



City of
Halfway, Oregon

**LAND FEASIBILITY STUDY
FOR WATER REUSE**

June 2015



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perry
& associates, inc.
engineering · surveying · natural resources

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**CITY OF HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE**

JUNE 2015



Funded in part by a grant from the Oregon Water Resources Department's Water Conservation, Reuse, and Storage Program and a Community Development Block Grant through the Oregon Business Development Department - Infrastructure Finance Authority.

ANDERSON PERRY & ASSOCIATES, INC.

La Grande, Oregon
Walla Walla, Washington

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Executive Summary

Introduction

This Land Feasibility Study for Water Reuse (Study) was prepared for the City of Halfway, Oregon (City), and to satisfy the conditions of a Senate Bill 1069 Grant awarded to the City from the Water Conservation, Reuse and Storage Grant Program administered by the Oregon Water Resources Department. The purpose of this Study is to assist the City in identifying a viable effluent water reuse site in preparation for a Wastewater System Improvements project. In this process, this Study assesses the appropriateness of available sites for utilization of reuse water for agricultural purposes.

This Study details the identification of potential reuse sites by first identifying key design considerations, locating candidate parcels, and conducting a public information campaign to generate interest and to solicit landowners interested in water reuse. The Study then proceeds with investigating the sites owned by interested landowners and gaining an understanding of the owners' water reuse objectives. From this information, conceptual designs for water storage sites and irrigation facilities were prepared for comparison. The resulting alternatives became the subject of the detailed feasibility analysis. Criteria of the analysis are presented and include state and federal regulatory agency concerns, followed by a discussion of each alternative with ratings applied to the criteria. The analysis concluded with a presentation of the data to the City Council and staff for selection of the preferred alternative. This Study closes with an outline of the actions necessary to implement the proposed water reuse project.

Alternative Site Identification and Public Information Campaign

In identifying potential water reuse sites, an analysis of the City's effluent disposal needs was combined with regulatory agency conditions. These conditions drive the size of parcel needed to provide the necessary storage capacity and irrigation area to store water over the non-irrigation period and irrigate all the water during the irrigation season. The resulting estimated storage need was determined to be 70.6 acre-feet of total storage capacity, requiring a pond site occupying approximately 13.7 acres of land. To irrigate the total effluent available, 41 acres of pasture or land in hay production is required, with additional area necessary for buffer zones from adjacent properties, domestic wells, or other restricted areas. Accounting for other location considerations such as distance from the existing wastewater treatment facility (WWTF) and operational efficiencies of co-location of storage and irrigation sites, possible sites were identified, as shown on Figure ES-1.

As the City desires to work with a willing landowner who has a need and interest in water reuse, a public information campaign was conducted. To increase the number of candidates and ensure landowners with promising alternatives had an opportunity to understand what the City was offering, a focused direct-contact campaign was conducted at the same time. A summary of those who came forward with an interest and those contacted directly, with their responses, is presented on Table ES-1. Following a public information meeting, four landowners were identified to move into the next phase of the Study, including Pine Valley Land, LLC; George and Marcia Gover; JD Cattle; and Chad Del Curto. Additionally, the City's existing irrigation site was considered for possible repurposing in the future reuse system.

**TABLE ES-1
 PHONE CONTACTS AND LANDOWNERS WHO INITIATED CONTACT**

Landowner	Location	Aware of Available Water	Interested in Reclaimed Water Use	Follow-up Actions
Pine Valley Land, LLC / George Rollins	South of WWTF on Highway 86	Yes	Yes. Initiated call to the Engineer and will attend meeting.	Follow-up at meeting
George and Marcia Gover	South of Halfway, Gover Road	Yes	Yes. Unable to attend meeting.	Set up individual meeting
JD Cattle/ Rick Jackson	South of WWTF on Highway 86	Yes	Yes. Will try to attend meeting.	Set up individual meeting if needed
Gordon Summers	East of WWTF	Yes	No interest in reclaimed water use.	No follow-up
Stan Gulick	East to northeast of WWTF	Yes	Initially yes, but later no. No need for water.	No further follow-up
Aaron Ingalls	North of WWTF	Yes	No. Will try to come to meeting.	No follow-up
Chad Del Curto	East and southeast of WWTF	Yes	Yes. In contact with the City and will attend meeting.	Follow-up at meeting

Resulting Alternatives

After reviewing possible storage and irrigation sites in workable combinations, six alternatives were identified and carried through to complete the feasibility analysis. See Figure ES-2.

Alternative 1: Del Curto Pond Storage and Irrigation

Alternative 2: Del Curto Pond Storage and JD Cattle Irrigation

Alternative 3: Del Curto Pond Storage and Pine Valley Land, LLC, Irrigation

Alternative 4: Gover Lower Reservoir Site and Upper Irrigation

Alternative 5: Gover Pond Storage and Lower Irrigation

Alternative 6: Gover Upper Reservoir Site and Upper Irrigation.

Feasibility Analysis Criteria

The analysis criteria of this Study were defined in the 1069 Grant Application and expanded to include criteria driven by state and federal regulatory agencies. The criteria are as follows:

Location - Proximity to the existing WWTF and associated irrigation sites, addresses pipeline infrastructure concerns and ongoing pumping operation and maintenance.

Size - Suitability of both the storage and irrigation aspects for required effluent disposal with consideration for future needs over time.

Soil Condition - Characteristics of the site soil for both construction of storage facility and irrigation of crops for beneficial use.

Financial Feasibility - Cost trade-off that includes environmental considerations, such as acquiring materials and the transportation of such to the improvement site.

Impacts to Farmland - The permanent conversion of farmland or farm-classified soils from production.

Water Rights - Review of existing water rights that can be replaced with reuse water for other uses such as additional irrigation or returning flows to Pine Creek.

Cultural Resources - The risk of encountering or displacing a significant cultural site.

Environmental/Regulatory Feasibility - The overall assessment of an alternative's impacts to wetlands, waterbodies, endangered species, and floodplains.

Analysis Summary

Each of the six alternatives was reviewed and analyzed for feasibility across the listed criteria. Given a rating of 1 to 6 (1 being most preferred), a ranking of the alternatives is presented with the lowest score representing the most preferred. Figure ES-3 contains the full summary.

Site Selection

Following the feasibility analysis, a selection meeting was held with the Halfway City Council and staff on September 11, 2014. The presentation included a review of maps, overall feasibility, and cost estimates of the six alternatives. After much deliberation, the City decided to proceed with further analysis toward eventual design and construction of Alternative 6: Gover Upper Reservoir Site and Upper Irrigation. See Figure ES-4.

Next Steps (Project Implementation)

As a conclusion of this Study, additional tasks are outlined that need to be completed to further clear the selected alternative for development of the proposed improvements and satisfy regulatory requirements. These items are as follows:

A Memorandum of Understanding should be entered into by the City and landowners to facilitate completion of the necessary investigations of the site, and to assure the City that the landowners will remain committed to working toward completion of the ultimate project, barring any environmental, physical, or financial limitation.

An environmental review will be required that satisfies all funding agency requirements.

A wetland delineation will be necessary to identify regulated sites within the area of impact to facilitate preparation for mitigation and securing a Joint Permit from the Oregon Department of State Lands and the U.S. Army Corps of Engineers.

Endangered Species Act (ESA) Section 7 consultation will be required with the National Marine Fisheries Service and U.S. Fish and Wildlife Service.

Cultural resources surveys, investigations, and documentation will be required as necessary to identify possible cultural resources, determine eligibility, and initiate avoidance/mitigation measures if necessary.

Soils investigations will be required to ensure site suitability from a geotechnical perspective, and to verify that adequate source materials of sufficient quality are available on site.

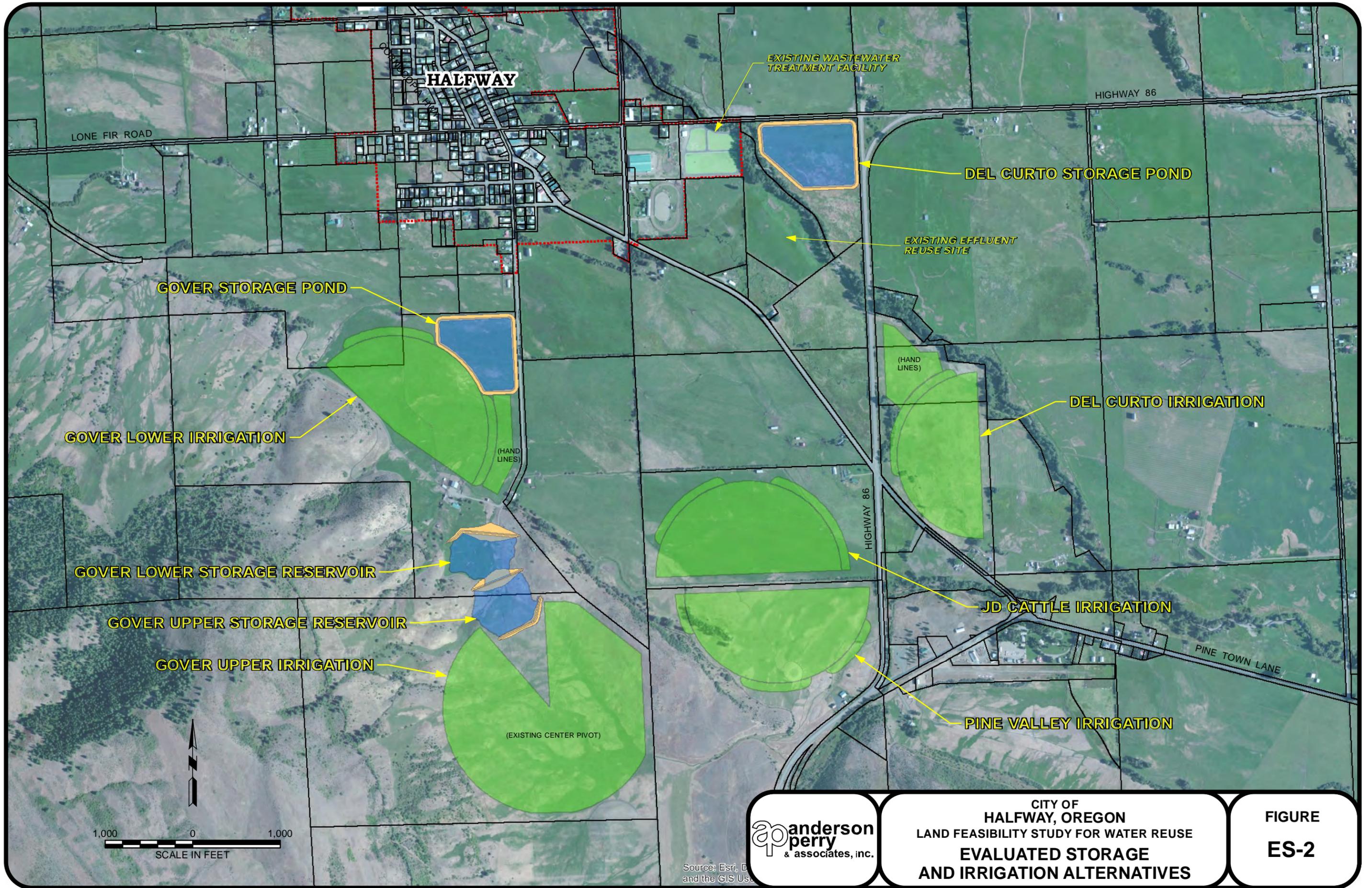
All necessary permits and conditions of approval will need to be obtained from relevant federal, state, and local authorities. This will likely include a Conditional Use Permit from Baker County for a Utility Facility in an Exclusive Farm Use Zone.

Consultation with the Natural Resources Conservation Service will be required for approval of a "Farmland Conversion Impact Rating" U.S. Department of Agriculture Form AD-1006 to allow for conversion of farmland from farm use. This will also require approval from local authorities.

Additional pipeline and storage facility easements and permits will likely need to be identified and prepared. If any property is to be purchased or encumbered by an easement for the facilities, the applicable processes, such as Uniform Relocation Assistance and Real Property Acquisition Policies Act, must be followed. Additionally, purchase of land for a storage site will require a partition plat from Baker County.

As of the middle of 2015, over 70 percent of the work listed above has been completed in anticipation of moving into construction in the fall of 2015. The analysis made possible by the 1069 Grant identified potentially viable reuse sites, expedited this schedule, and is helping the City attain compliance with their wastewater treatment permit.

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LAND FEASIBILITY STUDY FOR WATER REUSE
EVALUATED STORAGE
AND IRRIGATION ALTERNATIVES

FIGURE
ES-2

Source: Esri, DeLorme, and the GIS User

**CITY OF HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE
FEASIBILITY SUMMARY**

Alternative	Location/Size	Soil	Cost ¹	Impact to Farmland	Water Rights	Environmental Feasibility	Total Rank
Alternative 1: Del Curto Pond Storage and Irrigation	Irrigation site - 43.7 acres. Pond is acceptable size and close to WWTF. ²	Pond - silt/loam. Irrigation site - silt/loam.	\$1,814,700	Pond and irrigation site - prime farmland if irrigated and prime farmland if irrigated and drained.	Sufficient. Reuse could replace Pine Creek Diversion.	Pond proximity to Pine Creek. Substantial wetland impacts from irrigation site. Stream crossings required. Irrigation site located partially in Zone A (100-year flood zone).	
Rank	6	6	3	6	5	6	32
Alternative 2: Del Curto Pond Storage and JD Cattle Irrigation	Irrigation site - 43.5 acres. Pond is acceptable size and close to WWTF.	Pond - silt/loam. Irrigation site - silt/loam.	\$1,880,500	Pond - prime farmland if irrigated and prime farmland if irrigated and drained. Irrigation site - farmland of unique importance and prime farmland if irrigated.	Sufficient. Reuse could replace Pine Creek Diversion.	Pond proximity to Pine Creek. Stream crossings required. Substantial wetland impacts from irrigation site.	
Rank	1	5	5	3	6	5	25
Alternative 3: Del Curto Pond Storage and Pine Valley Land, LLC, Irrigation	Irrigation site - 44.4 acres. Pond is acceptable size and close to WWTF.	Pond - silt/loam. Irrigation site - silt/loam, cobbly.	\$1,905,500	Pond - prime farmland if irrigated and prime farmland if irrigated and drained. Irrigation site - farmland of statewide importance.	Sufficient but junior water rights. Reuse could replace Pine Creek Diversion or extend irrigation season.	Pond proximity to Pine Creek. Irrigation site proximity to an irrigation ditch. Tree removal required for irrigation pivot. Stream crossings required. Almost no wetland or floodplain impacts.	
Rank	3	4	6	4	3	4	25
Alternative 4: Gover Lower Reservoir Site and Upper Irrigation	Irrigation site - 93+ acres. Pond is acceptable size, more distant from irrigation site than Alternative 6.	Pond - silty clay loam and cobbly silt loam. Irrigation site - silty clay loam, clay, cobbly silt loam. Clay dominant.	\$1,621,600	Pond - prime farmland. Irrigation site - mix of not prime farmland and farmland of statewide importance.	Water rights in pond area can be moved to another area. Irrigation area has sufficient but junior water rights. Reuse could replace Pine Creek Diversion or extend irrigation season.	Irrigation site has the fewest wetland impacts of any site except for Pine Valley Land, LLC, Irrigation.	
Rank	5	3	1	1	2	1	13
Alternative 5: Gover Pond Storage and Lower Irrigation	Irrigation site - 48.6 acres. Pond is acceptable size.	Pond - gravelly loam and clay. Irrigation site - clay.	\$1,871,000	Pond - farmland of statewide importance and prime farmland if irrigated. Irrigation site - farmland of statewide importance.	Sufficient senior water rights. Reuse could replace Pine Creek Diversion.	Lower irrigation site and storage pond have substantial wetland impacts.	
Rank	4	2	4	5	4	3	22
Alternative 6: Gover Upper Reservoir Site and Upper Irrigation	Irrigation site - 93+ acres. Pond is acceptable size and closest to irrigation site.	Pond - clay, clay/loam, cobbly silt loam. Irrigation site - silty clay loam, clay, cobbly silt loam. Clay dominant.	\$1,707,600	Pond - primarily not prime farmland. Irrigation site - mix of not prime farmland and farmland of statewide importance.	Water rights in pond area can be moved to another area. Irrigation area has sufficient but junior water rights. Reuse could replace Pine Creek Diversion or extend irrigation season.	Irrigation site has the fewest wetland impacts of any site except for Pine Valley Land, LLC, Irrigation.	
Rank	2	1	2	2	1	2	10

¹ Preliminary cost estimate. All costs include a 15 percent contingency.

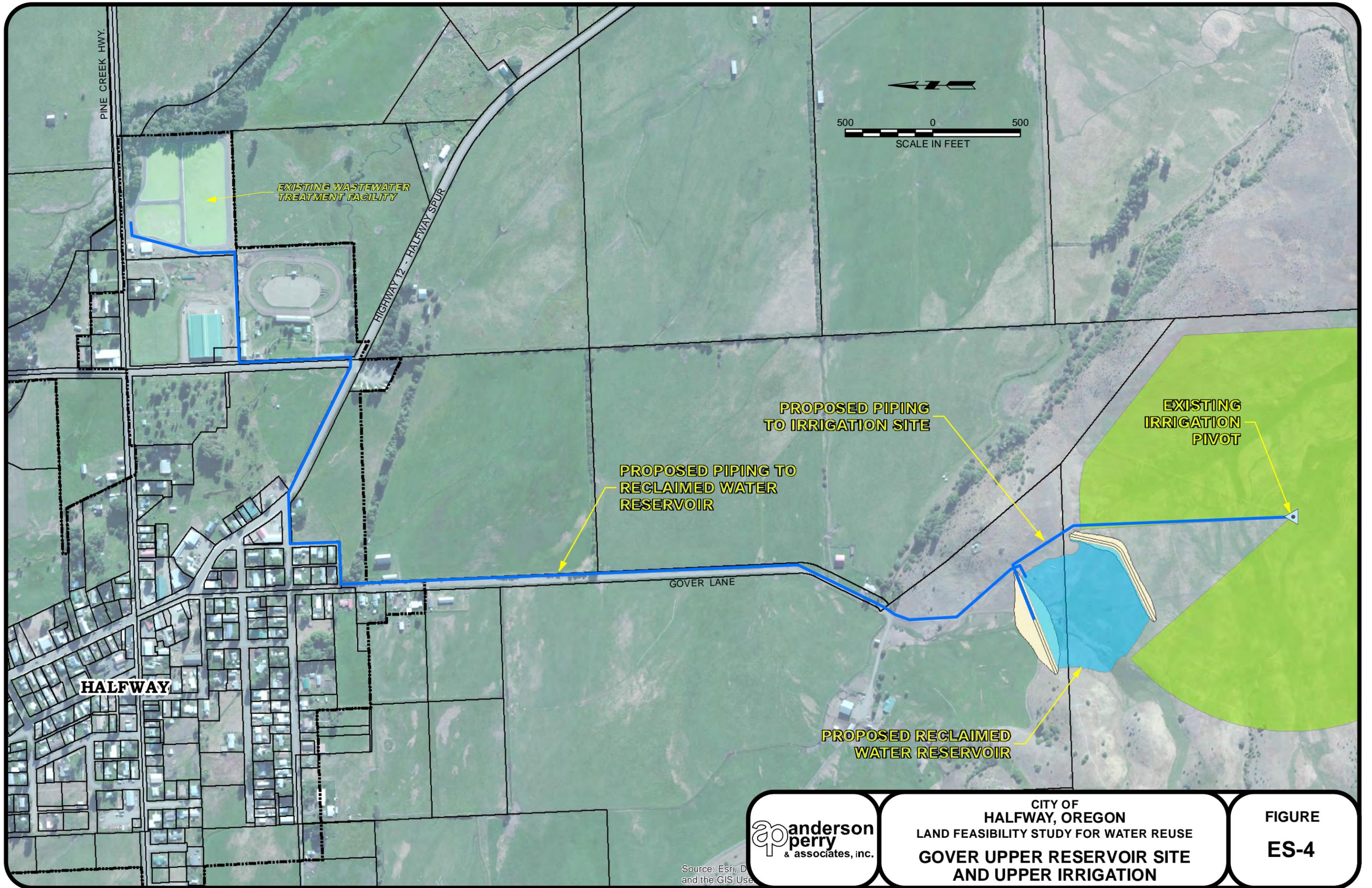
² WWTF = wastewater treatment facility



CITY OF
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LAND FEASIBILITY STUDY FOR WATER REUSE

FEASIBILITY SUMMARY

FIGURE
ES-3



Section 1 - Introduction

Background

This Land Feasibility Study for Water Reuse (Study) was prepared for the City of Halfway, Oregon (City), to meet the terms and conditions of a Grant Agreement between the Oregon Water Resources Department (OWRD) and the City. A Senate Bill 1069 Grant (1069 Grant) was awarded to the City from the Water Conservation, Reuse and Storage Grant Program to financially support and assist the City in identifying a viable effluent water reuse site in preparation for a Wastewater System Improvements project.

The City of Halfway is a small community of approximately 290 persons located in the eastern portion of Baker County, Oregon. The City's existing wastewater treatment facility (WWTF) was constructed in 1968. The WWTF consists of a three-cell facultative lagoon treatment system. The treatment system is designed to discharge treated effluent to Pine Creek through an outfall pipe from November through May, and irrigate an approximately 12.5-acre, City-owned field from June through October. Figure 1-1 shows the location and vicinity maps of the City of Halfway, with an outline of the study area. Figure 1-2 shows the existing WWTF, outfall to Pine Creek, and effluent reuse site.

Periodic violations of the City's National Pollutant Discharge Elimination System Permit prompted the establishment of a Mutual Agreement and Order (MAO) with the City in 2007 that outlines steps to be taken by the City to achieve regulatory compliance. The Permit violations outlined in the MAO were associated with meeting the conditions of the surface discharge into Pine Creek.

Following the MAO, the City initiated a series of plans and reports to investigate and review alternatives to address their WWTF violations. Beginning in 2010, a Wastewater Facilities Plan (WWFP) was prepared, followed by a Wastewater Pre-design Report in 2012 and a Pine Creek Existing Conditions Reconnaissance Report, also prepared in 2012. This effort culminated with the preparation of a WWFP Update that was completed in 2013. In this Update, it was determined that removing effluent discharge from Pine Creek and reusing the water through irrigation was desired. The improvements for disposal of treated wastewater would include the development of a winter storage lagoon and an expanded recycled wastewater irrigation system. In the latter part of 2013, the City prepared and submitted a 1069 Grant Application to help identify viable reuse sites.

Purpose and Objectives

The purpose of this Study is to identify local land parcels for potential sites to be used for water reuse, and assess the appropriateness of available sites for utilization of reuse water for agricultural purposes. Several irrigation/agricultural sites are identified and assessed for reuse water that can leave more natural water in Pine Creek. Additionally, this Study identifies sites that may not currently be using irrigation water efficiently. This Study takes into consideration the location, size, soil condition, and financial feasibility of each potential site. The stated goal in the 1069 Grant Application was to "Identify a potential site, or sites, that will be feasible to apply reuse water for irrigation purposes to agricultural land to meet state and federal regulatory agency criteria."

Scope

The 1069 Grant Agreement requires the feasibility scope of work to be broken into key tasks. The following key tasks were defined and completed in preparing this Study for the City to meet the objectives listed above.

