,000 appropriation for the Level III Improvements Project is not sufficient
<table>
<thead>
<tr>
<th>DESIGNATION</th>
<th>Description</th>
<th>Cost</th>
<th>WWDC</th>
<th>(b/a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Construct new North Piney Creek Diversion and related structures (with electrically-operated motors and SCADA system), pipe North Piney Ditch Section, construct Drop #1 and Drop #2 structures associated with current Level III Improvements Project</td>
<td>$1,048,000</td>
<td>$476,000</td>
<td>$438,000</td>
</tr>
<tr>
<td>B</td>
<td>Construct new North Piney Creek Diversion and related structures (with electrically-operated motors and SCADA system), line North Piney Ditch Section, construct Drop #1 and Drop #2 structures associated with current Level III Improvements Project</td>
<td>$1,048,000</td>
<td>$251,000</td>
<td>$438,000</td>
</tr>
<tr>
<td>C</td>
<td>Construct new North Piney Creek Diversion and related structures (with electrically-operated motors and SCADA system), clean North Piney Ditch Section, construct Drop #1 and Drop #2 structures associated with current Level III Improvements Project</td>
<td>$1,048,000</td>
<td>$25,000</td>
<td>$438,000</td>
</tr>
<tr>
<td>D</td>
<td>Construct new North Piney Creek Diversion and related structures (without electrically-operated motors and SCADA system), pipe North Piney Ditch Section, construct Drop #1 and Drop #2 structures associated with current Level III Improvements Project</td>
<td>$901,000</td>
<td>$476,000</td>
<td>$438,000</td>
</tr>
<tr>
<td>E</td>
<td>Construct new North Piney Creek Diversion and related structures (without electrically-operated motors and SCADA system), line North Piney Ditch Section, construct Drop #1 and Drop #2 structures associated with current Level III Improvements Project</td>
<td>$901,000</td>
<td>$251,000</td>
<td>$438,000</td>
</tr>
<tr>
<td>F</td>
<td>Construct new North Piney Creek Diversion and related structures (without electrically-operated motors and SCADA system), clean North Piney Ditch Section, construct Drop #1 and Drop #2 structures associated with current Level III Improvements Project</td>
<td>$901,000</td>
<td>$25,000</td>
<td>$438,000</td>
</tr>
<tr>
<td>H</td>
<td>Construct New Diversion Dam and Related Structures similar to existing structures at existing locations, pipe North Piney Ditch Section, construct Drop #1 and Drop #2 structures associated with current Level III Improvements Project</td>
<td>$600,000</td>
<td>$476,000</td>
<td>$438,000</td>
</tr>
<tr>
<td>I</td>
<td>Construct New Diversion Dam and Related Structures similar to existing structures at existing locations, line North Piney Ditch Section, construct Drop #1 and Drop #2 structures associated with current Level III Improvements Project</td>
<td>$600,000</td>
<td>$251,000</td>
<td>$438,000</td>
</tr>
<tr>
<td>J</td>
<td>Construct New Diversion Dam and Related Structures similar to existing structures at existing locations, clean North Piney Ditch Section, construct Drop #1 and Drop #2 structures associated with current Level III Improvements Project</td>
<td>$600,000</td>
<td>$25,000</td>
<td>$438,000</td>
</tr>
<tr>
<td>K</td>
<td>Install new grouted rock diversion dam at existing location, pipe North Piney Ditch Section, construct Drop #1 and Drop #2 structures associated with current Level III Improvements Project</td>
<td>$680,000</td>
<td>$476,000</td>
<td>$438,000</td>
</tr>
<tr>
<td>L</td>
<td>Install new grouted rock diversion dam at existing location, line North Piney Ditch Section, construct Drop #1 and Drop #2 structures associated with current Level III Improvements Project</td>
<td>$680,000</td>
<td>$251,000</td>
<td>$438,000</td>
</tr>
<tr>
<td>M</td>
<td>Install new grouted rock diversion dam at existing location, clean North Piney Ditch Section, construct Drop #1 and Drop #2 structures associated with current Level III Improvements Project</td>
<td>$680,000</td>
<td>$25,000</td>
<td>$438,000</td>
</tr>
<tr>
<td>N</td>
<td>District and PDWSC jointly utilize existing PDWSC diversion dam, headgates and approximately 315 LF of existing PDWSC Ditch, construct Inlet Structure #1J, Pipeline #1J and EDS #1J, construct Drop #2 structures associated with current Level III Improvements Project</td>
<td>$0</td>
<td>$0</td>
<td>$603,000</td>
</tr>
</tbody>
</table>
to fund Alternative N as modified. However, in light of the fact that Alternative N is more cost-effective than the sum of the current Level III Improvements Project plus North Piney Diversion Dam and North Piney Ditch Section improvements, it is believed that the WWDC could justify authorization of the design for this project component to move forward.

4. Apply for an additional $163,000 (= $1,018,000 - $855,000) to allow for total funding of Alternative N. If the WWDC allows for design of Alternative NPJD at this time, this will allow for construction to be performed in the fall of 2017 if the 2017 Legislature provides the additional funding. The application for the additional $163,000 should be made to the WWDC in the fall of 2016.

5. Complete design of Alternative NPJD, and incorporate this with the previously-designed Level III Improvements Project components that provide for a solution to the Drop #2 situation. As part of this design effort, notify the owners of the irrigation pumps for the three Tunnel Hill property owners who currently pump water from the North Piney Ditch Section that this ditch will no longer be available for their use. It appears at this time that the most expedient method for them to continue to obtain irrigation water would be for them to relocate their pumping systems so that they would pump water out of the PDWSC Ditch.

6. Work with the NRCS to obtain possible EQIP funding and DEQ to obtain possible EPA Section 319 funding for the recommended Alternative N improvements. Procurement of these additional funds will reduce the District’s financial obligation by paying a share of the non-WWDC portion of the recommended improvements.

7. Secure the additional right-of-way necessary to construct Alternative N. Prior to commencing with negotiations for the additional right-of-way, secure an appraised value for the right-of-way to determine a fair price to offer. Compensation for rights-of-way which are based upon an appraised value are eligible for WWDC funding.


9. Once construction of Alternative N is underway, submit an application to the WWDC for funding of the design and construction associated with SPD1. The application should be made for consideration by the 2018 Wyoming State Legislature. (It would be unwise to request funding for the SPD1 improvements and the necessary additional funding to implement Alternative N at the same time.)

10. Work with the NRCS to obtain possible EQIP funding for the recommended SPD1 improvements. Also work with the WG&FD and USF&WS to obtain funding for the recommended SPD1 improvements that pertain to fish passage. Procurement of these additional funds will reduce the District’s financial obligation by paying a share of the non-WWDC portion of the recommended improvements.

11. Once funding is obtained from the Wyoming State Legislature in 2018, enter into an engineering design contract for SPD1. Plans, specifications and right-of-way access would have to be completed and obtained promptly so that construction could begin in the late fall of 2018. If this schedule can be met, SPD1 could be available for use in the spring of 2019.