- Secure funding
- Contract for engineering services
- Contract for realty services
- Begin preliminary identification and meetings
- Main work on Study
- Conclude Study and Final Report
- Close out 1069 Grant

Previously Completed Tasks

The initial key tasks involving funding and contracts were completed prior to the work focus of this Study. The 1069 Grant was awarded in April 2014. The necessary matching funds were secured on May 29, 2014, as part of a Community Development Block Grant through the Oregon Business Development Department Infrastructure Finance Authority.

Contracting for engineering services was initiated on June 23, 2014, through an agreement with Anderson Perry & Associates, Inc. (AP); however, work did not proceed until the second agreement for services, which included the matching funds, was signed on August 14, 2014.

The third key task, contracting for realty services, was satisfied under the second key task. The objective of retaining realty services was to obtain technical support personnel qualified and experienced with land negotiations, agreements, and state and federal relocation requirements. AP has a qualified staff member with over 15 years of experience in land and easement acquisition, and has negotiated hundreds of agreements while satisfying relocation requirements of state and federal funding agencies. The agreements with AP for engineering services therefore included land acquisition assistance and other services consisting of negotiating for land rights, assisting the City with establishing appropriate agreements, and coordinating with landowners for relocation requirements.

Document Organization

The remainder of this Study is organized, consistent with the key tasks, into the following sections:

Section 2: Preliminary Identification and Meetings

An initial determination of available water and subsequent irrigation and storage needs is presented in this section. A review of the surrounding properties is presented with a map of potential sites. The details of the public campaign to solicit interest are included with records of personal contacts and meeting notes of the concluding public meeting.

Section 3: Main Work on Study - Identification of Possible Sites

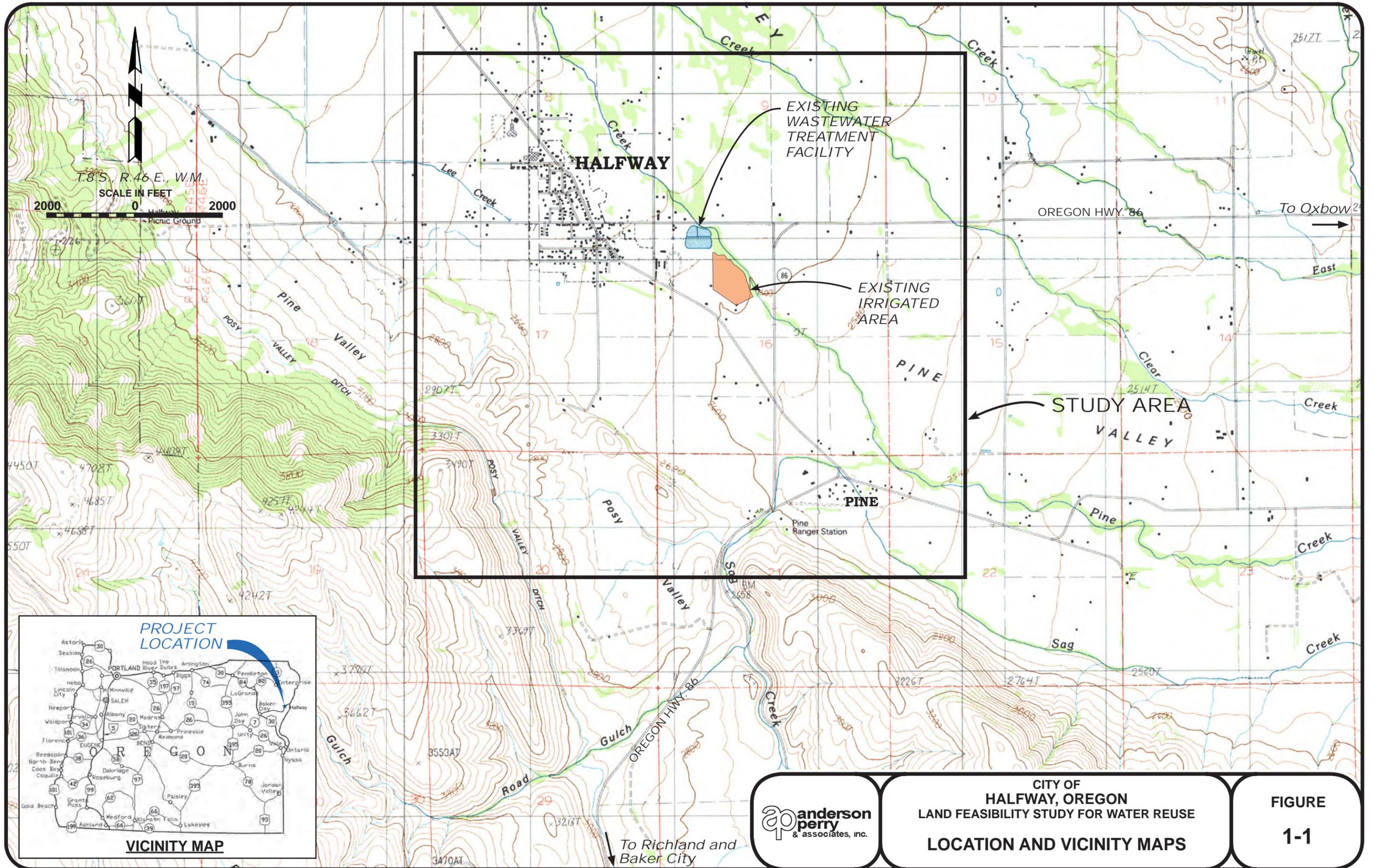
The four properties of interested landowners that were identified as potential sites in the public meeting are evaluated. Further analysis and discussion with one landowner identified three possible configurations of irrigation and storage on the property. This resulted in a total of six alternatives to compare. The evaluation criteria are discussed and expanded for inclusion of state and federal regulatory agency concerns; each alternative is rated based on the criteria.

Section 4: Conclude Study and Final Report

The results of the presentation of the Study to the City Council and staff are provided. A preferred alternative was selected and further discussions with the landowner initiated, along with detailed investigations of risk factors that could preclude the use of the property as proposed.

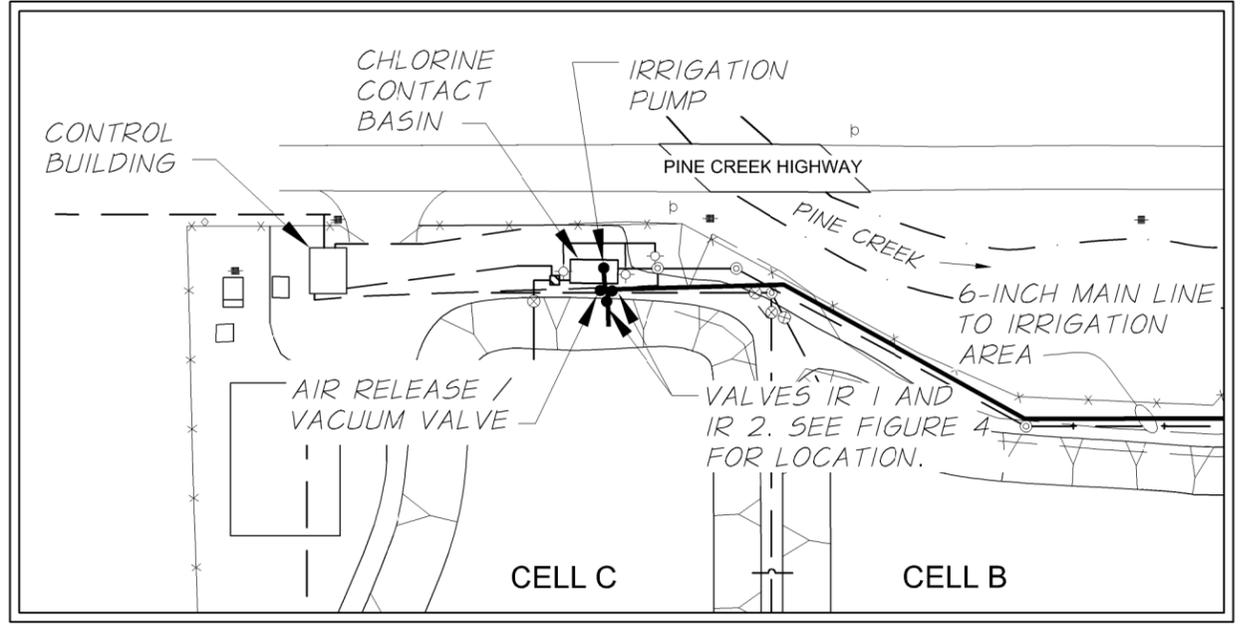
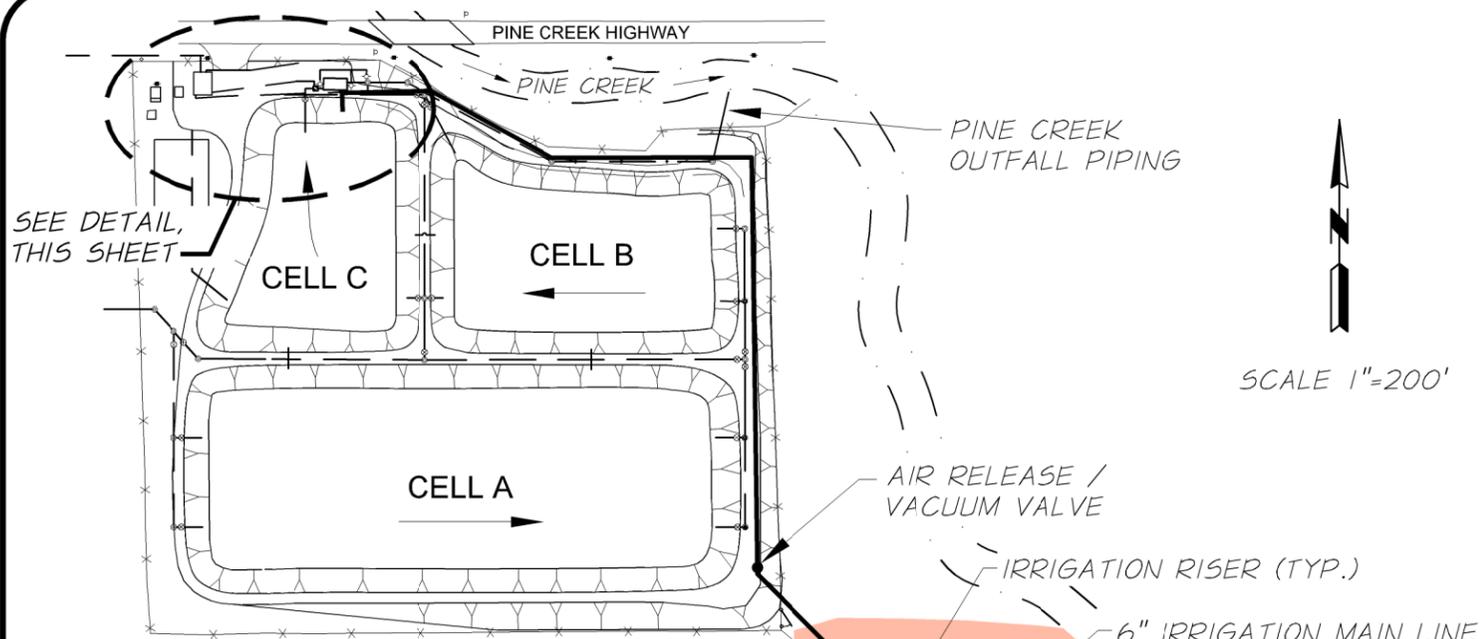
Section 5: Close Out 1069 Grant - Next Steps in the Project

Closing out the 1069 Grant will be accomplished with the submission of this Study to the OWRD. However, to complete the implementation of an effluent reuse irrigation site as proposed in this Study, the additional tasks outlined in this section will need to be completed. A discussion of each task is presented with reference to regulatory requirements.

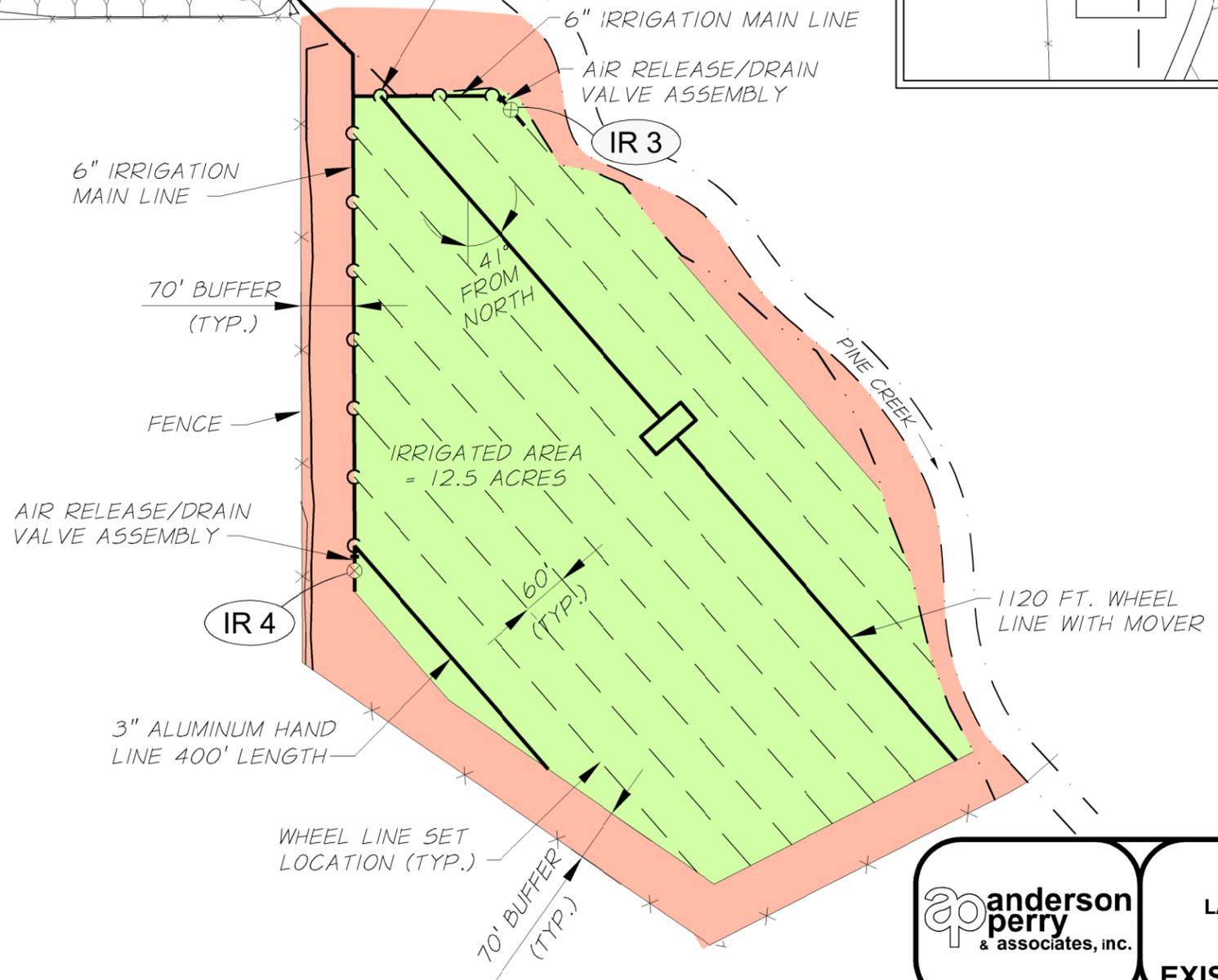


CITY OF HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE
LOCATION AND VICINITY MAPS

FIGURE 1-1



DETAIL
SCALE 1"=100'



LEGEND

- NEW 6" IRRIGATION LINE
- IRRIGATION RISER
- 1120 FT. WHEEL LINE WITH MOVER
- - - WHEEL LINE SET LOCATION
- · - · - · EDGE OF FIELD
- IRRIGATION AREA
- BUFFER ZONES
- NORMAL FLOW PATH



CITY OF
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LAND FEASIBILITY STUDY FOR WATER REUSE
EXISTING EFFLUENT REUSE SITE PLAN

FIGURE
1-2

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Section 2 - Preliminary Identification and Meetings

General

The preliminary efforts of this Land Feasibility Study for Water Reuse (Study) included defining the facility requirements of a suitable water reuse site, taking an inventory of available properties within a reasonable piping distance of the existing wastewater treatment facility (WWTF), conducting a public relations program to provide information to landowners who may have suitable sites, and holding a public meeting to educate landowners of the City's effluent disposal needs and irrigation opportunities using reuse water.

Through this preliminary identification and meeting process, the number of potential properties to evaluate was reduced, after initial review, to interested landowners who have parcels that are at least able to support the necessary reuse facilities. From this resulting list, a more in-depth analysis was conducted (see Section 3).

Design Drivers

In order to set up a reuse facility for winter storage and summer irrigation, the available water flows must be determined and factors that affect the volume of storage that is needed, as well as the volume of irrigation that can be applied, must be accounted for. The 2013 Wastewater Facilities Plan (WWFP) Update presented the wastewater system design criteria included on Figure 2-1. From this criteria and accounting for changes of the proposed Wastewater System Improvements (WWSI) project, a water balance table was prepared and is included as Figure 2-2. This water balance shows, in rough numbers, that 23 million gallons (MG) of storage coupled with 41 acres of irrigation could meet the needs of the City, with projected growth to 2035. This calculated volume and area are based on reducing infiltration/inflow (I/I) flows 30 percent from current levels. Work on the collection system to achieve such an I/I reduction is detailed in the proposed WWSI project.

In addition to the basic design requirements of a storage pond site of a particular size and irrigable acres, regulatory agency conditions increase the size of parcel needed. The design and construction of water storage ponds is under the regulation of the Oregon Water Resources Department (OWRD) Dam Safety Program. Codified in Oregon Administrative Rules (OAR) 690-020, the rules affecting any design of water retention structures are summarized as follows:

- Dams under 10 feet high or storing less than 9.2 acre-feet have fewer review and approval requirements (but will require a larger site for the same volume of storage capacity).
- The dam hazard rating will drive regulatory requirements.
- Hazard ratings (high, significant, or low) are assigned using dam breach inundation analysis and the resulting risk to life or property.
- High hazard dams (and significant hazard dams for many items listed) will require:
 - Additional site suitability and/or geotechnical evaluation.
 - Higher inflow design flood capacity.

- Embankment structures of wider construction and/or more complex design.
- Increased spillway design requirements.
- Additional monitoring and instrumentation devices.
- Increased submittals and notifications to OWRD.
- Additional approval by the State Engineer for design and modification.
- Operations and Maintenance Plans.

Based on these rules, potential water storage sites must be assessed with an understanding of design considerations such as dam height, storage capacity, and added requirements due to surrounding topography and potential risk factors.

For a water reuse facility using treated effluent, the State of Oregon has rules in place that govern buffers and setbacks that will affect the area needed for a particular irrigated site. The Oregon Department of Environmental Quality enforces these rules as codified in OAR 340-055. The recycled water available from the City's WWTF is Class D, so the following requirements will apply to the irrigation site:

- Only certain types of crops can be irrigated.
- The destination of any crops will be limited (such as no human ingestion).
- Setback distances will apply:
 - 100 feet from the edge of irrigation to the site property line.
 - 100 feet from the edge of irrigation to a water supply source for human consumption.
 - Recycled water must not be sprayed within 70 feet of a food preparation area, serving area, or drinking fountain.
- Animals used for milk production must be restricted from direct contact with the recycled water.
- Signs shall be posted around the perimeter of the site stating recycled water is used and not safe for drinking.
- Irrigation of certain crops is prohibited for three days before harvesting.

Therefore, when assessing a particular reuse site, factors such as the types of crops in the area, the location of property lines and wells, or the presence of certain animals will affect the available acreage for irrigation.

Storage Need

Using the data from the 2013 WWFP Update, the City's need is to store 23 MG of reclaimed water over the winter, which will then be applied to crops over the irrigation season until the pond is empty (see Figure 2-2). This is approximately 70.6 acre-feet of total storage capacity. To identify storage pond sites, an initial design storage depth of 7 feet was assumed. This is a compromise of excavated storage volume with the footprint on constructed dikes and the additional acreage needed for the sloped sides.

It also allows 3 feet of freeboard with a 10-foot dam structure. The result is a pond with an average surface area of 10.1 acres.

In a simple square configuration, a pond of this size would require approximately 2,600 lineal feet of diking with 60 feet of width outside the 10.1 acres of needed surface area, or 3.6 additional acres of property. This area for dikes could increase if a particular site has a shape or elevation difference that increases the length or the width of necessary diking.

Combining the storage surface area needed with that of necessary dikes, the area of land needed for a basic storage site is approximately 13.7 acres. Smaller sites could still be candidate locations, as the storage depths can be increased with a corresponding (but not directly related) decrease in surface area required for the facility.

Irrigation Need

The primary crops in Pine Valley, and in particular the area around the existing WWTF, are animal forage (pasture) and hay production. Therefore, the 2013 WWFP Update irrigation site size of 41 acres is based on irrigation of an alfalfa crop with a growing season of April to September. The consumptive use of the site assumes irrigation at agronomic rates using an 80 percent efficient irrigation system (sprinklers) and accounting for average annual precipitation and average evapotranspiration.

In addition to the irrigable acreage needed to apply the available recycled water, it will be necessary to accommodate the particular footprint of the selected irrigation system(s) (i.e., fixed-set, hand lines, wheel lines, center pivot, etc.) and provide sufficient buffers between irrigated areas and property lines or other regulated facilities or activities. While a center pivot system is the easiest to operate with reclaimed water because it requires the least manual interaction with the system, a pivot system may not work well with specific irrigation sites. Combining such a system with a wheel line or other systems can improve the efficient use of a parcel, but it comes with the operational hassle of manually moving lines and the connection and disconnection of a supply line.

Properties that are borderline capable of providing enough acreage may be able to have the buffer areas reduced by switching the manner in which the water is applied. When sprinklers are used, there is a 100-foot minimum separation from the edge of property. If water is applied directly to the soil, such as using drop hoses and water socks to release the water at ground level, only 10 feet of separation is required from the property line.

The approach used in this Study to identify potential irrigation sites was to prepare quick sketches of possible irrigation system layouts with suitable buffers and then calculate the available irrigable site. As it is possible to combine two or more sites to achieve the desired 41 acres of irrigated crops, smaller sites are included as possible candidates. However, having to deal with multiple landowners for acquiring the right to irrigate, and then coordinating with these multiple operators to time water use and share the available water, quickly becomes cumbersome. The alternative of using multiple sites is not in the best interest of the City and was, therefore, held as a backup alternative if sufficient single-owner sites could not be identified or selected for detailed evaluation.

Other Location Considerations

Additional considerations, other than having sufficient area for the particular facility, apply to the selection of a storage and irrigation site. The suitability of a potential site can be affected by items such as the distance water will need to be transferred, how the elevations of the various components of the system will affect pumping costs, the availability of storage pond construction materials (or access to material sources), and what water rights exist for the affected land.

The proximity of the storage site to the current WWTF has immediate and long-term impacts due to the capital cost of constructing a long transmission pipeline and pump station, and also includes operational issues with the pump station and ongoing electrical expense. As distance and/or elevation between the sites increases, so does the cost. However, due to the relatively flat nature of Pine Valley around the City of Halfway, it appears pumping will be necessary to any site.

As the distance to the irrigation site increases, continuous pumping to storage is preferred to allow reduction of transmission pipeline size, while keeping water velocities low to minimize line losses. Similarly, pumping from the storage facility to the irrigation site will require larger diameter pipes to accommodate the higher flow rate of irrigating. Elevations from irrigation pump to irrigation system should also be minimized to reduce power and equipment wear. If one storage site is closer to the WWTF or another closer to the irrigation site and all other criteria are the same, the latter would likely be chosen based on cost.

A primary expense of storage pond construction is acquiring and transporting the necessary materials for the water-containing structure. Having suitable material for purchase either on site or nearby to build dikes and dams is preferred. Securing materials needed to seal the structure from water leakage can be difficult. Due to the volume of such materials needed for a structure covering several acres, the transportation cost of these materials grows rapidly.

The availability of an existing water right on a potential site is desired, as the actual amount of available reclaimed water will fluctuate from year to year due to a number of factors. First, the current WWTF's flows are estimates due to problems with influent and effluent metering systems. Additionally, the resulting flow reductions of the proposed I/I improvements to be completed with construction are difficult to accurately estimate. After completion of the proposed I/I improvements, new sources of I/I into the collection system will occur and cannot be predicted. The City's plan to implement an I/I inspection and correction budget could also have an effect on future effluent flows. And finally, the growth or loss of population served by the City will occur over time along with the usual variation of water use from year to year.

Coupled with an existing water right, the application of reuse water can be adjusted to ensure the storage pond is emptied and ready for the following year's storage. Then, supplemental water from the existing water right can be used to maintain crop health when effluent volumes are insufficient for the irrigated site.

Additionally, to irrigate the buffer areas, it is necessary to use water sources other than the reclaimed water.

Initial Parcel Map Search

Applying the sizing and selection information discussed above, a map search was conducted of the area surrounding the existing WWTF (see Figure 1-1 for the study area). This search extended from the treatment lagoon for a radius of approximately 1 to 1.25 miles to include several properties of sufficient size and type.

An aerial photo was combined with a parcel map to aid in identifying potential sites and possible obstructions. The parcel map provided property size, shape, and owner information so adjacent or nearby sites could be considered as a whole when owned by the same individuals. The aerial photo allowed an initial assessment of irrigable areas with potential obstacles to an irrigation system, such as farm buildings, trees, fences, streams, ditches, and residences. This initial map assessment was supported with a cursory drive-by site investigation to clarify items unclear in the available photos or maps.

The resulting map of potential reuse sites is shown on Figure 2-3. Including the existing City-owned reuse site, fourteen sites were identified with preliminary irrigable estimates ranging from 12.5 to 90 acres. While rough estimates of necessary buffer areas were applied to each parcel with a simplistic irrigation layout, these estimates provided a quick overview of what is possible for a given site. Areas that are less than the desired 41 acres generally have corners that could be irrigated to pick up the additional area either with an end gun off of a center pivot or the addition of a wheel line or fixed-set irrigation system.

Public Information Campaign

The City of Halfway's approach for effluent disposal has been from the perspective that the City has a supply of reclaimed water that could be applied to beneficial use by a local farmer/rancher. It is the City's belief that a mutually beneficial agreement can be made with a landowner. By implementing the proposed improvements, the City would dispose of effluent with fewer regulatory constraints than the current system, while the landowner would gain the use of nutrient-rich water, which is warmer and puts less stress on a crop, to supplement or replace an existing water right.

In line with this objective, a primary criterion of selecting an irrigation reuse site is to find an interested and willing landowner. To give all owners in the area an opportunity to consider the benefits of using reclaimed water, a public information campaign was conducted. Every effort (a program of brochures, news releases, personal contacts, and a public meeting) was taken to let all landowners in the area know of the availability of reclaimed water.

Working with City staff, a folded 8-1/2-inch by 11-inch brochure was prepared, titled "Irrigation Water Available - Reclaimed Water Use Fact Sheet." A copy of the brochure is in Appendix A. The brochure gives a brief introduction of what reclaimed water is, announces that the City has a source of water available, and explains allowed uses. Then, with a series of 20 questions and answers, the brochure answers many of the typical questions asked by the public regarding the use and safety of the water. It discusses the size of an irrigation site being sought, the use of supplemental irrigation, restrictions of use and buffer areas, financial assistance available for irrigation system improvements, the operational agreement with the City, reclaimed water health safety, and extends an invitation to attend the public meeting for more information.

The brochure was distributed from key gathering areas in the City to achieve good coverage of the residents in the entire valley, particularly those within the study area. City staff checked on the supplies at these various locations to keep brochures stocked and monitor the numbers being taken. Locations around Halfway included the bank, post office, a restaurant, a grocery store, and City Hall. An estimated fifty brochures were taken, with a number of them being read and returned to the stack.

In addition to the brochure, a press release was prepared and published in the local newspaper. Appendix A includes a copy of the press release and the article published in the Hells Canyon Journal on July 9, 2014. The article went beyond what was in the press release and presented much of the information included in the brochure. Readers were given a brief history of the project, funding source, and current WWTF operations. It included a discussion of the proposed WWSI project and the availability of reuse water. The article was very informative about the irrigation opportunities, benefits to crops, and safety of the water source. The article concluded with an invitation to the upcoming public presentation and drew attention to the brochures available at locations around town. Following the public meeting, another newspaper article reporting on the August City Council meeting included an update of the progress of this Study. This article is included in Appendix A.

The news release and brochures provided contact information for the City and engineers so interested individuals could call with questions or comments prior to the scheduled meeting. Two contacts were received during the period leading up to the public meeting from landowners expressing interest in the available reclaimed water. One contact was from George Rollins, general manager with Pine Valley Land, LLC. Their operations are located south of the WWTF, with the closest parcel being identified as an alternative on the Potential Reuse Sites map (Figure 2-3).

The other inquiry came through the City from the Del Curto family. The family operations consist of several properties including one immediately east of the existing WWTF, across Pine Creek, and others southeast of the existing irrigation site. Chad Del Curto currently leases the City's effluent irrigation site for hay production and grazing.

To ensure the information regarding the availability of reclaimed irrigation water was reaching owners of possible sites large enough and close enough to the existing WWTF, telephone calls were made directly to landowners. The focus of the effort was to generate possible interest in the use of the water, and to rule out landowners with no interest. This effort began with searching out phone numbers of the selected properties followed with phone calls to identify and speak with the owner or managing interest. The owners were asked if they were aware of the public information campaign, then their level of interest in the available irrigation water was discussed. The calls were concluded with an invitation to the upcoming public meeting to learn more. The invitation and encouragement to attend the informational meeting were extended to all individuals contacted, regardless of their interest in using reclaimed water. If landowners stated they were unable to attend the scheduled meeting, an offer was made to meet with them individually at a time convenient to them.

The results of these phone calls, in addition to landowners who initiated contact with the City or its agents, are shown on Table 2-1.

**TABLE 2-1
 PHONE CONTACTS AND LANDOWNERS WHO INITIATED CONTACT**

Landowner	Location	Aware of Available Water	Interested in Reclaimed Water Use	Follow-up Actions
Pine Valley Land, LLC / George Rollins	South of WWTF on Highway 86	Yes	Yes. Initiated call to the Engineer and will attend meeting.	Follow-up at meeting
George and Marcia Gover	South of Halfway, Gover Road	Yes	Yes. Unable to attend meeting.	Set up individual meeting
JD Cattle/ Rick Jackson	South of WWTF on Highway 86	Yes	Yes. Will try to attend meeting.	Set up individual meeting if needed
Gordon Summers	East of WWTF	Yes	No interest in reclaimed water use.	No follow-up
Stan Gulick	East to northeast of WWTF	Yes	Initially yes, but later no. No need for water.	No further follow-up
Aaron Ingalls	North of WWTF	Yes	No. Will try to come to meeting.	No follow-up
Chad Del Curto	East and southeast of WWTF	Yes	Yes. In contact with the City and will attend meeting.	Follow-up at meeting

Public Meeting

The culmination of the public information campaign and personal phone contacts was a public information meeting held at Halfway City Hall on August 7, 2014, at 5:00 p.m. This meeting was set up to expand on the information made available in the brochures and press release. The meeting presented the background of the project with its purpose and need, elaborated on the availability of irrigation water, discussed how a reuse irrigation system may be configured with respect to existing irrigation systems, reviewed applicable regulatory requirements, held a question and answer session, and concluded with a discussion of what will happen next in the Study process.

A copy of the agenda, the sign-in sheet, the outline followed for the presentation, and a folded version of the map board used in the meeting are included in Appendix B. Attendance at the meeting was lower than hoped, but included those who had expressed interest in using reclaimed irrigation water and had stated they would be there. Other property owners identified in the initial assessment process had either expressed no interest in the irrigation water or were known to be unavailable for the meeting.

At the conclusion of the meeting, four property owners were identified for further consideration in the Study, including Pine Valley Land, LLC George and Marcia Gover; JD Cattle; and Chad Del Curto. These properties are owned by individuals interested in reuse water, are of sufficient size to facilitate all or portions of a reuse facility, and are within acceptable distances of the existing treatment lagoons. Additionally, the City-owned parcel was considered as a supplementary irrigation site or as a possible location for a storage pond.

DESIGN CRITERIA

	EXISTING	FUTURE	FUTURE With 30% I/I Reduction
	2013 ¹ Total ²	2035 Total ³	Total ⁴
Population ⁵	290	330	330
Average Annual Flow, MGD	0.153	0.157	0.125
Per Capita Flow, gpcd	530	475	378
Average Dry Weather Flow, MGD	0.080	0.084	0.081
Per Capita Flow, gpcd	275	255	245
Average Wet Weather Flow, MGD	0.182	0.186	0.169
Per Capita, gpcd	628	564	511
MMF, MGD ⁶	0.400	0.408	0.325
Per Capita, gpcd	1,380	1,235	985
MDF, MGD ⁶	0.842	0.850	0.683
Per Capita, gpcd	2,900	2,575	2,070
Typical Peak Hour Flow, MGD ⁷	1.263	1.271	1.025
Per Capita, gpcd	4,355	3,850	3,105
Average Influent BOD ₅			
lb/day ⁸	73	82	82
lb/capita/day	0.25	0.25	0.25
Average Influent TSS			
lb/day ⁸	87	99	99
lb/capita/day	0.30	0.30	0.30

¹ Existing 2013 column based on a review of 2011 and 2012 system data. Refer to Plan text* for further details.

² Existing total flows are based on historical plant operating data (i.e., Discharge Monitoring Reports) multiplied by a factor of 1.75. Refer to Plan text* for further details.

³ Future domestic flows are estimated using existing flows and adding 100 gpcd for projected new customers. Future loadings are calculated by applying per capita loadings to the projected 2035 population.

⁴ Future flows are based on existing flows and an estimated base flow of 150 gpcd for all customers. The future flows assume a 30 percent reduction in the wastewater volume that exceeds the 150 gpcd base flow.

⁵ Source: Portland State University, July 1, 2011, Certified Estimate and 2010 Census. Future population is based on a projected 20-year design life from project completion date and a 0.5 percent annual growth rate.

⁶ MMF and MDF are based on historical records reported in the 2010 Wastewater Facilities Plan.

⁷ Based on a typical assumed factor of 1.5 times the MDF.

⁸ Mass loadings have been estimated using 2010 Wastewater Facilities Plan assumed values. Refer to Plan text* for further details.

* Table data acquired from Table 6-2 of the 2013 Wastewater Facilities Plan Update. Plan text can be found in that document.

BOD = biochemical oxygen demand
gpcd = gallons per capita per day
I/I = Infiltration/Inflow
MDF = Maximum Daily Flow

MGD = million gallons per day
MMF = Maximum Month Flow
TSS = total suspended solids



CITY OF
HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE
WASTEWATER SYSTEM
DESIGN CRITERIA

**FIGURE
2-1**

CITY OF HALFWAY, OREGON
WASTEWATER TREATMENT PLANT WATER BALANCE WITH WINTER STORAGE AND IRRIGATION (ASSUMING 30 PERCENT REDUCTION IN THE I/I COMPONENT OF INFLUENT FLOWS)
YEAR 2035

Month	Influent ¹		Precipitation ²		Evaporation ³		Seepage ⁴ (MG)	Irrigation ⁵		Outfall (Discharge to River) ⁶ (MG)	Storage (+ into Strg., - out of Strg.) (MG)	Cumulative Storage Needed (MG)
	(gpd)	(MG)	(inches)	(MG)	(inches)	(MG)		Crop: Acreage: (inches)	Alfalfa 41 (MG)			
January	66,785	2.07	3.41	1.67	0.00	0.00	0.77	-	0.00	-	2.96	11.69
February	71,897	2.23	2.25	1.10	0.00	0.00	0.70	-	0.00	-	2.63	14.32
March	131,140	4.07	1.83	0.89	0.00	0.00	0.77	-	0.00	-	4.19	18.51
April	164,758	5.11	1.63	0.80	2.21	1.08	0.75	-	0.00	-	4.07	22.58
May	72,882	2.26	1.81	0.88	3.36	1.64	0.77	3.60	4.01	-	-3.28	19.30
June	131,113	4.06	1.37	0.67	4.22	2.06	0.75	5.70	6.35	-	-4.42	14.88
July	210,624	6.53	0.54	0.26	5.24	2.56	0.77	8.98	9.99	-	-6.54	8.34
August	191,205	5.93	0.56	0.27	4.76	2.33	0.77	8.50	9.46	-	-6.36	1.98
September	167,694	5.20	0.72	0.35	3.02	1.48	0.75	4.81	5.36	-	-2.03	0.00
October	127,076	3.94	1.21	0.59	1.92	0.94	0.77	-	0.00	-	2.82	2.82
November	70,371	2.18	2.96	1.45	0.00	0.00	0.75	-	0.00	-	2.88	5.70
December	66,334	2.06	3.58	1.75	0.00	0.00	0.77	-	0.00	-	3.03	8.73
TOTALS		45.63	21.87	10.69	24.74	12.09	9.11	31.59	35.17	0.00	-0.05	

Treatment/Storage Facility	Sq. Feet	Acres	Total Depth (feet)	Storage Depth (feet)	Storage Volume (MG)
Existing Lagoons ⁷	217,800	5.00	6.5	1	1.6
New Storage Lagoon	566,280	13.0	8	5	21.2
TOTAL	784,080	18.00	-	-	22.8

Month	Crop Usage Data-Alfalfa			
	Annual Precip. (inches)	Evapotrans. ⁸ (inches)	Net Irrigation Req'd (inches)	80% Efficiency (inches)
April	1.63	0.63	-1.00	-
May	1.81	4.69	2.88	3.60
June	1.37	5.93	4.56	5.70
July	0.54	7.72	7.18	8.98
August	0.56	7.36	6.80	8.50
September	0.72	4.57	3.85	4.81
October ⁹	1.21	-	-	-

Notes:

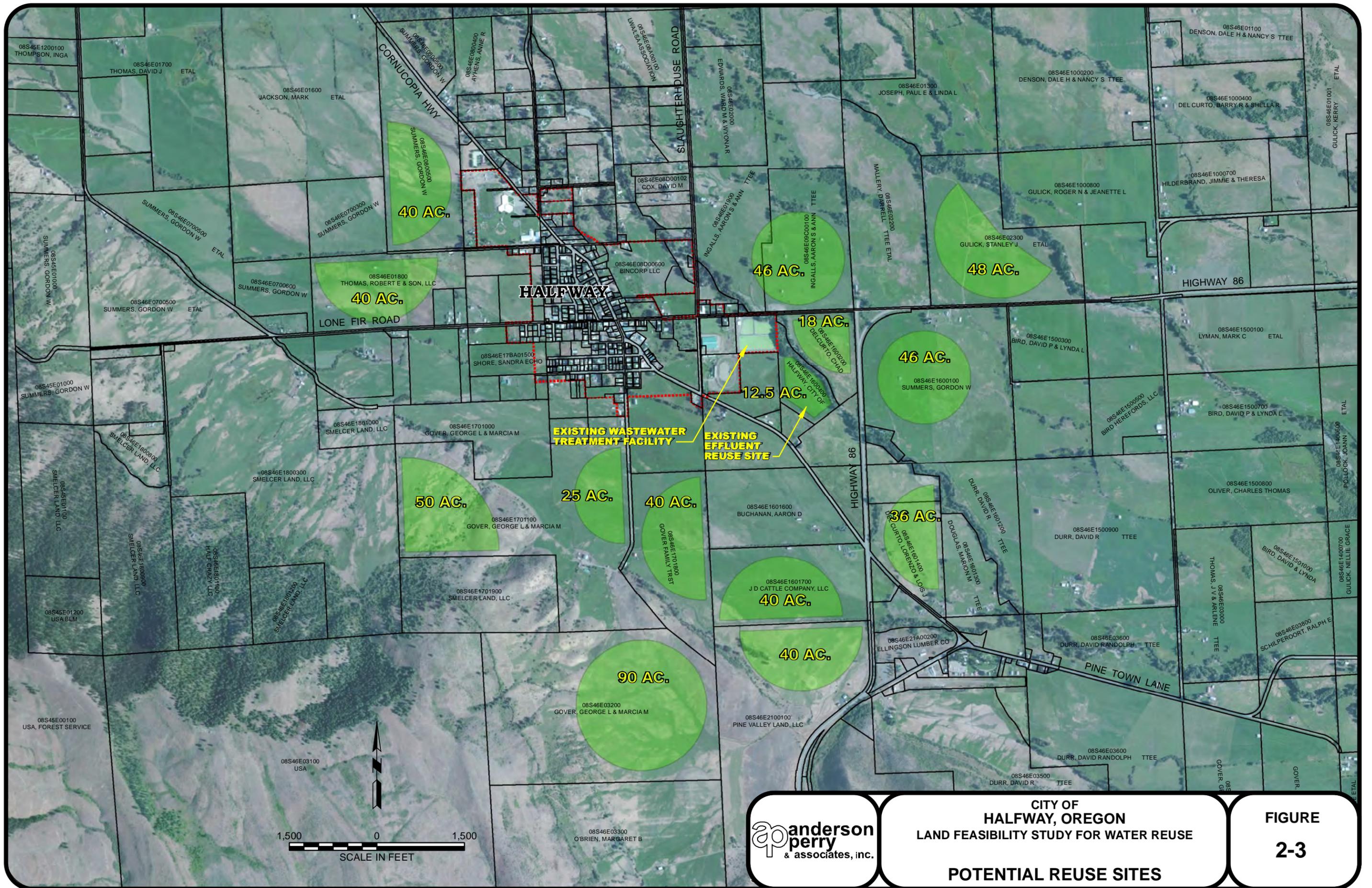
- Influent: Influent flows shown reflect a 30 percent reduction in I/I flows. Measured influent flows were adjusted by a factor of 1.75 obtained from a calculated influent flow. Influent flows were calculated using the measured effluent flows plus estimated seepage plus evaporation minus precipitation. The recorded effluent flows were used because the effluent flowmeter has been calibrated recently and the influent flowmeter readings are thought to be inaccurate.
- Precipitation: Utilized precipitation on record with the Western Regional Climate Center (WRCC) for Halfway, Oregon, 1981 to 2010 data (used mean rainfall for each month).
- Evaporation: Utilized pan evaporation data obtained from the WRCC, 1928 to 2005, for Union Experimental Station, Oregon, with a pan coefficient of 0.70.
- Seepage: Existing lagoon seepage rate assumed to be approximately 3/16 inch per day, using the projected area of the lagoon at a depth of 4.5 feet. New lagoon seepage assumed to be 0.
- Irrigation: Based on a crop of alfalfa with an irrigation season from April to September. Assumes 80 percent efficient irrigation system.
- Outfall: The existing outfall would be abandoned under this alternative as the current practice of seasonal discharge to the creek would be stopped.
- Existing lagoon size is shown with reduction for Cell B dike realignment.
- Evapotranspiration: Based on average monthly data from the U.S. Bureau of Reclamation AgriMet Station in Baker Valley.
- Average monthly evapotranspiration data were not available for October; therefore, no irrigation was calculated for October.

I/I = infiltration/inflow
gpd = gallons per day
MG = million gallons



CITY OF
HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE
PROJECTED WATER BALANCE (2035)

FIGURE
2-2



Section 3 - Main Work on Study - Identification of Possible Sites

General

With the preliminary identification of potential reuse sites completed, the main analysis work of the Study is presented in this section. The analysis began with an on-site meeting with the individual owners and an investigation of each property. This information gave the necessary understanding of how a site may be used in a water reuse capacity and gave the landowners an opportunity to express their interest, concerns, and preferences in considering the use of reclaimed water.

Employing the data from the site visits, a design team prepared conceptual designs for various storage and irrigation configurations using individual sites or a combination of sites. The evaluation criteria used to assess each of the alternatives are presented herein. This Study then discusses how the alternatives rate against the criteria and concludes with a summary matrix.

Four Landowners

The result of the initial parcel map search, public information campaign, and public meeting was the identification of four interested property owners with land potentially suitable for water reuse in the acreages needed by the City. A summary of an initial assessment of the land represented by the four landowners is presented on Table 3-1.

**TABLE 3-1
INTERESTED LANDOWNER PROPERTY SUMMARY**

Landowner/Contact	Location	Acreage	Distance from Existing WWTF¹	Comments
Pine Valley Land, LLC / George Rollins	South of WWTF on Highway 86	193 acres, plus additional parcels extending south	1 mile	Irrigation site and possible storage site
JD Cattle / Rick Jackson	South of WWTF on Highway 86	80 acres	0.8 mile	Irrigation site only
Del Curto Family / Chad Del Curto	East and southeast of WWTF	64 acres west and 61 acres east of Highway 86	0.2 to 0.8 mile	Irrigation and storage site
George and Marcia Gover	South of Halfway, Gover Road	515 acres	0.9 mile	Multiple irrigation and storage sites

¹ WWTF = wastewater treatment facility

Beginning in August 2014, following the public meeting, site visits were conducted with the landowners or the person with managing interest. The meetings mirrored the information provided at the public meeting for those who were not able to attend or consisted of a brief review of the public meeting for those who had attended. Ample time was given to address concerns, answer questions, and ensure understanding both by the landowner and the person conducting the site visit. Every effort was made to eliminate any misunderstandings that could prevent the future successful completion of a fully-

operational reuse site. It is important for the landowner to have full comprehension of what water reuse would entail, and for the design team to have a full understanding of the landowner's desires, limits, and concerns with respect to water reuse.

While visiting each site, the objective was to understand the landowner's proposed application, existing water rights, irrigation systems, lot configurations, possible setback constraints, etc.

A summary of each of these visits follows:

Pine Valley Land, LLC / George Rollins, General Manager

Pine Valley Land, LLC, is a limited liability corporation (LLC) operating several large parcels of land for cattle production. The contact is George Rollins, who is the general manager and lives on the subject parcel. Pine Valley Land, LLC, operates numerous areas of hay production and grazing throughout the Pine and Eagle Valleys of Halfway and Richland, Oregon, respectively. The parcel of interest is the first parcel on the valley floor when entering on Highway 86 from the south. This site is for running cattle only, with no haying operations. Cattle are usually brought in from June 1 through July, then for two to three days in October to clean up any growth after irrigation water runs out.

Perimeter fencing surrounds the property and separates the residence from the pasture area; however, no separations or segmenting occurs between or within irrigable areas. Two areas of land are irrigated with a hill and drainage separating them. The first area is higher in elevation and oriented into a long and narrow field of approximately 18 acres. The area has a gradual slope from south to north, with a low U-shape valley sloping to the north. There are spotty areas of low brush on the south end and east side. The landowner is happy with the forage production of this site and would not be interested in seeing it used as a storage location.

The second irrigable area is approximately 65 acres of land bordered by a hillside to the southwest and the highway to the east and southeast. The land is gently sloped from the southwest to the northeast with a drainage ditch along the north property line. There is a band of trees on the west side of the area that would need to be removed for center pivot irrigation. Boggy areas are located at the west and east ends of the field. There is a knoll of rocky ground at the south to southeast portion of the irrigable area, with a nearby domestic well and residence to the southeast. Irrigation water comes from the Posy Valley Ditch, with the parcel being the last delivery on the ditch. Effectively operating on the tail water of the ditch, this parcel receives inconsistent water deliveries from the beginning of irrigation season until the end of July or early August, when water runs out. Both irrigable areas are flood-irrigated with irregular coverage due to the terrain and soils.

The landowner's interest in water reuse is in supplementing the existing water source and extending the irrigation season. A pressurized system would be acceptable; however, changes in running cattle on the property would be required while irrigating with effluent. While a storage pond on the upper pasture would not be welcome, the landowner suggested other alternatives located farther south of the subject property. Upon investigation, these alternatives were unsuitable due to the resulting limited storage capacity after accounting for the terrain and other obstructions in the area.

In summary, the Pine Valley Land, LLC, property is a promising irrigation site of sufficient size (41+ acres) with a willing landowner; however, storage alternatives do not appear to be available at this location.

JD Cattle / Rick Jackson

JD Cattle is an LLC operating in Pine Valley with several property holdings in Baker County. The meeting was held with Rick Jackson, the resident at the subject parcel and a relative of a member/manager of the LLC. The parcel of interest is immediately north of the Pine Valley Land, LLC, parcel discussed above; it is located west of Highway 86 when entering the valley from the south. JD Cattle is currently running cattle on the property without harvesting or haying operations. Cattle are cycled through the site in the spring, summer, and fall. The parcel is approximately 80 acres with a residence and cluster of farm buildings in the northeast corner, and a single-story structure at the midpoint of the north property line. The site has perimeter fencing with separation from the residence, and the pastures have additional fences to facilitate cattle rotation.

The site is relatively flat with a gradual slope from west to east. Brush and small tree growth is limited to the fence lines at the property boundaries. The irrigation water source is water adjudicated to Foot Hills Ditch. The land is flood-irrigated with a network of small distribution and drainage ditches crisscrossing the property. Primary ditches surround the property at the property lines. Water application appears to be well distributed with some minor variations due to terrain and soils.

The residence and the domestic well source are adequately separated from the desired reuse site so as to provide more than the required buffer distance between them. Mr. Jackson expressed an interest in installing some type of sprinkler irrigation and specifically mentioned a wheel line system. No mention was made of having a lack of sufficient irrigation water.

This parcel provides a promising irrigation site of sufficient size with an interested landowner. A reclaimed water storage site is not available at this location.

Del Curto Family / Chad Del Curto

A father and son of the Del Curto family own several properties of interest in the vicinity of the existing treatment lagoons, with the family owning cattle operations in the Pine and Eagle Valleys. The son, Chad, owns the parcels west of Highway 86 that are adjacent to the treatment ponds and irrigation site. The father, Lorenzo, owns property east of Highway 86, across from Chad's property. For the site investigation of this Study, the meeting was held with Chad. Both Chad and Lorenzo see Chad as the principal operator now and anticipate him taking over the subject properties in the future.

The group of Del Curto properties of initial interest consisted of three areas: A parcel west of Highway 86 and north of Pine Creek, a separate but connected parcel south of Pine Creek, and a group of parcels south of Pine Creek and east of Highway 86.

The parcel north of Pine Creek is approximately 23 acres in size. It has a triangular shape that is bounded by Highway 86 on the east, Pine Creek Highway on the north, and Pine Creek on the southwest. The land gently slopes from north to southeast and is flood irrigated. The parcel provides pasture for cattle that are moved onto the property in rotation with other properties in the family's holdings. There are no buildings, structures, or wells on the site.

When looking into the details of the site west of Highway 86 and south of Pine Creek, it was found to contain approximately 40 acres, but has significant drawbacks for locating either a storage facility or irrigation site. While the site has a moderate slope from northwest to southeast, it has an abundance of surface and subsurface water with related environmental concerns. Of more concern, however, is the shape of the property. With its long, narrow triangular shape, it is difficult to configure an efficient irrigation system with adequate buffer zones. Creating sufficient storage in a pond would require longer lengths of dike material to get comparable storage capacity of a site with more proportionate dimensions. After initial review of this parcel, it was removed from further consideration.

The property located east of Highway 86 consists of three lots of over 60 acres. The site is generally rectangular with the south property line angled northwest to southeast by Pine Town Lane, and the north property line angled from northwest to southeast by Pine Creek and its riparian zone. A residence and a few outbuildings are located in the southeast corner of the lot. A few groups of trees and brush are located along irrigation and drainage ditches near Highway 86 and a ditch traversing the property north of Pine Town Lane. According to the landowner, the area south of this ditch is sub-irrigated through the growing season.

The landowner is interested in additional irrigation water and the nutritive aspects of it. He currently works with the City on the existing irrigation site, so he has experience with water reuse. With regard to a possible storage site, he is less interested in losing the land to a pond; however, he stated that he understands he might need to sell to the City if there is a compelling need for the storage. He said having to do so could potentially create a problem with meeting minimum contiguous acreage requirements for permitting a new residence in the future.

Between the various parcels held by the Del Curto family, there is both a promising irrigation site of sufficient size with a combination of irrigation systems and a suitable site for a storage pond.

George and Marcia Gover

George and Marcia Gover own a group of properties located south and west of the City of Halfway with potential for water reuse irrigation and storage sites. They hold a total of 515 acres that include flat valley bottom land, portions of the adjoining foothills, and the northern end of Posy Valley. Posy Valley at the Gover's property is a small, elevated valley tucked into the base of the adjoining foothills. The mix of properties contains several irrigated areas with varying water rights. Some areas benefit from senior water rights or sub-irrigation on the valley floor, while other areas have shortened irrigation seasons due to subordinate rights or no water rights.

Irrigation of the property is a mix of flood and sprinkler systems, depending on which field is being considered. Generally, lower fields are flood irrigated from distribution ditches with portable dams. In fields located in areas of moderate slopes, there is predominantly the use of gated pipe for flood irrigating, while higher areas with steep slopes have fixed-set sprinklers operating on gravity pressure. Of particular interest for water reuse is the center pivot system operating on gravity pressure that is irrigating an area of about 100 acres in the Posy Valley. These upper areas have the junior water rights that typically run out of water in late July and early August.

Due to the distance of the Gover property from the existing WWTF (and the other previously-discussed water storage alternatives), it is economically more practical to locate a storage pond and

pump station in a closer proximity to the irrigation site. The Gover property would be the best candidate for such a storage site, as their property has a mix of land types that could facilitate a pond or reservoir, and they would be the ultimate benefactors of the reclaimed water. A few water storage sites were discussed with the Govers during this investigation phase, ranging from the 55-acre field west of Gover Road just south of the City limits to a couple of sites in the 16-acre ravine at the mouth of Posy Valley.

The Gover family business is ranching with the various parcels they own providing forage throughout the growing season. All of the fields are fenced with additional cross fencing to accommodate rotation of pasturing herds. In the later part of the grazing season, the cattle are moved into the lower fields with sub-irrigation and the more senior water rights. Any fall growth in the drier upper pastures is grazed off prior to snowfall, with no hay harvested off the subject parcels.

The landowners' interest in reuse water is either to increase their acreage of irrigated lands or to extend the water in fields with junior water rights. They expressed that losing some land to a storage pond may be acceptable depending on the land affected and other conditions. With multiple irrigation and storage alternatives apparently possible on the Gover property, they expressed a lot of interest in looking at alternatives that may be agreeable to both them and the City.

An additional 83-acre parcel, which is owned by Mr. Gover's brother, is located immediately east of the subject properties, and also has potential as an irrigation or storage site. However, Mr. Gover's brother is not an active participant in the ranching business and expressed no interest in water reuse.

City Irrigation Property

In addition to the properties discussed above, the City's existing water reuse site adjacent to the WWTF could be used to augment a smaller irrigation site or possibly be repurposed for water storage. As configured, the approximately 20-acre site provides 12.5 acres of irrigation with appropriate buffers to adjoining property lines and Pine Creek located along the northeast property line. The site is roughly rectangular in shape and slopes from northwest to southeast. The north end of the parcel and northeast side along the creek consist of a heavily wooded riparian zone. The reuse irrigation system is a wheel line with risers at each irrigation station at the northeast end. The human interaction necessary to operate a wheel line irrigating reuse water is not user-friendly; however, this system is additionally complicated due to the need to add or remove a length of wheel line pipe for nearly all station moves. This operational difficulty has presented points of conflict with the City and lease operators when trying to achieve the desired level of wastewater disposal while complying with Oregon Department of Environmental Quality (DEQ) water reuse requirements.

Due to past operational frustrations, the City would prefer not to rely on this irrigation site in the future, unless it is required to meet total irrigation flows in conjunction with another primary irrigation site. If the land is not needed as part of the improved system, it may be held for a few years as the system performance is observed, and then sold.

Conceptual Design

After meeting with each of the interested landowners, gaining an understanding of the property possibilities and limitations, and hearing the landowners' desires and what would be acceptable to them on their property, conceptual design alternatives were prepared. Both a storage and irrigation facility are required to meet the reuse needs of the City, and they should be within a reasonable distance of each other to minimize pumping and operational costs. Therefore, based on the possible sites available, there are two groups of alternatives geographically split into the areas southeast and southwest of the existing WWTF.

Southeast

Storage Locations for a Southeast Irrigation System

Three locations in the southeast area were considered for reuse water storage during the conceptual design phase of this Study.

City Storage Pond Site

The City's existing irrigation site adjacent to the WWTF initially appeared to have sufficient size and a shape that could accommodate dike structures of moderate efficiency. However, as design efforts progressed, it became clear that achieving the necessary storage capacity was not possible without significant cost penalties. The riparian zone along Pine Creek (which would need to be maintained for habitat), takes up a fair amount of the available space of the site. The loss of this area narrows the remaining usable portion of the property with the long axes aligned with the sloping grade. The elevation difference from one end of the parcel to the other is approximately 10 feet, which is the preferred maximum dike height. To account for the elevation drop and achieve the desired storage capacity, the pond must be dug significantly below the existing grade, the dikes must be built up higher using imported materials, or an inner dike must be constructed to provide stepping storage cells that follow the grade. Unfortunately, none of these corrective alternatives are practical. Shallow groundwater of the area prevents digging the pond lower, the cost of importing large quantities of diking material makes building up too expensive, and an inner dike structure would drive up construction costs while reducing storage volume. Therefore, this site was removed from consideration for a storage site in this Study.

Pine Valley Land, LLC, Storage Pond

As discussed earlier, Pine Valley Land, LLC, has an area that appears to be suitable for a reuse water storage site. Initial conceptual design efforts identified some concerns similar to the City's irrigation field. The acreage of the site is somewhat constrained (approximately 17 acres) due to an access roadway at the south, property lines on the west, a low ridge to the east, and a ravine to the north, which boxes the area down to the minimum needed for a reasonably deep pond. These boundaries also create a proportionally longer rectangular shape that aligns with the dropping elevation. This site is not affected by shallow groundwater, so alternatives to achieve the desired storage volume are possible, although some construction cost increases would be expected.

After further discussion about this storage site with the landowner, the alternative was removed from consideration. The management of Pine Valley Land, LLC, highly values the pasture for grazing and expressed disinterest in selling it. The City concurs with removing this alternative, as they do not want to force a sale from an unwilling landowner, especially when there are other storage sites with interested sellers available. This alternative was removed from further analysis in this Study.

Del Curto Storage Pond

The third site considered for water reuse storage with service to the southeast irrigation areas is the Del Curto parcel located northeast of Pine Creek. It is located immediately east of the existing WWTF, so transferring treated effluent to storage can be accomplished with a relatively short length of forcemain piping. While this property also has the need to protect a riparian area along Pine Creek, doing so does not constrain the usable portion of land into an inefficient storage pond configuration. The usable site remains at nearly square proportions with moderate elevation differences. Using an area of about 19 acres, approximately 3,410 lineal feet of diking with an elevation of less than 10 feet can provide a storage facility of 70 acre-feet. This will also leave plenty of area for an irrigation pump station near the southeast corner of the pond with Highway 86 access. As not all of the parcel would be needed, the remaining area could continue to be utilized by the Del Curtos in conjunction with the property they own to the south.

A moderate length irrigation forcemain from this storage site would be able to efficiently serve irrigation sites on the Del Curto, JD Cattle, or Pine Valley Land, LLC, parcels. Service to these sites could be accomplished through routing piping in existing road rights-of-way (ROW). Additionally, with the storage and pumping site so close to the existing irrigation system adjacent to the WWTF, it would be possible to operate the City's wheel line system as a backup facility or for future growth. This storage pond option was retained for further analysis in this Study.

Southeast Irrigation System Locations

The irrigation conceptual designs primarily focus on the use of center pivot systems to minimize the need for human contact with the reuse water. Such a system supports a more uniform application of the water without puddling or creating runoff. Two criteria are necessary to remain compliant with DEQ regulations in the application of reuse water. Other systems, such as wheel lines and hand lines that require moving sprinklers from station to station, may not be moved as often as desired, or may be left unattended in one position.

A fixed-set sprinkler system with remotely actuated valves and an automated control system is another alternative with a reduced need for operator contact. However, fixed sprinklers in a field with cattle require measures to prevent damage to the equipment and have associated maintenance costs to address damage as it occurs. Also, when it comes time to work a field either to harvest, till, or seed, special care must be taken to ensure risers and buried equipment are protected.

Sites were analyzed from north to south in the area southeast of the existing WWTF.

Del Curto Irrigation Site

For the Del Curto parcel located east of Highway 86, an analysis was conducted at the landowner's request to evaluate the benefits and costs of two pivot configurations.

The first option was 1,590 feet in length with 50 degrees of mobility. This option would have a smaller footprint than the second option; the footprint would be approximately 25 acres with an additional 2.6 acres to be added on through using an end gun. Due to the proximity to buildings, this option would require irrigation socks to reduce impacts outside of the irrigation area and to provide a protective buffer zone area. This option would also require the removal of trees near buildings. The combination of buffering, tree removal, and low acreage of the site caused this option to be rejected as infeasible and cost-prohibitive.

The second option was a full half-circle pivot that was 950 feet in length and consisted of a total of 32 acres with the option to extend an additional 3.7 acres through using an end gun, and an additional 8 acres using a hand line system. This acreage totaled approximately 43.7 acres and would be sufficient for current wastewater disposal needs. Potential concerns with this location included a ditch crossing through the pivot area that would need to be piped, and a high groundwater table and presence of sub-irrigated areas that would potentially not require additional irrigation. This site was retained for further evaluation in this Study.

JD Cattle Irrigation Site

The irrigation site option owned by JD Cattle was a half-circle pivot that was 1,060 feet in length and consisted of 40.5 acres with the option to extend an additional 3 acres through use of an end gun. The benefits of this site included the likelihood of a clean installation; the concerns included potential issues with ditch crossings to be addressed. This site was retained for further analysis in this Study.

Pine Valley Land, LLC, Irrigation Site

The irrigation site option owned by Pine Valley Land, LLC, was a half-circle pivot 1,060 feet in length and consisted of 40.5 acres with the option to extend an additional 3.9 acres through the use of an end gun. The center pivot would affect a 700-foot by 100-foot area of trees. These trees would need to be removed; however, no other significant issues were noted. This alternative was retained for further evaluation in this Study.

Southwest

One landowner southwest of the existing WWTF expressed interest in applying reuse water. George and Marcia Gover jointly own several adjoining parcels that provide multiple areas for irrigation and storage possibilities. With the land all held by a single owner, it is possible to mix and match storage and irrigation sites with the primary difference being the necessary pipelines to transfer effluent to storage and then to the irrigation site, and small variations in pumping requirements.

Storage Locations for a Southwest Irrigation System

Three locations in the southwest area were considered for reuse water storage during the conceptual design phase of this Study.

Gover Lower Storage Reservoir

Initial storage discussions with the Govers were focused on a traditional dam and reservoir at the lowest point of Posy Valley, located 250 feet behind the Gover residence. This site, referred to as Gover Lower Storage Reservoir, would contain a water surface elevation of 2690 feet mean sea level (MSL) and would have a surface area (including the dam structure) of approximately 11.6 acres. The dam would be approximately 670 feet in length with the top of the dam located at an elevation of approximately 2695 feet and a base elevation of approximately 2658 feet. The dam face would have a 37-foot elevation. To construct this dam, approximately 32,000 cubic yards (CY) of material would be required and it would occupy a significant portion of the pasture south of the residence. The storage reservoir would extend into the Gover-owned parcel with the center pivot pasture, capable of serving the existing pivot, or lower fields. This option was retained for further analysis in this Study.

Gover Storage Pond

The second potential location for a storage pond on the Gover property would provide the opportunity to bring storage closer to the existing WWTF. This would necessitate a shorter effluent forcemain and would be beneficial from engineering and cost-efficiency perspectives. This pond would be located on the main property in the main pasture north of the Gover residence, adjacent to Gover Road. It would require the conversion of 9 acres of land, including the dikes. The pond would include a 9.8-foot dike height and a 7.8-foot water depth. This location would be ideal to service irrigation on the lower fields and could also be utilized with a pump to be tied in with the existing center pivot. This option was retained for further analysis in this Study.

Gover Upper Storage Reservoir

At the request of the landowners, a third site was evaluated and a conceptual design was prepared. This option, referred to as Gover Upper Storage Reservoir, was located farther up Posy Valley near the south property line of the main parcel, with most of the storage site on the property to the south. This reservoir would have a water surface elevation around 2702 feet MSL and would comprise approximately 12 acres in surface area (including dams). The construction of this dam would require 25,000 CY of fill. The top of the dam would be located at an elevation of approximately 2705 feet MSL, and the base would be located at 2679 feet MSL. The dam would require a 26-foot face. A benefit of being situated on the crest of the saddle is the spillway of this dam could be set to discharge to the north or south. This location would be able to fulfill the need for a front and back dam, and could be very flexible as to the depth or size of area needed. This flexibility is a great advantage to this location. A disadvantage to this location is that it obscures a portion of the pivot rotation (or outer towers, depending on size). This option was retained for further analysis in this Study.

Southwest Irrigation System Locations

Gover Lower Irrigation

The Gover Lower Irrigation option is located on the main property in the main pasture north of the Gover residence. This location includes the southeast corner of an adjacent parcel of land, also owned by the Govers. This irrigation option is nearly a half-circle pivot that has a 1,075-foot radius and includes 40 acres, with the option for extending irrigation to an additional 4.6 acres using an end gun, and another 4 acres using hand lines. This site would provide a total of approximately 48.6 acres. The design of this irrigation site is based on the assumption that a storage pond would be located in the same field. This site would service nearly all of the main pasture north of the house (except for buffers and a small area north of the pivot/end gun reach). An irrigation ditch located in the site would need to be piped. This option was retained for further analysis in this Study.

Gover Upper Irrigation

The Gover Upper Irrigation option includes an existing center pivot that has a 1,135-foot radius and irrigates 93 acres, which could be extended by 14 acres if needed through use of end guns. Benefits of this location are the size and the fact that this area is in need of water, especially in the later part of irrigation season. Current irrigation in this area runs out in late July or early August. The proximity of this site to property lines will require adjustments for buffer zone requirements. This option was retained for further analysis in this Study.

The Govers expressed interest in irrigating other sites on their property, such as the east slopes of the Posy Valley area and specific knolls along the west borders of the property; however, these were not analyzed due to the need to mix and match with other alternatives to meet the desired acreage. The ultimate irrigation of these alternative sites will depend on the financial and environmental benefits of each option. For analysis in this Study, only the lower and upper irrigation sites were retained.

Retained Options

Of the evaluated storage pond options, four potential locations were retained. These include the Del Curto Storage Pond, Gover Storage Pond, Gover Lower Storage Reservoir, and Gover Upper Storage Reservoir.

Of the evaluated irrigation site options, five potential irrigation sites were retained. These include Del Curto Irrigation; JD Cattle Irrigation; Pine Valley Land, LLC, Irrigation; Gover Lower Irrigation; and Gover Upper Irrigation.

These options are shown on Figure 3-1 and were combined to create six alternatives for analysis.

Resulting Options: Alternatives Description

Following this analysis of the conceptual designs, six alternatives were evaluated, as described below. Other alternatives that did not meet minimum project requirements of storage and irrigation capacity were rejected and are not analyzed further.

Alternative 1: Del Curto Pond Storage and Irrigation

This alternative is shown on Figure 3-2. The reclaimed water storage pond is located adjacent to the existing WWTF as well as to Pine Creek Highway. The proposed Del Curto Pond has a volume of 65 acre-feet (1,020 feet in length and 470 feet in width). The pond would have a storage depth of 6 feet and a height of 8 feet, using 10.83 acres of land. Piping to the irrigation site would be constructed in the Highway 86 ROW. The proposed site for irrigation is approximately 36 acres and is located at the intersection of Highway 86 and Highway 12. This irrigation option would utilize a new half-circle center pivot with an end gun to pick up additional irrigation area outside of the basic circle. Additionally, a wheel or hand line irrigation section is included in this alternative. Total irrigable area is approximately 43.7 acres. This irrigation site has a ditch that intersects the irrigation area and would need to be piped. The additional area of the end gun and hand line irrigation systems would be needed to allow for enough irrigation area to meet the project need. This alternative utilizes property owned by a single landowner.

Alternative 2: Del Curto Pond Storage and JD Cattle Irrigation

This alternative is shown on Figure 3-3. This alternative utilizes the same reclaimed water storage pond as Alternative 1 (see Alternative 1 for description). Piping to the irrigation site would be constructed in the Highway 86 ROW to the JD Cattle property to the west of the highway. The proposed site for irrigation is approximately 43.5 acres and is located to the west of Highway 86 and to the south of Highway 12. In addition to the half-circle irrigation pivot that would be utilized for this alternative, end gun areas would be required to ensure that the irrigation site was large enough to meet the project need. A building is located directly adjacent to this proposed irrigation site, so the end gun area would be required to be shut off near the building to maintain an appropriate buffer. This alternative utilizes property owned by two landowners.

Alternative 3: Del Curto Pond Storage and Pine Valley Land, LLC, Irrigation

This alternative is shown on Figure 3-4. This alternative utilizes the same reclaimed water storage pond as Alternatives 1 and 2 (see Alternative 1 for description). This pond is located adjacent to the existing WWTF as well as to Pine Creek Highway. Piping to the irrigation site would be constructed in the Highway 86 ROW to the Pine Valley Land, LLC, property west of the highway. The proposed site for irrigation is approximately 44.4 acres and is located west of Highway 86 and south of Highway 12. This irrigation area would be a half-circle irrigation pivot with an end gun to obtain enough irrigation area to meet the project need. The end gun area would be turned off in three locations to avoid encroaching into an existing irrigation ditch and to avoid a domestic well head. An area of trees would need to be removed to allow for the irrigation pivot to operate correctly. This alternative utilizes property owned by two landowners.

Alternative 4: Gover Lower Reservoir Site and Upper Irrigation

This alternative is shown on Figure 3-5. This alternative would utilize a reclaimed water reservoir adjacent to the irrigation site. The Gover Lower Reservoir Site appears to be a natural place for water storage based on the topographic contours of the land. The reservoir site is located at a significantly greater distance (5,000 feet versus 500 feet straight line distance) from the existing WWTF than the Del Curto Pond. The reservoir would be approximately 670 feet long and 220 feet wide at the base. It would be approximately 5 acres in surface area and 14 feet deep to provide 70

acre-feet of storage. The height and location of this reservoir would make it highly visible from town and surrounding areas. Additionally, it would be located near buildings and would impact view sheds by changing the view at the base of the hills. A buried fiber optic cable is currently located in a portion of the high water area of this reservoir design and would need to be relocated. The location of the Gover Lower Reservoir Site would be in an active pasture area and would require the permanent conversion of this agricultural land to a reservoir. Piping to both the reservoir and irrigation site would be constructed in city, county, and state highway ROW when possible along Highway 12, city streets, and Gover Road. If laying pipe is found to be more efficient through the property of a landowner, an easement would be obtained for this purpose. The pond and irrigation site are located to the south of Gover Road. The proposed site for irrigation is approximately 90 acres with an existing full-circle irrigation pivot in the center of the site, providing much more irrigation area than required for effluent disposal. This alternative utilizes property owned by a single landowner.

Alternative 5: Gover Pond Storage and Lower Irrigation

This alternative is shown on Figure 3-6. This alternative would utilize a reclaimed water storage pond adjacent to the irrigation site. The Gover Pond storage location would be 9 acres, 7.8 feet deep, with a 9.8-foot dike. This low profile would provide minimal visual impact. This pond is also located slightly closer to the WWTF (3,000 feet straight line distance) than the reservoir discussed in Alternative 4. Piping to both the reservoir and irrigation site would be constructed in city, county, and state highway ROW when possible along Highway 12, city streets, and approximately half way down Gover Road. The pond and irrigation site would be located to the west and directly adjacent to Gover Road. The proposed site for irrigation is approximately 48 acres. This irrigation site would be composed of a newly-constructed half-circle irrigation pivot, with end gun areas and a hand line-irrigated section providing more than the project need for irrigation space. An irrigation ditch running through this irrigation site would need to be piped. This alternative utilizes property owned by a single landowner.

Alternative 6: Gover Upper Reservoir Site and Upper Irrigation.

This alternative is shown on Figure 3-7. This alternative would utilize a reclaimed water reservoir adjacent to the irrigation site. The Gover Upper Reservoir Site is located farther up the Posy Valley ravine and would not impact view sheds to the same extent as the Gover Lower Reservoir Site. This reservoir is located the greatest distance from the existing WWTF (5,300 feet straight line distance) of all of the alternatives. Piping to both the reservoir and irrigation site would be constructed in city, county, and state highway ROW when possible along Highway 12, city streets, and Gover Road. The pond and irrigation site are located to the south of Gover Road. The proposed site for irrigation is the same as Alternative 4 with 90 acres, exceeding the area needed for wastewater disposal. This alternative utilizes property owned by a single landowner.

Feasibility Analysis Criteria

These six alternatives were evaluated based on feasibility analysis criteria that combined requirements listed in the 1069 Grant Application with criteria driven by state and federal regulatory agencies. The criteria are described below.

1069 Grant Application Criteria

Location

The location of each site was the first criterion evaluated. Site location factors included proximity to the existing WWTF, proximity of the pond to the irrigation site, and qualitative factors such as proximity to similar activities. Each alternative was mapped and evaluated based on distance for piping, storage possibilities, and maximum irrigable acreage. View impact of the alternative was also considered. The locations were evaluated based on impacts to existing view sheds due to the height and location of the water storage ponds and reservoirs.

Size

The size of both the irrigation site and pond was considered. Land available in cohesive parcels was considered preferable. When the needed storage pond surface area is combined with that of necessary dikes, the area of land needed for a basic storage site is approximately 13.7 acres. Smaller sites could still be candidate locations, as the storage depths can be increased with a corresponding (but not directly related) decrease in surface area required for the facility. When assessing a particular site, if it requires dam heights in excess of 10 feet or 9 acre-feet of storage, additional consideration must be given to the Oregon Water Resources Department requirements and/or restrictions that may apply. The size of the irrigation site was determined to be approximately 41 acres. These minimum sizes will require additional space for dikes and buffer areas; additional space for future growth (if needed) is preferred from an engineering perspective.

Soil Condition

The characteristics of soil are important from storage pond constructability and irrigation and crop production perspectives. Soil condition was also evaluated for the irrigation site location because it is essential that these areas be loamy and well drained to allow for efficient disposal of water through irrigation. Soil was evaluated through field visits and using the Natural Resources Conservation Service (NRCS) web soil survey mapping function to identify crop soils for irrigation and potential material sources for clay and gravel. See Figure 3-8.

Financial Feasibility

Preliminary cost estimates for each alternative were created to compare the financial feasibility of different location options. A cost estimate can be an indicator of how efficient an alternative is compared to another as it takes into account elements such as length of pipe required, existing irrigation systems, pump station requirements, stream crossings, and earthwork for the various alternatives. By balancing the various construction costs for comparable components of each alternative, it is possible to determine the most cost-effective solution for the City of Halfway.

State and Federal Regulatory Criteria

Impacts to Farmland

Prime farmland and farmland of statewide importance were evaluated when selecting a location. Permanently removing farmland from productive use requires consultation with the NRCS and compliance with the Farmland Protection Policy Act. This could require the completion of a "Farmland Conversion Impact Rating" U.S. Department of Agriculture AD-1006 Form. The amount of important farmland permanently impacted by each alternative and the ability to avoid or mitigate the impacts were considered in this evaluation (see Figure 3-9 for a Zoning Map).

Water Rights

Existing irrigation and water rights determine the amount and priority of water that can be taken from Pine Creek or other sources for irrigation in Halfway. Points of diversion, existing water rights, and ability of wastewater reuse to reduce the irrigation demands on Pine Creek were considered in this evaluation (see Figure 3-10).

Cultural Resources

The City of Halfway and surrounding area is located in the Pine Valley. This area is fertile land, and as such, was inhabited in historic and prehistoric times; therefore, the entire area has potential to contain sites of cultural interest or significance. Not many cultural investigations have been prepared in the area, so the number or location of sites is difficult to predict. Much of the water reuse facilities will be located on ground with limited or no previous disturbance. Most areas have been used for grazing cattle with some areas being farmed in recent times.

Pipeline routes would tend to be located in existing ROWs and disturbed soils; however, some routes that cut through farmed or pastured areas may be preferred. As such, one of the outcomes of this Study will be to initiate a cultural resource evaluation as part of the design and environmental review, and also to have environmental monitoring during ground-disturbing activities in areas of potential cultural resources.

With limited up-front knowledge of potential cultural impact, this criterion was not used to evaluate the alternatives in this Study, but will be used in later stages of evaluation to determine avoidance and mitigation strategies as needed.

Overall Environmental/Regulatory Feasibility

Environmental factors, such as impacts to wetlands and waterbodies, endangered species, and floodplains, were considered when evaluating the alternatives (see Figure 3-11 for a National Wetlands Inventory [NWI] Map). Each alternative was reviewed for regulatory feasibility and was rated based on minimizing impacts to natural resources

Alternative Feasibility

Alternatives were reviewed for suitability based on the criteria described above. A brief discussion of the review for each alternative is provided below.

Alternative 1: Del Curto Pond Storage and Irrigation

This alternative is shown on Figure 3-2. The location of the Del Curto storage pond is desirable because it was the closest to the existing WWTF, uses a portion of the site, and cattle could potentially graze on the unneeded area and thus allow a portion of the area to remain in production. The size of the irrigation site is only 43.7 acres; the optimal number of acres was determined to be at least 41. Because the number of available acres is so close to the desired 41 acres, this irrigation area would provide limited flexibility for future expansion to accommodate potential future growth in need of disposal of treated wastewater. The hand line irrigation area is less desirable for the operator and will expend additional labor hours for operation of the system. Both the pond and irrigation site are composed of silt/loams, which are characteristic of farmland soils. This site would require the acquisition of additional borrow material of clay and gravels to complete the construction of the pond. The piping from the existing WWTF to the storage pond would be 900 feet. The piping from the storage pond to the irrigation site would be 3,800 feet.

This alternative would cost approximately \$1,814,700 to construct (see Figure 3-12). The cost of this alternative is the third lowest. This alternative is located in prime farmland if irrigated, and prime farmland if drained. The storage pond would be located in land that is in use and would take farmland out of production. Water rights are sufficient for this alternative and, therefore, water reuse could allow for leaving additional water in Pine Creek. This alternative has the highest environmental concerns of all alternatives because of storage pond proximity to Pine Creek (and the aquatic life therein), substantial wetlands located on the irrigation site, and the location of part of the irrigation site in the 100-year floodplain. This irrigation area is located near Pine Creek and would require a buffer area for Pine Creek and also for the nearby residence. An irrigation ditch also crosses the irrigation area and would need to be piped if this alternative is selected. This alternative would require creek crossings, which could be accomplished by either attaching the pipe to a bridge or trenching the pipe beneath the creek. The environmental impacts from trenching the creek would be more significant due to fill and removal in a waterbody.

Alternative 2: Del Curto Pond Storage and JD Cattle Irrigation

This alternative is shown on Figure 3-3. The location of the Del Curto storage pond has the same benefits and concerns as described in Alternative 1. The size of the irrigation site is 43.5 acres; the optimal number of acres was determined to be at least 41. Because the number of available acres is so close to the desired 41 acres, this irrigation area would provide limited flexibility for future expansion to accommodate potential future growth in need of disposal of treated wastewater. Both the pond and irrigation site are composed of silt/loams, which are characteristic of farmland soil. The piping from the storage pond to the irrigation site would be 5,600 feet.

This alternative would cost approximately \$1,880,500 to construct (see Figure 3-13). The cost of this alternative is the second highest. The irrigation site is located in farmland of unique importance, and prime farmland if irrigated. Water rights are sufficient for this alternative and, therefore, water reuse could allow for water to remain in Pine Creek. This alternative has the same storage pond

benefits and concerns as Alternative 1 and has an irrigation site that has the second highest amount of environmental concerns because of environmental impacts to the storage pond (described in Alternative 1) and substantial impacts to wetlands located on the irrigation site. This alternative would require creek crossings, which could be accomplished by either attaching the pipe to a bridge or trenching the pipe beneath the creek. The environmental impacts from trenching the creek would be more significant due to fill and removal in a waterbody. This alternative would also require special protections and buffers for the building located in the path of the irrigation end guns.

Alternative 3: Del Curto Pond Storage and Pine Valley Land, LLC, Irrigation

This alternative is shown on Figure 3-4. The location of the Del Curto storage pond has the same benefits and concerns as described in Alternative 1. The size of the irrigation site is 44.4 acres; the optimal number of acres was determined to be at least 41. Because the number of available acres is close to the desired 41 acres, this irrigation area would provide a small amount of flexibility for future expansion to accommodate potential future growth in need of disposal of treated wastewater. The irrigation site is composed of cobbly silt/loams, which are characteristic of farmland soils. The piping from the storage pond to the irrigation site would be 6,300 feet.

This alternative would cost approximately \$1,905,500 to construct (see Figure 3-14). The cost of this alternative is the highest of all alternatives. The irrigation site is located in farmland of statewide importance. Water rights are sufficient for this alternative. This alternative has the third highest amount of environmental concerns because of storage pond proximity to Pine Creek (and the aquatic life therein). This alternative also requires the removal of trees in the pathway of the irrigation pivot. The irrigation pivot is adjacent to an existing irrigation ditch. This alternative would require creek crossings, which could be accomplished by either attaching the pipe to a bridge or trenching the pipe beneath the creek. The environmental impacts from trenching the creek would be more significant due to fill and removal in a waterbody. Only a very small part of the irrigation site is located in a wetland and 100-year floodplain.

Alternative 4: Gover Lower Reservoir Site and Upper Irrigation

This alternative is shown on Figure 3-5. The location of the storage pond in this alternative is feasible; however, it is more distant from the irrigation site than Alternative 6. A storage reservoir in this location would be in a highly visible location and would impact view sheds in the area. The size of the irrigation site is 93 acres; the optimal number of acres was determined to be at least 41. This excess of available irrigation area provides the option for future expansion if the City's demand for areas to dispose of treated wastewater increases due to growth. The pond is composed of silty clay loams and cobbly silt loams. The irrigation site is composed of silty clay loam, clay, and cobbly silt loam with clay as the most dominant soil type. This site would not require additional borrow material to line the reservoir because it would be provided by the clay constituent of the soils. This lower reservoir site currently has a fiber optic cable located within the potential reservoir boundaries; this alternative would require relocating this fiber optic cable. The piping from the WWTF to the storage pond would be 7,300 feet. The piping from the storage pond to the irrigation site would be 2,500 feet.

This alternative would cost approximately \$1,621,600 to construct (see Figure 3-15). The cost of this alternative is the lowest of all alternatives. This storage pond is located primarily in not prime farmland. The irrigation site is located in a mix of not prime farmland and farmland of statewide

importance. Water rights are sufficient for this alternative; however, the pond and irrigation areas have junior water rights, which run out of water in late July to early August. The pond would allow for moving approximately 10.6 acres of water rights to other areas of the ranch. Reuse on the 93-acre site would benefit Pine Creek by allowing water to stay in stream; but, with larger-than-needed area and short water supply, reuse in the latter part of the season to maintain crop health and production is another alternative. This alternative would require creek crossings, which could be accomplished by either attaching the pipe to a bridge or trenching the pipe beneath the creek. The environmental impacts from trenching the creek would be more significant due to fill and removal in a waterbody. This alternative has the least environmental impact because the irrigation site has minimal wetland impacts and the reservoir has no wetland impacts, according to the NWI map.

Alternative 5: Gover Pond Storage and Lower Irrigation

This alternative is shown on Figure 3-6. The location of the storage pond in this alternative is feasible. The size of the irrigation site is 48 acres; the optimal number of acres was determined to be at least 41. This irrigation area would provide for some ability for future expansion to accommodate potential future growth in need of disposal of treated wastewater. The hand irrigation portion of the site would require labor-intensive operation. The pond is composed of mostly gravelly loam and clay. The irrigation site is composed of clay. The soils in this site are the second best of all of the alternatives because they would potentially provide adequate borrow material (clay and gravel) for the pond construction and lining. The piping from the existing WWTF to the storage pond would be 4,700 feet. The piping from the storage pond to the irrigation site would be 1,800 feet.

This alternative would cost approximately \$1,871,000 to construct (see Figure 3-16). The cost of this alternative is the fourth lowest of all alternatives. This storage pond is located in farmland of statewide importance and prime farmland if irrigated. The irrigation site is located in farmland of statewide importance. Water rights are sufficient for this alternative. The water rights attached to this site are senior water rights. The sub-irrigated pond site would possibly allow moving water rights for approximately 9 acres, but may not have area to do so. There is no real shortage of water in this location, but reuse would help keep water in Pine Creek. This alternative would require creek crossings, which could be accomplished by either attaching the pipe to a bridge or trenching the pipe beneath the creek. The environmental impacts from trenching the creek would be more significant due to fill and removal in a waterbody. This alternative has the fourth highest environmental impact because the pond and irrigation site have substantial wetland impacts, according to the NWI map.

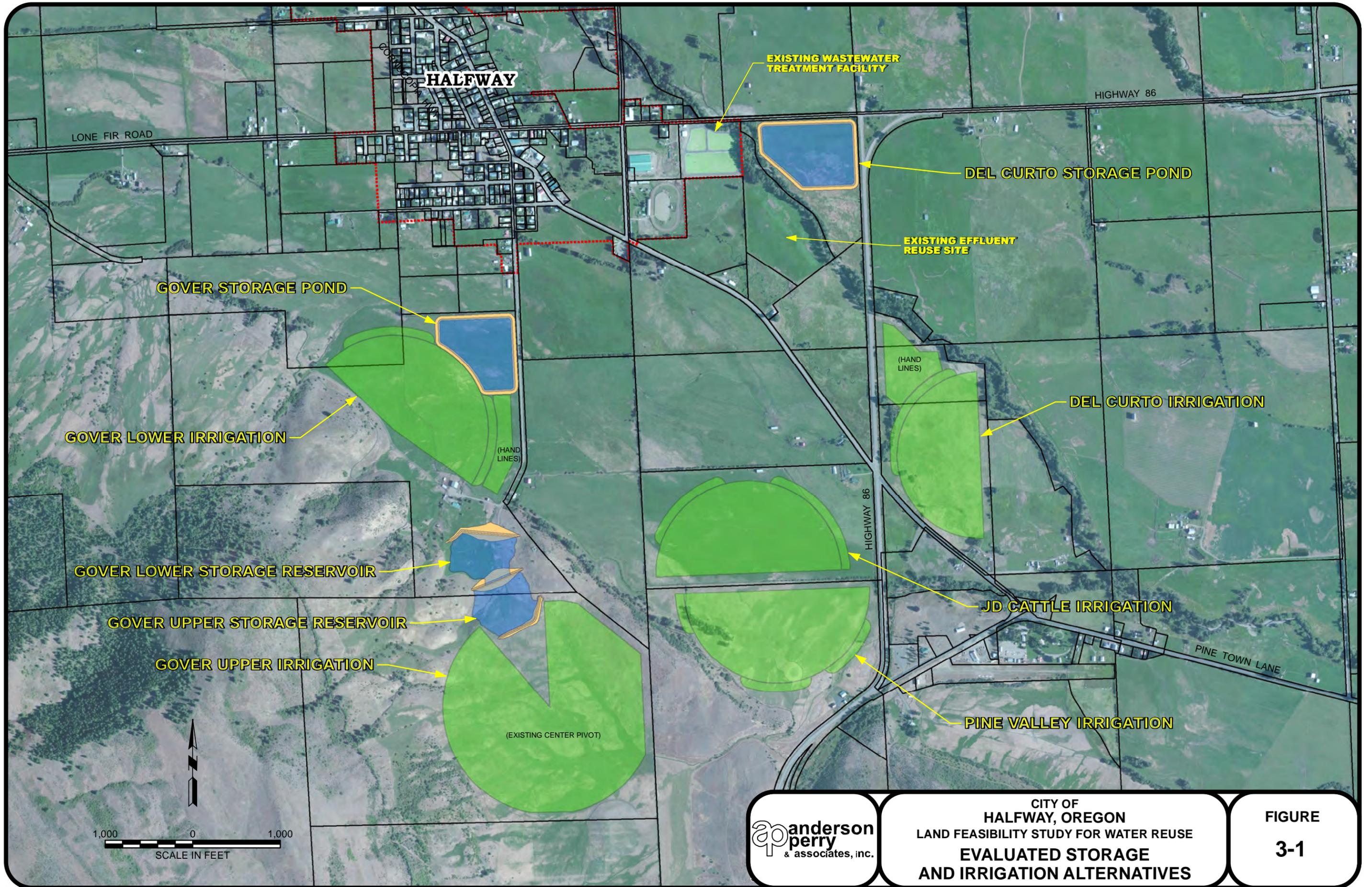
Alternative 6: Gover Upper Reservoir Site and Upper Irrigation

This alternative is shown on Figure 3-7. The location of the storage pond in this alternative is feasible and located close to the irrigation site. It is the greatest distance from the existing WWTF. It is located in an area that will not impact view sheds to the same extent as Alternative 4. The irrigation site has the same benefits and concerns as described in Alternative 4. The pond is composed of clay, clay/loam, and cobbly silt loam. The irrigation site is composed of silty clay loam, clay, and cobbly silt loam, with clay as the dominant soil type. This site would not require additional borrow material to line the reservoir because it would be provided by the clay constituent of the soils. The piping from the existing WWTF to the storage pond would be 8,000 feet. The piping from the storage pond to the irrigation site would be 1,800 feet.

This alternative would cost approximately \$1,707,600 to construct (see Figure 3-17). The cost of this alternative is the second lowest of the alternatives. This storage pond is located primarily in not prime farmland and would have the least impact to farmland of all storage pond options. Water rights are sufficient for this alternative; the pond would impact approximately 7.3 acres of water rights that could be moved to other areas on the ranch. This alternative would require creek crossings, which could be accomplished by either attaching the pipe to a bridge or trenching the pipe beneath the creek. The environmental impacts from trenching the creek would be more significant due to fill and removal in a waterbody. This alternative has the second lowest environmental impact because the irrigation site has minimal wetland impacts and the reservoir appears to have no wetland impacts, according to the NWI map.

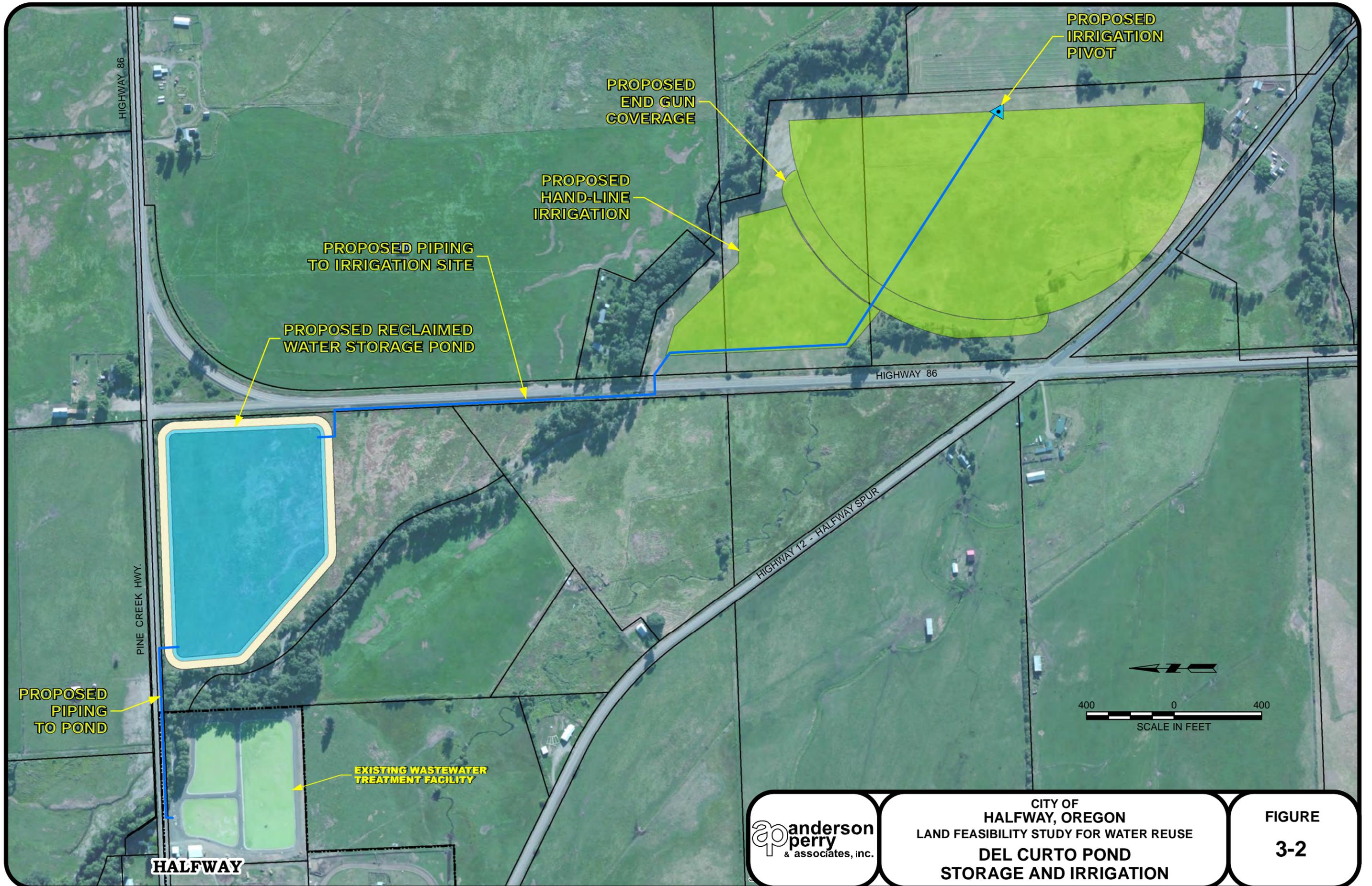
Feasibility Summary

Alternatives were given a rating from 1 to 6 based on the evaluation criteria. The scale for evaluation was 1 - Best Option to 6 - Least Acceptable Option. The impact to cultural resources for each of the alternatives could not be determined at this time, and a cultural resources inventory will be conducted for the selected alternative; therefore, the cultural resources criterion is not included in this analysis. The alternative with the lowest overall ranking score is the most favorable based on these criteria. Although there is a level of subjectivity in ranking alternatives, the qualitative analysis above confirms these decisions. See Figure 3-18.



**FIGURE
3-1**

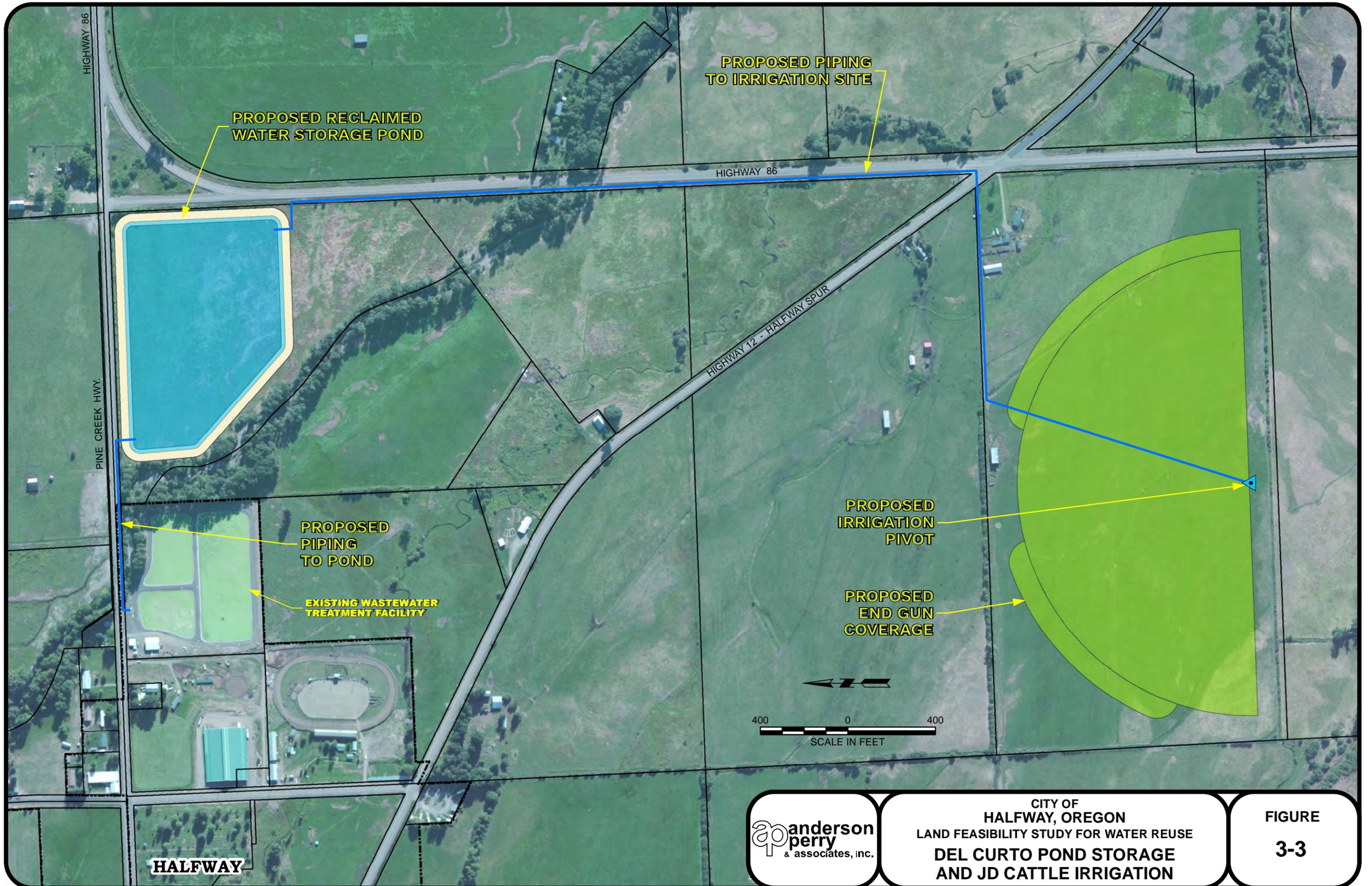
\\LGS\VR6\gis\projects\Halfway\9866-21_WWReuseFeasibility\Fig_DelCurtoPondandIrrigation.mxd, 6/25/2015, 11:36:54 AM



CITY OF
HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE
DEL CURTO POND
STORAGE AND IRRIGATION

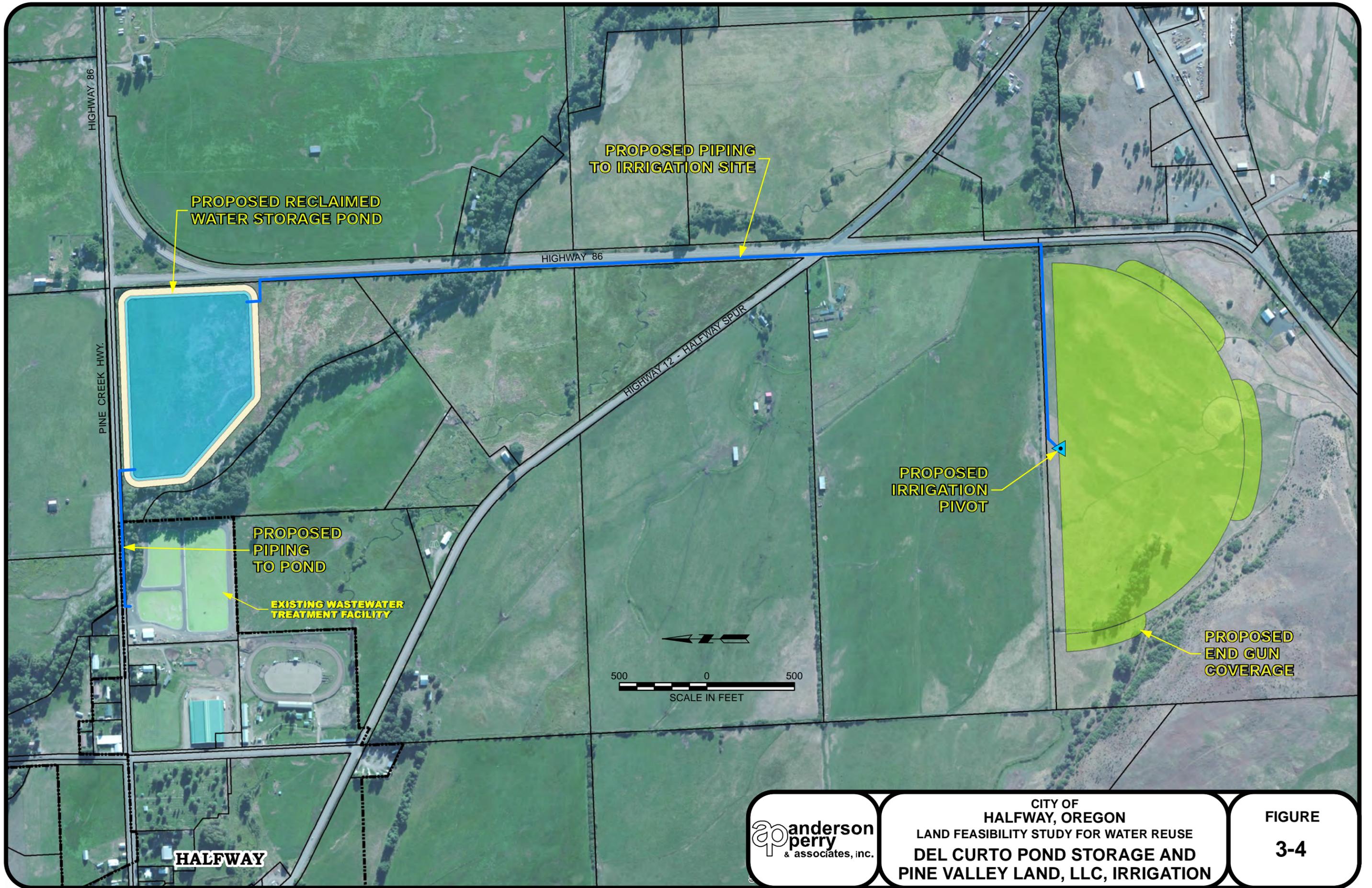
FIGURE
3-2

\\LGS\VR6\gis\projects\Halfway\9866-21_WWReuseFeasibility\Fig_DelCurtoPond_JDCattle.mxd, 6/25/2015, 11:41:55 AM



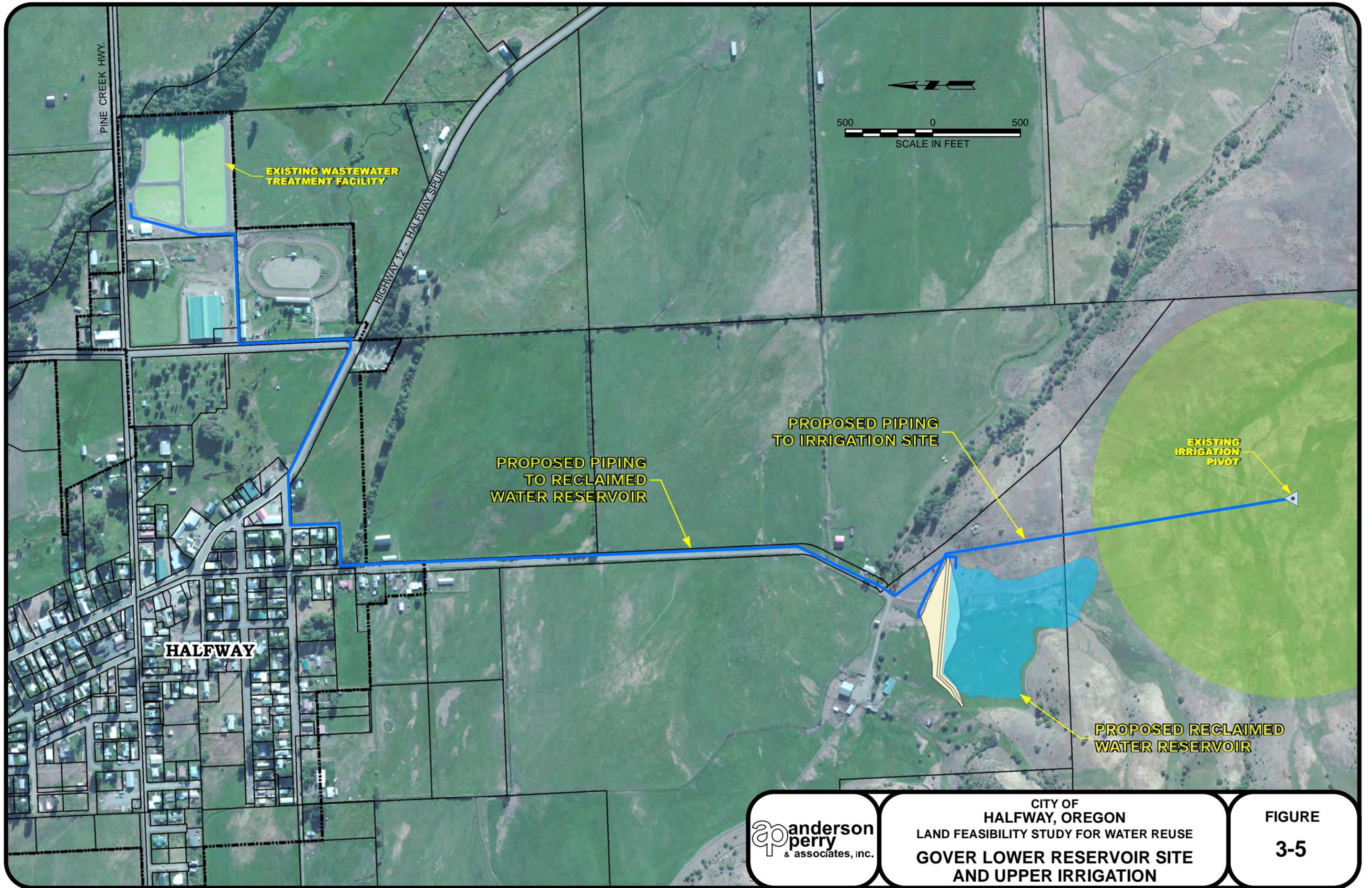
CITY OF
HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE
DEL CURTO POND STORAGE
AND JD CATTLE IRRIGATION

FIGURE
3-3



CITY OF
HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE
DEL CURTO POND STORAGE AND
PINE VALLEY LAND, LLC, IRRIGATION

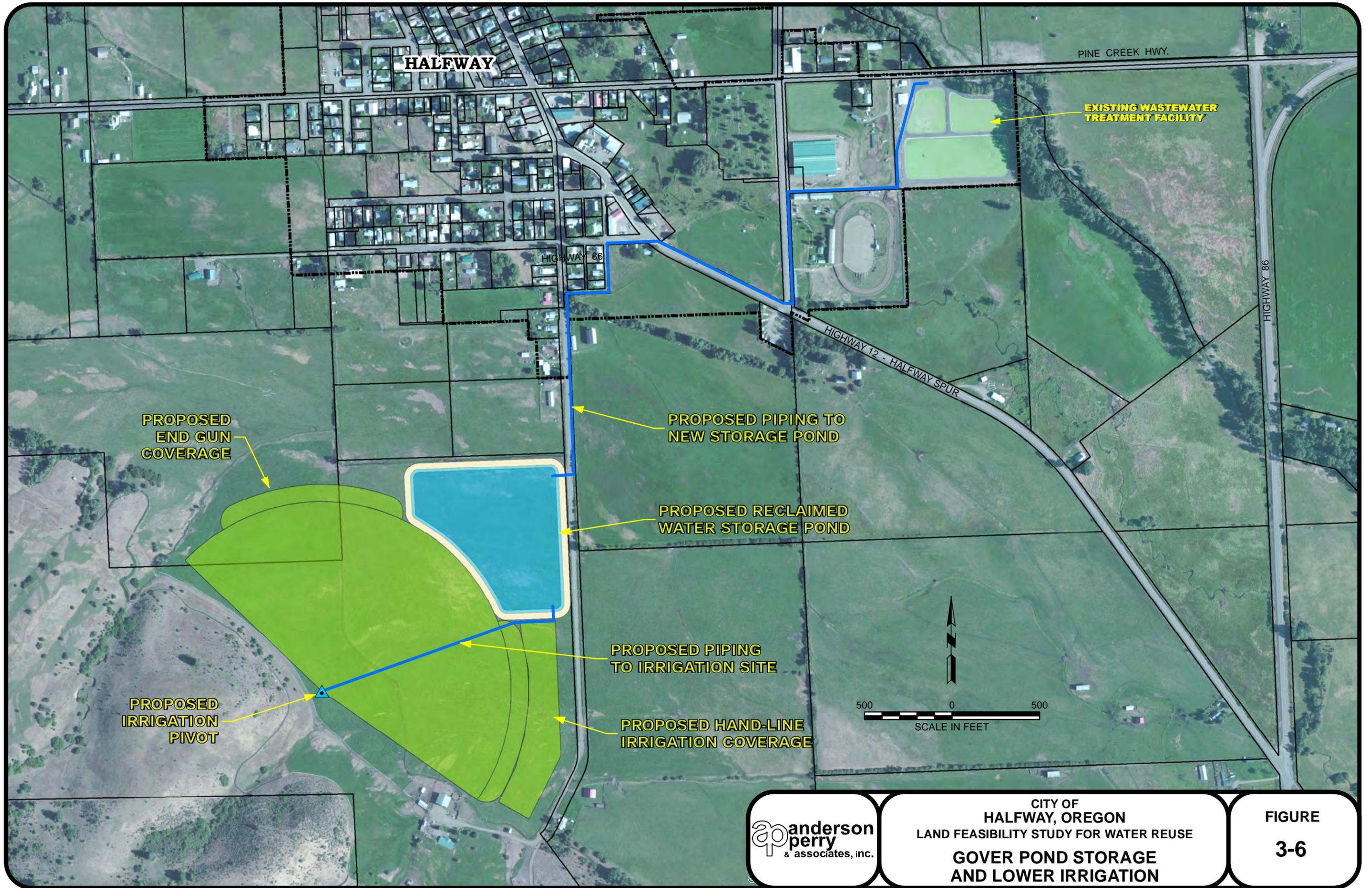
FIGURE
3-4



CITY OF
HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE
GOVER LOWER RESERVOIR SITE
AND UPPER IRRIGATION

FIGURE
3-5

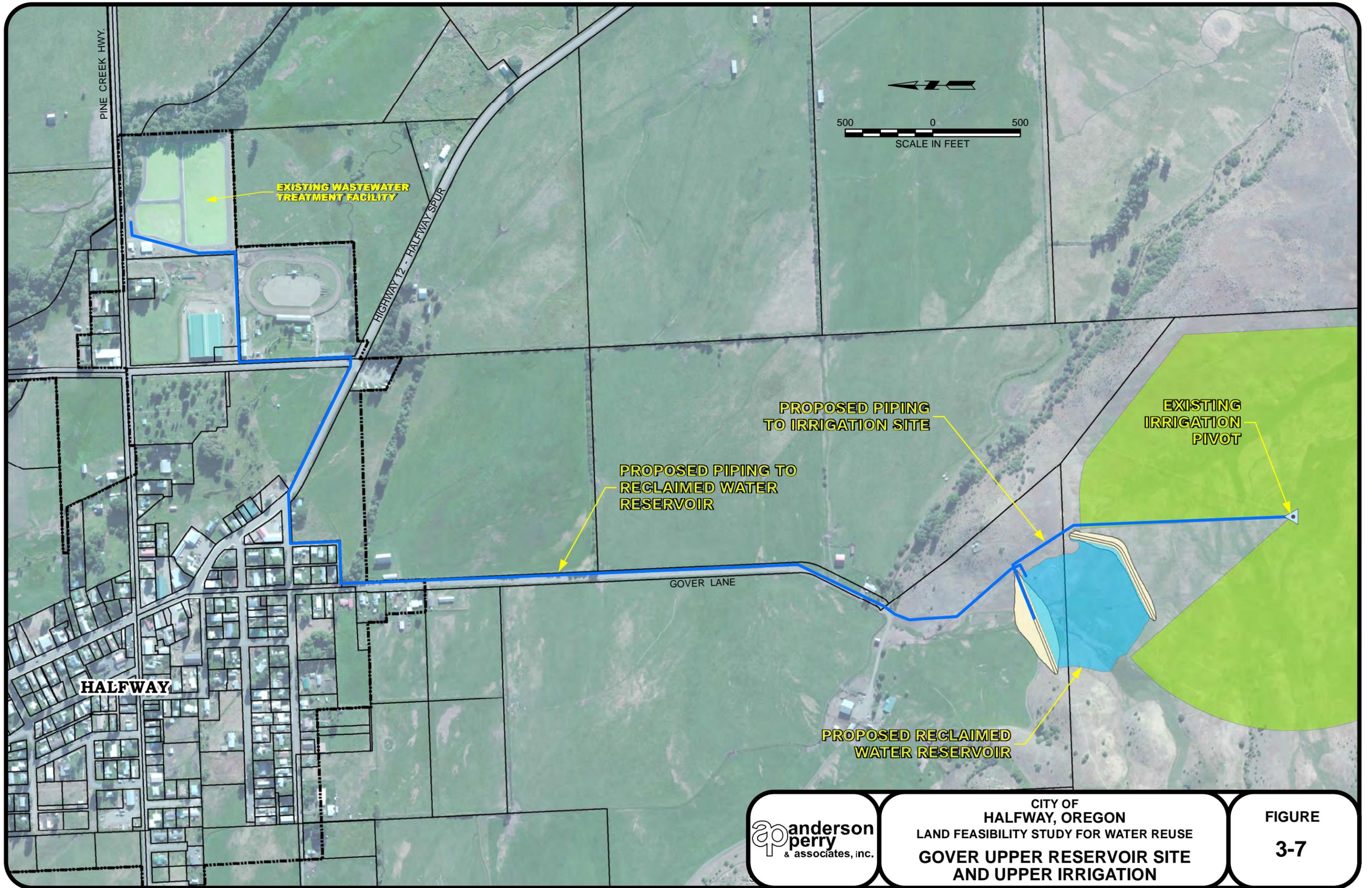
\\LGS\VR6\gis\projects\Halfway\9866-21_WWReuseFeasibility\Fig_Gover_Pond.mxd, 6/25/2015, 11:51:12 AM



CITY OF
HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE
**GOVER POND STORAGE
AND LOWER IRRIGATION**

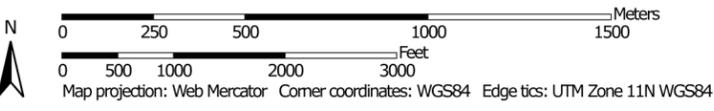
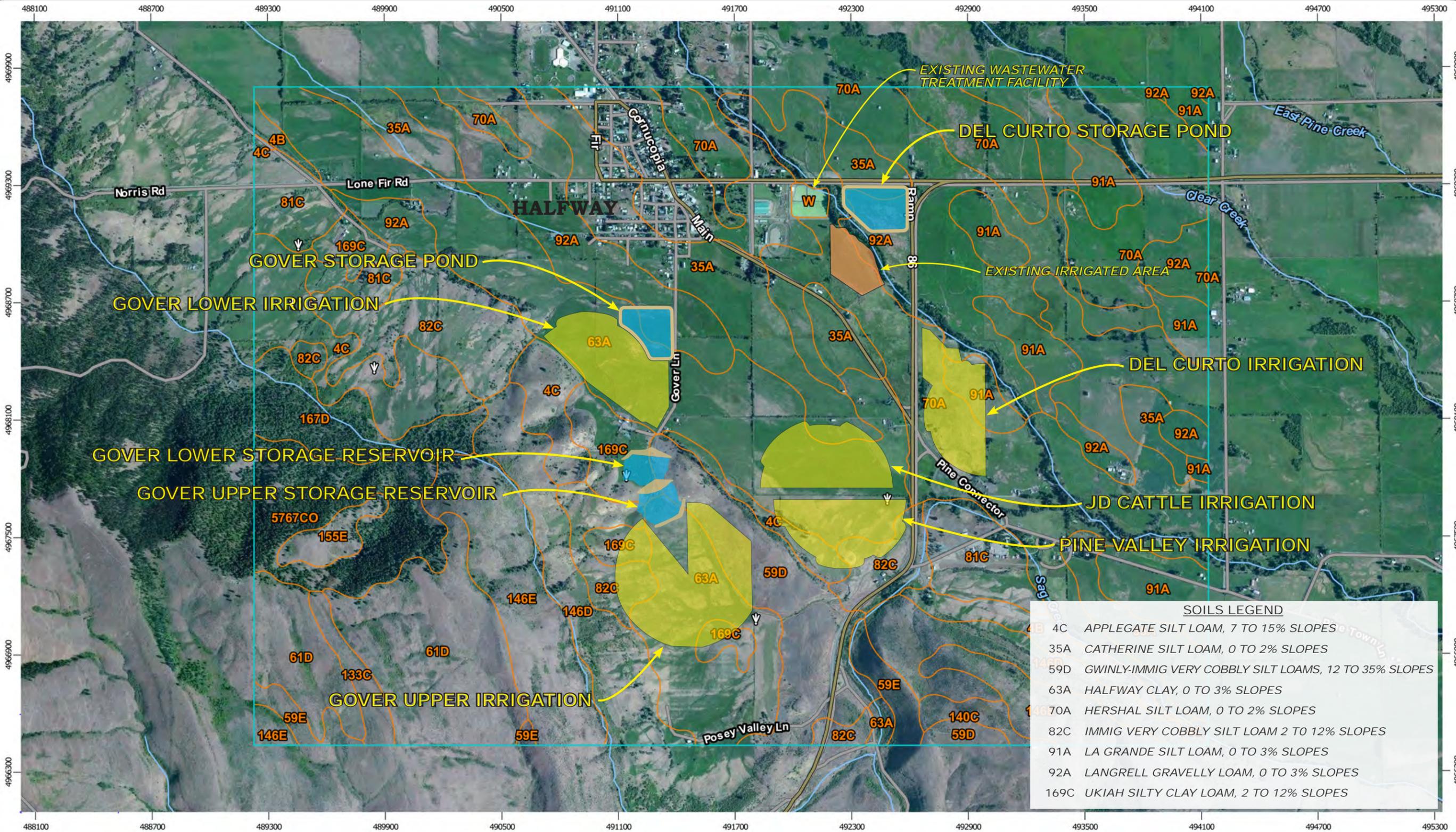
FIGURE
3-6

\\LGS\VR6\gis\projects\Halfway\9866-21_WWReuseFeasibility\Fig_Gover_UpperRes.mxd, 6/25/2015, 11:53:40 AM



CITY OF
HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE
GOVER UPPER RESERVOIR SITE
AND UPPER IRRIGATION

FIGURE
3-7



USDA Natural Resources Conservation Service Web Soil Survey National Cooperative Soil Survey

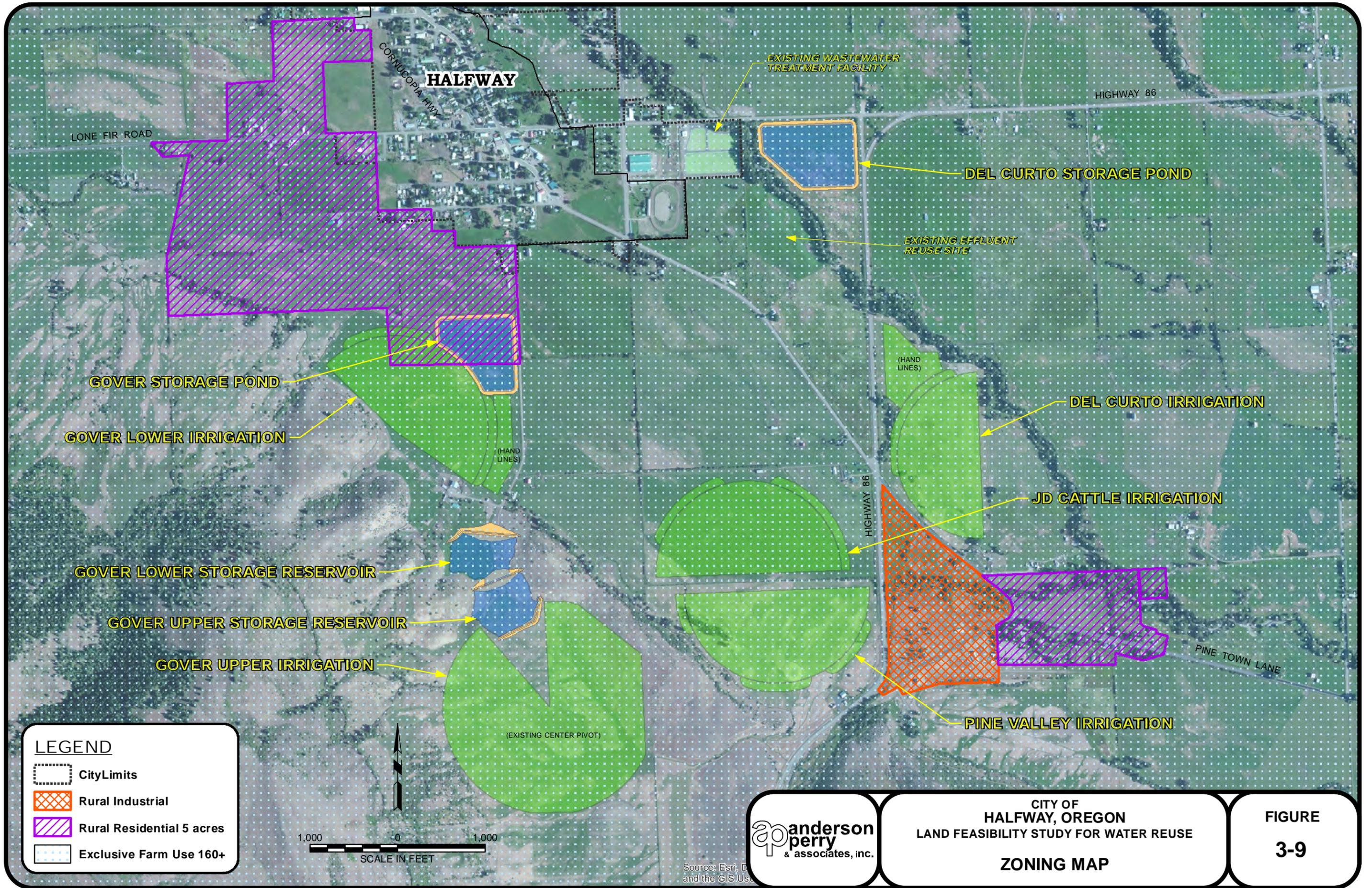


CITY OF
HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE
AREA SOILS MAP

**FIGURE
3-8**

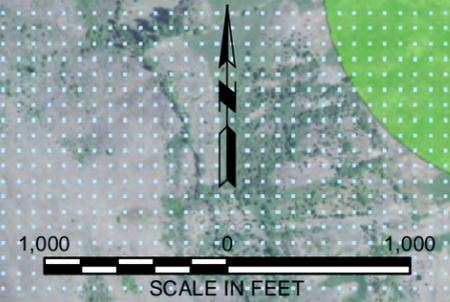
SOILS LEGEND	
4C	APPLEGATE SILT LOAM, 7 TO 15% SLOPES
35A	CATHERINE SILT LOAM, 0 TO 2% SLOPES
59D	GWINLY-IMMIG VERY COBBLY SILT LOAMS, 12 TO 35% SLOPES
63A	HALFWAY CLAY, 0 TO 3% SLOPES
70A	HERSHAL SILT LOAM, 0 TO 2% SLOPES
82C	IMMIG VERY COBBLY SILT LOAM 2 TO 12% SLOPES
91A	LA GRANDE SILT LOAM, 0 TO 3% SLOPES
92A	LANGRELL GRAVELLY LOAM, 0 TO 3% SLOPES
169C	UKIAH SILTY CLAY LOAM, 2 TO 12% SLOPES

\\LGS\VR6\gis\projects\Halfway\986-21_WWR\Reuse\feasibility\Fig_Zoning.mxd, 6/9/2015, 10:23:22 AM



LEGEND

-  City Limits
-  Rural Industrial
-  Rural Residential 5 acres
-  Exclusive Farm Use 160+



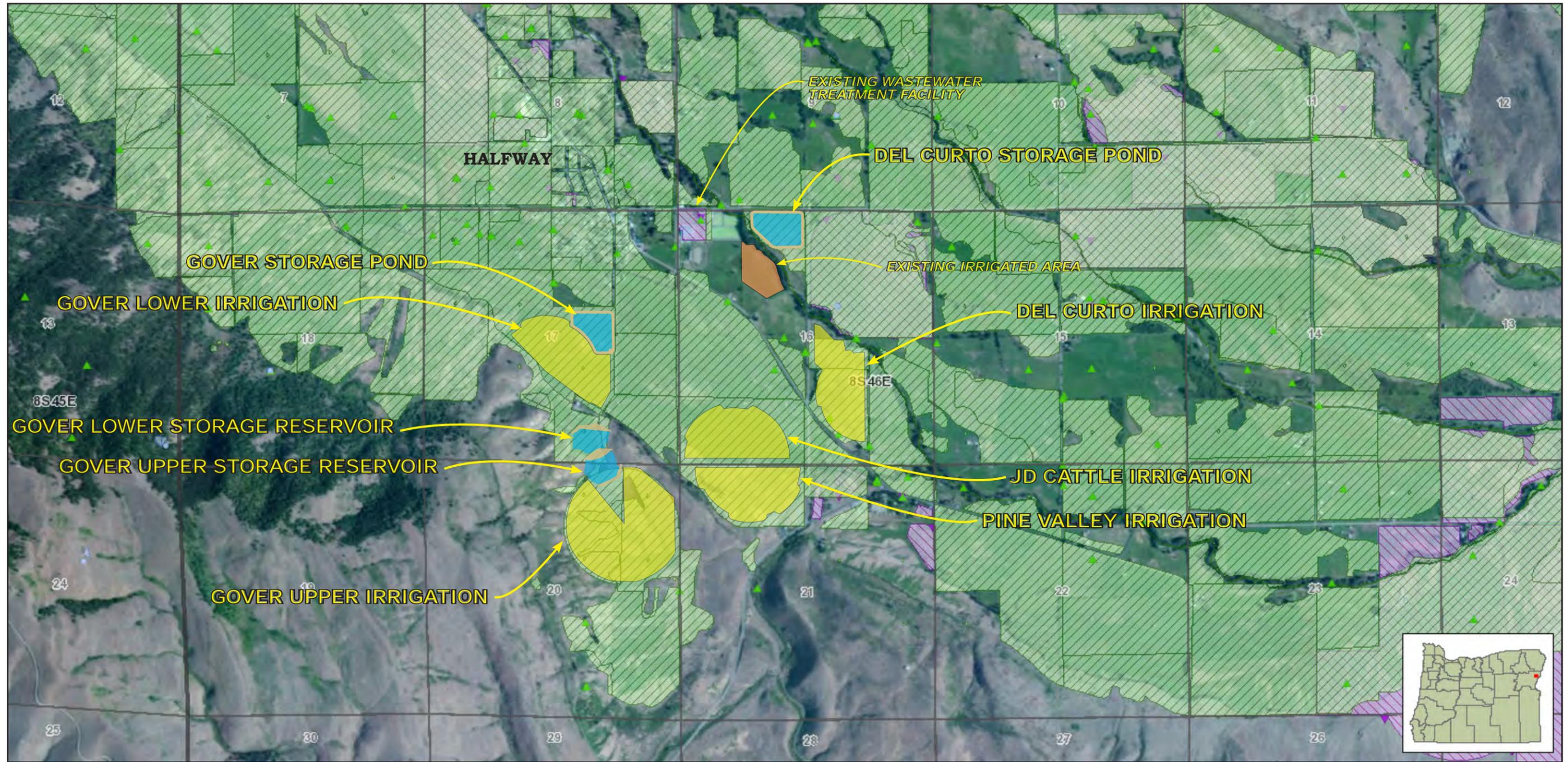
ap anderson perry
 & associates, inc.

Source: Esri, DigitalGlobe, GeoEye, IGN, Aeriac, AeroGRID, IGN, and the GIS User Community

CITY OF
HALFWAY, OREGON
 LAND FEASIBILITY STUDY FOR WATER REUSE

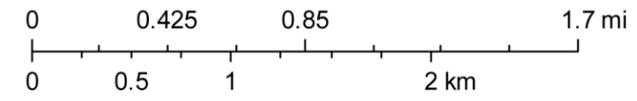
ZONING MAP

FIGURE
3-9



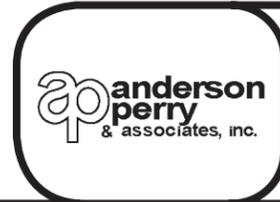
Water Rights by Type

Points of Diversion	Places of Use
	Storage Water
	Surface Water
	Groundwater



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Oregon Water Resources Department
725 Summer St NE, Suite A, Salem, OR 97301
(503)986-0900

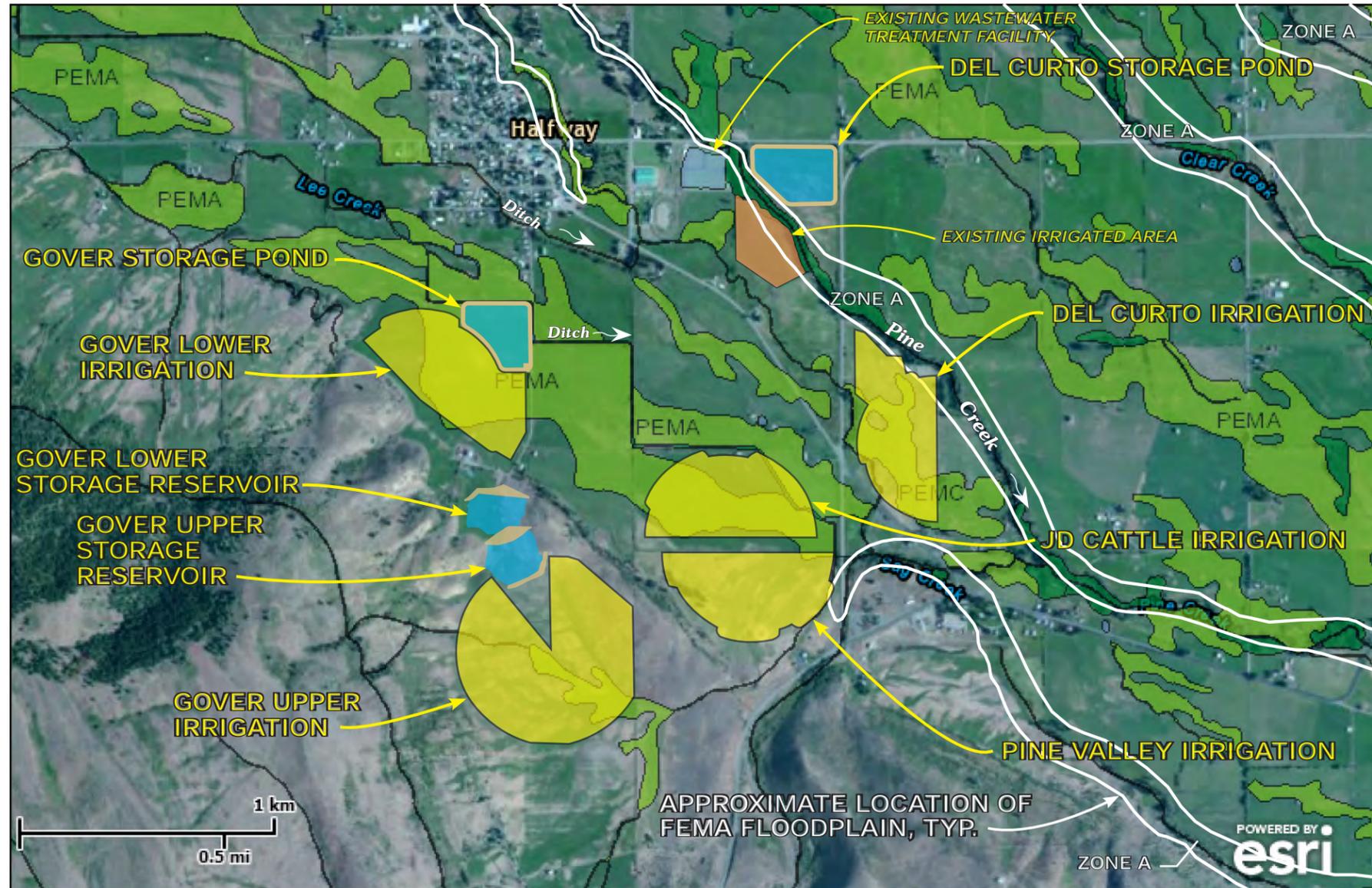
CITY OF
HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE
AREA WATER RIGHTS MAP

FIGURE
3-10



U.S. Fish and Wildlife Service National Wetlands Inventory

Apr. 1, 2015



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

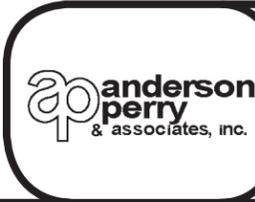
INFORMATION SOURCES:

WETLANDS: US FISH AND WILDLIFE SERVICE - WETLANDS MAPPER (<http://www.fws.gov/wetlands/Data/Mapper.html>)
 FLOODPLAIN: FLOOD INSURANCE RATE MAP (FIRM) PANEL NO. 41001C0295C - BAKER COUNTY, OREGON



T.8 S., R.46 E., W.M.

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.



CITY OF
 HALFWAY, OREGON
 LAND FEASIBILITY STUDY FOR WATER REUSE
 AREA WETLANDS, WATERWAYS, AND
 FLOODPLAIN MAP

FIGURE
 3-11

**CITY OF HALFWAY, OREGON
PRELIMINARY COST ESTIMATE
DEL CURTO POND STORAGE AND IRRIGATION
(YEAR 2014 COSTS)
September 2014**

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	\$ 75,100	All Req'd	\$ 75,100
2	Temporary Protection and Direction of Traffic/Project Safety	LS	2,000	All Req'd	2,000
3	6-inch Transmission Line	LF	30	900	27,000
4	Transfer Pump Modifications	LS	100,000	All Req'd	100,000
5	Asphalt Surface Repair	SY	50	50	2,500
6	Gravel Surface Repair	SY	20	100	2,000
7	Creek Crossing	EA	10,000	2	20,000
8	Clear and Grub	ACRE	1,000	13	13,000
9	Earthwork	CY	12	43,000	516,000
10	Hand Line	LS	5,000	All Req'd	5,000
11	Outlet Piping	LS	15,000	All Req'd	15,000
12	Irrigation Pump Station	LS	100,000	All Req'd	100,000
13	8-inch Irrigation Pipeline	LF	34	3,800	129,200
14	Pond Liner	SF	1.00	436,000	436,000
15	Pivot	LS	80,000	All Req'd	80,000
16	Ditch Relocation	LF	4	1,200	4,800
17	Fencing	LF	12	3,200	38,400
18	Base Rock	CY	20	600	12,000
Total Estimated Construction Cost					\$ 1,578,000
Contingencies @ 15%					236,700
TOTAL ESTIMATED COMPARATIVE COST (2014)					\$ 1,814,700



CITY OF
HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE
DEL CURTO POND STORAGE AND
IRRIGATION
PRELIMINARY COST ESTIMATE

**FIGURE
3-12**

**CITY OF HALFWAY, OREGON
PRELIMINARY COST ESTIMATE
DEL CURTO POND STORAGE AND JD CATTLE IRRIGATION
(YEAR 2014 COSTS)
September 2014**

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	\$ 77,800	All Req'd	\$ 77,800
2	Temporary Protection and Direction of Traffic/Project Safety	LS	2,000	All Req'd	2,000
3	6-inch Transmission Line	LF	30	900	27,000
4	Transfer Pump Modifications	LS	100,000	All Req'd	100,000
5	Asphalt Surface Repair	SY	50	50	2,500
6	Gravel Surface Repair	SY	20	100	2,000
7	Creek Crossing	EA	10,000	2	20,000
8	Clear and Grub	ACRE	1,000	13	13,000
9	Earthwork	CY	12	43,000	516,000
10	Outlet Piping	LS	15,000	All Req'd	15,000
11	Irrigation Pump Station	LS	100,000	All Req'd	100,000
12	8-inch Irrigation Pipeline	LF	34	5,600	190,400
13	Pond Liner	SF	1.00	436,000	436,000
14	Ditch Relocation	LF	4	800	3,200
15	Pivot	LS	80,000	All Req'd	80,000
16	Fencing	LF	12	3,200	38,400
17	Base Rock	CY	20	600	12,000
Total Estimated Construction Cost					\$ 1,635,300
Contingencies @ 15%					245,200
TOTAL ESTIMATED COMPARATIVE COST (2014)					\$ 1,880,500

**CITY OF HALFWAY, OREGON
PRELIMINARY COST ESTIMATE
DEL CURTO POND STORAGE AND PINE VALLEY LAND, LLC, IRRIGATION
(YEAR 2014 COSTS)
September 2014**

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	\$ 78,900	All Req'd	\$ 78,900
2	Temporary Protection and Direction of Traffic/Project Safety	LS	2,000	All Req'd	2,000
3	6-inch Transmission Line	LF	30	900	27,000
4	Transfer Pump Modifications	LS	100,000	All Req'd	100,000
5	Asphalt Surface Repair	SY	50	50	2,500
6	Gravel Surface Repair	SY	20	100	2,000
7	Creek Crossing	EA	10,000	2	20,000
8	Clear and Grub	ACRE	1,000	13	13,000
9	Earthwork	CY	12	43,000	516,000
10	Outlet Piping	LS	15,000	All Req'd	15,000
11	Irrigation Pump Station	LS	100,000	All Req'd	100,000
12	8-inch Irrigation Pipeline	LF	34	6,300	214,200
13	Pond Liner	SF	1.00	436,000	436,000
14	Pivot	LS	80,000	All Req'd	80,000
15	Fencing	LF	12	3,200	38,400
16	Base Rock	CY	20	600	12,000
Total Estimated Construction Cost					\$ 1,657,000
Contingencies @ 15%					248,500
TOTAL ESTIMATED COMPARATIVE COST (2014)					\$ 1,905,500



CITY OF
HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE
DEL CURTO POND STORAGE AND
PINE VALLEY LAND, LLC, IRRIGATION
PRELIMINARY COST ESTIMATE

**FIGURE
3-14**

**CITY OF HALFWAY, OREGON
PRELIMINARY COST ESTIMATE
GOVER LOWER RESERVOIR SITE AND UPPER IRRIGATION
(YEAR 2014 COSTS)
September 2014**

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	\$ 67,100	All Req'd	\$ 67,100
2	Temporary Protection and Direction of Traffic/Project Safety	LS	2,000	All Req'd	2,000
3	6-inch Transmission Line	LF	30	7,300	219,000
4	Transfer Pump Modifications	LS	100,000	All Req'd	100,000
5	Asphalt Surface Repair	SY	50	300	15,000
6	Gravel Surface Repair	SY	20	600	12,000
7	Creek Crossing	LS	5,000	All Req'd	5,000
8	Clear and Grub	ACRE	1,000	8	8,000
9	Earth Core	CY	40	2,500	100,000
10	Earthwork	CY	6	32,000	192,000
11	Spillway	LS	10,000	All Req'd	10,000
12	Outlet Piping	LS	30,000	All Req'd	30,000
13	Irrigation Pump Station	LS	100,000	All Req'd	100,000
14	8-inch Irrigation Pipeline	LF	34	2,500	85,000
15	Reservoir Liner	SF	1.00	280,000	280,000
16	Riprap	CY	50	1,500	75,000
17	Fencing	LF	12	3,000	36,000
18	Base Rock	CY	20	450	9,000
19	Dam Seepage Control System	LS	55,000	All Req'd	55,000
20	Pivot Modifications	LS	10,000	All Req'd	10,000
Total Estimated Construction Cost					\$ 1,410,100
Contingencies @ 15%					211,500
TOTAL ESTIMATED COMPARATIVE COST (2014)					\$ 1,621,600



CITY OF
HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE
GOVER LOWER RESERVOIR SITE AND
UPPER IRRIGATION
PRELIMINARY COST ESTIMATE

**FIGURE
3-15**

**CITY OF HALFWAY, OREGON
PRELIMINARY COST ESTIMATE
GOVER POND STORAGE AND LOWER IRRIGATION
(YEAR 2014 COSTS)
September 2014**

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	\$ 77,400	All Req'd	\$ 77,400
2	Temporary Protection and Direction of Traffic/Project Safety	LS	2,000	All Req'd	2,000
3	6-inch Transmission Line	LF	30	4,700	141,000
4	Transfer Pump Modifications	LS	100,000	All Req'd	100,000
5	Asphalt Surface Repair	SY	50	300	15,000
6	Gravel Surface Repair	SY	20	600	12,000
7	Creek Crossing	LS	5,000	All Req'd	5,000
8	Clear and Grub	ACRE	1,000	13	13,000
9	Ditch Piping	LF	75	1,800	135,000
10	Earthwork	CY	8	48,000	384,000
11	Outlet Piping	LS	15,000	All Req'd	15,000
12	Irrigation Pump Station	LS	100,000	All Req'd	100,000
13	8-inch Irrigation Pipeline	LF	34	1,800	61,200
14	Pond Liner	SF	1.00	436,000	436,000
15	Pivot	LS	80,000	All Req'd	80,000
16	Fencing	LF	12	3,200	38,400
17	Base Rock	CY	20	600	12,000
Total Estimated Construction Cost					\$ 1,627,000
Contingencies @ 15%					244,000
TOTAL ESTIMATED COMPARATIVE COST (2014)					\$ 1,871,000



CITY OF
HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE
GOVER POND STORAGE AND
LOWER IRRIGATION
PRELIMINARY COST ESTIMATE

**FIGURE
3-16**

**CITY OF HALFWAY, OREGON
PRELIMINARY COST ESTIMATE
GOVER UPPER RESERVOIR SITE AND UPPER IRRIGATION
(YEAR 2014 COSTS)
September 2014**

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	\$ 70,700	All Req'd	\$ 70,700
2	Temporary Protection and Direction of Traffic/Project Safety	LS	2,000	All Req'd	2,000
3	6-inch Transmission Line	LF	30	8,000	240,000
4	Transfer Pump Modifications	LS	100,000	All Req'd	100,000
5	Asphalt Surface Repair	SY	50	300	15,000
6	Gravel Surface Repair	SY	20	600	12,000
7	Creek Crossing	LS	10,000	All Req'd	10,000
8	Clear and Grub	ACRE	1,000	9	9,000
9	Earth Core	CY	20	2,500	50,000
10	Earthwork	CY	6	35,000	210,000
11	Spillway	LS	10,000	All Req'd	10,000
12	Outlet Piping	LS	30,000	All Req'd	30,000
13	Irrigation Pump Station	LS	100,000	All Req'd	100,000
14	8-inch Irrigation Pipeline	LF	34	1,800	61,200
15	Reservoir Liner	SF	1.00	380,000	380,000
16	Riprap	CY	50	2,000	100,000
17	Fencing	LF	12	3,000	36,000
18	Base Rock	CY	20	450	9,000
19	Dam Seepage Control System	LS	30,000	All Req'd	30,000
20	Pivot Modifications	LS	10,000	All Req'd	10,000

Total Estimated Construction Cost \$ 1,484,900

Contingencies @ 15% 222,700

TOTAL ESTIMATED COMPARATIVE COST (2014) \$ 1,707,600



CITY OF
HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE
GOVER UPPER RESERVOIR SITE AND
UPPER IRRIGATION
PRELIMINARY COST ESTIMATE

**FIGURE
3-17**

**CITY OF HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE
FEASIBILITY SUMMARY**

Alternative	Location/Size	Soil	Cost ¹	Impact to Farmland	Water Rights	Environmental Feasibility	Total Rank
Alternative 1: Del Curto Pond Storage and Irrigation	Irrigation site - 43.7 acres. Pond is acceptable size and close to WWTF. ²	Pond - silt/loam. Irrigation site - silt/loam.	\$1,814,700	Pond and irrigation site - prime farmland if irrigated and prime farmland if irrigated and drained.	Sufficient. Reuse could replace Pine Creek Diversion.	Pond proximity to Pine Creek. Substantial wetland impacts from irrigation site. Stream crossings required. Irrigation site located partially in Zone A (100-year flood zone).	
Rank	6	6	3	6	5	6	32
Alternative 2: Del Curto Pond Storage and JD Cattle Irrigation	Irrigation site - 43.5 acres. Pond is acceptable size and close to WWTF.	Pond - silt/loam. Irrigation site - silt/loam.	\$1,880,500	Pond - prime farmland if irrigated and prime farmland if irrigated and drained. Irrigation site - farmland of unique importance and prime farmland if irrigated.	Sufficient. Reuse could replace Pine Creek Diversion.	Pond proximity to Pine Creek. Stream crossings required. Substantial wetland impacts from irrigation site.	
Rank	1	5	5	3	6	5	25
Alternative 3: Del Curto Pond Storage and Pine Valley Land, LLC, Irrigation	Irrigation site - 44.4 acres. Pond is acceptable size and close to WWTF.	Pond - silt/loam. Irrigation site - silt/loam, cobbly.	\$1,905,500	Pond - prime farmland if irrigated and prime farmland if irrigated and drained. Irrigation site - farmland of statewide importance.	Sufficient but junior water rights. Reuse could replace Pine Creek Diversion or extend irrigation season.	Pond proximity to Pine Creek. Irrigation site proximity to an irrigation ditch. Tree removal required for irrigation pivot. Stream crossings required. Almost no wetland or floodplain impacts.	
Rank	3	4	6	4	3	4	25
Alternative 4: Gover Lower Reservoir Site and Upper Irrigation	Irrigation site - 93+ acres. Pond is acceptable size, more distant from irrigation site than Alternative 6.	Pond - silty clay loam and cobbly silt loam. Irrigation site - silty clay loam, clay, cobbly silt loam. Clay dominant.	\$1,621,600	Pond - prime farmland. Irrigation site - mix of not prime farmland and farmland of statewide importance.	Water rights in pond area can be moved to another area. Irrigation area has sufficient but junior water rights. Reuse could replace Pine Creek Diversion or extend irrigation season.	Irrigation site has the fewest wetland impacts of any site except for Pine Valley Land, LLC, Irrigation.	
Rank	5	3	1	1	2	1	13
Alternative 5: Gover Pond Storage and Lower Irrigation	Irrigation site - 48.6 acres. Pond is acceptable size.	Pond - gravelly loam and clay. Irrigation site - clay.	\$1,871,000	Pond - farmland of statewide importance and prime farmland if irrigated. Irrigation site - farmland of statewide importance.	Sufficient senior water rights. Reuse could replace Pine Creek Diversion.	Lower irrigation site and storage pond have substantial wetland impacts.	
Rank	4	2	4	5	4	3	22
Alternative 6: Gover Upper Reservoir Site and Upper Irrigation	Irrigation site - 93+ acres. Pond is acceptable size and closest to irrigation site.	Pond - clay, clay/loam, cobbly silt loam. Irrigation site - silty clay loam, clay, cobbly silt loam. Clay dominant.	\$1,707,600	Pond - primarily not prime farmland. Irrigation site - mix of not prime farmland and farmland of statewide importance.	Water rights in pond area can be moved to another area. Irrigation area has sufficient but junior water rights. Reuse could replace Pine Creek Diversion or extend irrigation season.	Irrigation site has the fewest wetland impacts of any site except for Pine Valley Land, LLC, Irrigation.	
Rank	2	1	2	2	1	2	10

¹ Preliminary cost estimate. All costs include a 15 percent contingency.

² WWTF = wastewater treatment facility



CITY OF
HALFWAY, OREGON
LAND FEASIBILITY STUDY FOR WATER REUSE

FEASIBILITY SUMMARY

**FIGURE
3-18**

Section 4 - Conclude Study and Final Report

General

After completing this Feasibility Analysis, a selection meeting was held with the Halfway City Council and staff on September 11, 2014. At this meeting, a presentation included a review of maps, overall feasibility, and cost estimates of the six alternatives. After discussion of the strengths and weaknesses of each of the sites, it was decided to proceed with further analysis of the Gover Upper Reservoir Site and to formally discuss with the landowners how to proceed. The selection of Alternative 6 is supported by the feasibility analysis conducted in this Study.

As can be seen on Figure 3-18, the alternatives were differentiated through a ranking system that emphasized locational feasibility, soil types, cost-efficiency, and impacts to farmland, water rights, and overall environmental issues. The results are as follows.

Alternative 1: Del Curto Pond Storage and Irrigation

Due to a combination of the number of acres in the irrigation site not being conducive to accommodating potential growth in demand for water disposal, lack of clays in the area (requiring more environmental costly procurement of material to line the storage pond), large impacts to farmland and wetlands, and some impacts to the flood zone, this alternative ranked as the fifth most desirable alternative.

Alternative 2: Del Curto Pond Storage and JD Cattle Irrigation

Due to a combination of the number of acres in the irrigation site not being conducive to accommodating potential growth in demand for water disposal, lack of clays in the area (requiring more environmental costly procurement of material to line the storage pond), moderate impacts to farmland and wetlands, and high costs to construct, this alternative tied as the fourth most desirable alternative.

Alternative 3: Del Curto Pond Storage and Pine Valley Land, LLC, Irrigation

Due to a combination of the number of acres in the irrigation site not being conducive to accommodating potential growth in demand for water disposal, lack of clays in the area (requiring more environmental costly procurement of material to line the storage pond), moderate impacts to farmland, need to remove trees from the site, and high costs to construct, this alternative tied as the fourth most desirable alternative.

Alternative 4: Gover Lower Reservoir Site and Upper Irrigation

Due to a combination of a large excess of irrigation acres to accommodate potential growth in demand for water disposal, prevalence of clays and gravels in the area to use as borrow material for the reservoir construction, moderate impacts to farmland and wetlands, and possession of junior water rights, this alternative ranked as the second most desirable alternative.

Alternative 5: Gover Pond Storage and Lower Irrigation

Due to a combination of the number of acres in the irrigation site not being conducive to accommodating potential growth in demand for water disposal, prevalence of clays and gravels in the area to use as borrow material for the reservoir construction, significant impacts to farmland and wetlands, and possession of senior water rights, this alternative ranked as the third most desirable alternative.

Alternative 6: Gover Upper Reservoir Site and Upper Irrigation

Due to a combination of a large excess of irrigation acres to accommodate potential growth in demand for water disposal, prevalence of clays and gravels in the area to use as borrow material for the reservoir construction, only minor impacts to farmland and wetlands, reasonable cost-efficiency, and adequate water rights (with potential transfer locations identified), this alternative ranked as the most desirable alternative. This is the selected alternative that will be carried forward to design and construction.

Section 5 - Close Out 1069 Grant - Next Steps in the Project

This Land Feasibility Study for Water Reuse (Study) concludes the project work conducted under Senate Bill 1069 Grant funding. The 1069 Grant will be concluded with the submission of this Study to the Oregon Water Resources Department. This Study yielded six feasible alternatives and enabled the identification of a preferred alternative. However, to complete the implementation of an effluent reuse irrigation site as proposed in this Study, the additional tasks outlined in this section will need to be completed. A discussion of each task is presented with reference to regulatory requirements.

To facilitate further site investigations for suitability of the site and to complete the necessary environmental reviews, the City and landowners should prepare and sign a Memorandum of Understanding stating each participant's commitment to work toward completion of the ultimate project, barring any environmental, physical, or financial limitation precluding it. In this manner, the expenditures of funds for investigations and preliminary designs may proceed with the least risk possible and access to the site will be granted as needed for the work.

To satisfy funding requirements, an environmental review will be completed to analyze potential impacts of the selected alternative on key environmental features. This environmental review will be made available for both agency and public comment and will follow all relevant regulatory requirements.

A wetland delineation will be conducted and, if necessary, mitigation sites will be identified and evaluated and a mitigation plan will be drafted. The wetland delineation report will be submitted to the Oregon Department of State Lands (DSL) and the U.S. Army Corps of Engineers (USACE) for concurrence. If the selected alternative has impacts to waters of the state, a Joint Permit Application will be submitted to satisfy removal and fill requirements of DSL and USACE. A USACE Alternatives Analysis Report will be submitted to supplement the Joint Permit Application.

Endangered Species Act Section 7 consultation will be fulfilled through coordination with the National Marine Fisheries Service and U.S. Fish and Wildlife Service. It is anticipated that due to lack of waterway impacts and the project location, this consultation process will be fulfilled with No Effect Documentation after a field visit and desktop review of species in the area.

A cultural resources inventory will be conducted to satisfy Oregon State Historic Preservation Office and tribal requirements. Because the project is located in an area with a high likelihood of cultural resource presence, it is anticipated that the inventory will be conducted through an intensive pedestrian survey and shovel test pits. If sites are found, additional analysis will occur to determine the eligibility and extent of the site, and initiate avoidance/mitigation measures if necessary.

Soils investigations will be conducted to ensure site suitability from a geotechnical perspective, and to verify that appropriate source materials of sufficient quantities are located on site.

All necessary permits and conditions of approval will be obtained from relevant federal, state, and local authorities prior to construction. A Conditional Use Permit from Baker County will be required for the construction of a Utility Facility in an Exclusive Farm Use Zone. Consultation with the Natural Resources

Conservation Service and the approval of a "Farmland Conversion Impact Rating" U.S. Department of Agriculture AD-1006 Form will be required to allow for conversion of farmland from farm use. This will also require approval from local authorities. Additional pipeline and storage facility easements and permits may be required. If any or all of the property is to be purchased, the applicable processes, such as Uniform Relocation Assistance and Real Property Acquisition Policies Act, must be followed. A partition plat would be needed for acquisition of the storage site by the City.

As of the middle of 2015, over 70 percent of the work listed above has been completed, and this project is anticipated to go to construction in the fall of 2015. The analysis made possible by the 1069 Grant identified potentially viable reuse sites, expedited this schedule, and is helping the City of Halfway attain compliance with their wastewater treatment permit.

APPENDICES

Appendices Table of Contents

Appendix A Public Search Notices

Appendix B Public Meeting Record

APPENDIX A
Public Search Notices



14. What else would be in the agreement?

The agreement content will depend on the land being irrigated. Basically, the City will want an agreement that ensures the crops are not for human consumption, the water is being irrigated properly, and irrigation will occur for a number of years. If the City is going to pay for a pipeline and irrigation system modifications, we want to make sure that the water will be irrigated long enough to pay for the investment.

15. How is the City paying for this? The City has received a grant for these improvements, and City residents are paying for the improvements through an increase in your sewer rates.

16. How safe is the water? Prior to disinfection, the water has ducks, bugs, turtles, and other wildlife living in it and calling it home, without any ill effects. The water has been properly treated and disinfected for the intended purpose. However, this water is not appropriate for drinking or swimming.

17. How does chlorine disinfection affect crops? Chlorine disinfection will not have any effect on crops. The chlorine is basically

consumed during the disinfection process before the water is sent to the fields. Any chlorine residual remaining will either be stripped off by the atmosphere during irrigation or be too low to be of concern.

18. Who will operate the irrigation system?

The irrigation system will be operated by the farmer with an understanding that it must be operated in accordance with City requirements that prevent over-irrigating and growing crops for human consumption. Also, it must be operated when the City ponds are full and need to get rid of water.

19. Who will coordinate sending water to the fields?

The farmer will coordinate water needs with the City, and the City will deliver the water to the fields.

20. This brochure is helpful, but where can I go for more information?

Additional information is available at the public information meeting noted below. You can also call Page Frederickson with the City of Halfway at 541-742-4741, or Brett Moore and Ed Hibbard with Anderson Perry & Associates, Inc., at 541-963-8309.

PUBLIC MEETING NOTICE

After reading this brochure, if you have questions about this project or are interested in using reclaimed water for irrigation, please come to a public meeting presentation on August 7, 2014, at 5 p.m. at the Halfway City Hall.

**Irrigation
Water Available**

**Reclaimed
Water Use
Fact Sheet**

**July 2014
City of Halfway**



Introduction

Reclaimed water is water that has been treated and disinfected and is available for irrigating crops. The City of Halfway has reclaimed water available for irrigating crops that are used for livestock feed or tree farms. Historically, the City has discharged its treated water to Pine Creek but is currently considering irrigation as an alternative. The treatment of reclaimed water from the City's wastewater treatment facility is strictly regulated by the Oregon Department of Environmental Quality (DEQ) to ensure that no potential health issues are associated with the use of reclaimed water.

Questions

- 1. How much land can be irrigated?** About 41 acres.
- 2. Do I have to have 41 acres and take all of the water?** It is preferable to send the water to one site, but it could be divided among a few smaller sites.
- 3. How will the water be delivered to the site?** The City is planning to pipe pressurized water to the irrigation site.
- 4. Does one need supplemental irrigation for this land?** Supplemental irrigation is desired, but not required. The supplemental irrigation would maximize crop production until water volumes from the City increase.
- 5. What restrictions apply to the water?** The water cannot be used for crops grown for human consumption. It can be used for hay, pasture, or grains not used for human consumption, or tree farms.

6. Why is the City looking to irrigate? The water contains nitrogen and phosphorus and is warmer than the creek, so irrigation is a better use for the water than discharging it to Pine Creek.

7. Can I use an existing irrigation system? Yes, with modifications. The irrigation system needs to be installed to provide for a buffer zone between the edge of the irrigation area and the property line.

8. Can I irrigate the buffer zone? Yes, but not with reclaimed water.

9. What distance needs to be maintained for the buffer zone? The buffer zone distance (edge of property to edge of irrigation) ranges from 10 feet to 100 feet, depending on the type of irrigation system installed. Impact sprinklers require a 100-foot buffer.

10. How do I irrigate the buffer zone? The irrigation system can be designed to use reclaimed water on the center portion and regular irrigation water in the buffer zone.

11. Does my field need to be fenced? The field must have a fence around it and signs indicating reclaimed water is being used.

12. Who pays for the irrigation system modifications? The City has some funds available to assist with installing an approved irrigation system.

13. Who monitors buffer zone and crop use requirements? The City is responsible to ensure that the irrigation and crops meet DEQ requirements. The City will require an agreement with the interested landowner to ensure that these requirements are met.



For Immediate Release: July 18, 2014

Contact: Ed Hibbard at Anderson Perry & Associates, Inc., 541-963-8309, ehibbard@andersonperry.com

Public Meeting Notice

City of Halfway - Reclaimed Irrigation Water and Land Feasibility Study

5:00 p.m., August 7, 2014, City Hall, 155B East Record Street, Halfway, Oregon

The City of Halfway has reclaimed water available for irrigating on qualifying properties. Historically, the City has discharged its treated water to Pine Creek in combination with irrigation of crops on City-owned land. However, due to changing regulations, the City is currently considering irrigation as the sole means of disposal without discharge to Pine Creek. The City is seeking landowners interested in the use of reclaimed water for irrigation.

A public meeting will be held Thursday, August 7, starting at 5:00 p.m. at Halfway City Hall (155B East Record Street) to provide information regarding the opportunities of reclaimed water irrigation and to answer questions. The public and interested landowners in attendance will meet with Anderson Perry & Associates, Inc. (AP) engineers and City staff.

Informational brochures are available at locations around town or can be picked up at City Hall during business hours. Questions or comments prior to the meeting may be addressed to Page Frederickson with the City of Halfway at 541-742-4741, or to Brett Moore or Ed Hibbard of AP at 541-963-8309. You may e-mail Ed Hibbard at ehibbard@andersonperry.com.

wastewater Upgrade Will Provide Reclaimed Irrigation Water

by Hayley Sanders
of the Hells Canyon Journal

The City of Halfway's wastewater facility upgrade may mean the availability of extra irrigation water for some local crop growers – an unexpected boon in an increasingly dry climate.

La Grande-based engineering firm Anderson Perry is in the process of conducting a land feasibility study, using a \$40,000 grant from the Oregon Water Resources Department. The study will be used to determine what options are available to the city when it updates the wastewater facility and expands its summer irrigation regime.

The city's current facility treats wastewater through a series of four ponds that primarily use natural biological processes to break down waste. Quick-evaporating chlorine is used at low levels during the end stages of the treatment process to ensure safety and kill bacteria. During the winter, the treated wastewater is discharged into Pine Creek, but during the spring and summer months the city uses a sprinkler irrigation system to "reclaim" the treated and disinfected wastewater to irrigate a nearby hay field.

Due to DEQ regulations and concern over releasing wastewater effluent directly into waterways, the city will be unable to directly discharge into Pine Creek in the future. The plan for the new facility will continue to utilize the four treatment ponds (only a small portion of one pond will be removed for the purposes of flood mitigation), but will store the treated wastewater in a large storage pond during the winter, then all the water will be reclaimed through an expanded irrigation system in the spring and summer.

Anderson Perry estimates the city will have enough reclaimed water to irrigate approximately 41 acres. The irrigation could be done on one larger field, or multiple smaller fields, depending on the number of interested property owners, location, distance from the wastewater facility, cost, ability to meet regulatory requirements, and other factors that the land feasibility study will examine.

Because the irrigation water is reclaimed, there are restrictions on how it must be used and applied. It cannot be used on any crops intended for human consumption, but is acceptable for hay, pasture, grains for animal feed, and tree farms. While there is some flexibility, irrigators must coordinate with the city on timing for application and harvesting, and must be able to meet certain DEQ regulations to ensure there are no potential health hazards. Because of the substantial investment in the new

to be able to meet these requirements on a long-term basis.

Additionally, land that uses reclaimed water will need a buffer zone between the edge of the irrigation area and the property line. The buffer zone distance ranges from 10 feet to 100 feet, depending on the type of irrigation system installed. The city does have some funds available to assist with installing improved irrigation systems for qualifying landowners.

While there are some restrictions, the reclaimed irrigation water does have advantages over regular irrigation water from ditches and creeks. Reclaimed water contains nitrogen and phosphorus, which can be a concern when discharged directly into waterways, but provides essential nutrients for plant growth when applied to crops. The reclaimed water is also warmer, meaning crops are not stressed by cold water.

Anderson Perry says that supplemental irrigation is desired, but not required, so the reclaimed water from the city could provide either additional irrigation water to maximize crop production, or provide irrigation water to land that has few or no other water rights.

7-9-14 Hells Canyon Journal

Those worried about the safety of applying reclaimed water to fields are assured that the city's system is remarkably clean and healthy. Natural biological processes, rather than chemicals, are used to treat the raw sewage and break down wastes. The overall health of the facility is evident by the fact that the treatment ponds are habitat to water fowl, turtles, aquatic insects, and other organisms that would not be able to survive if the ponds contained toxins harmful to plants and wildlife. Chlorine is added at a low level toward the end of the process to disinfect the water of E. coli bacteria, but the type used loses strength and dissipates soon after being added. There is no risk of crops being harmed by chlorine in the reclaimed water.

Landowners interested in learning more about the city's reclaimed irrigation water and the land feasibility study are strongly encouraged to attend a public presentation and information meeting at Halfway City Hall on Thursday, August 7 starting at 5:00 p.m. Anderson Perry engineers and city employees will be on hand at the meeting to answer questions.

Informational brochures will be available in town prior to the meeting as well. More information can also be obtained from Page Frederickson with the City of Halfway at 541-742-4741, or Brett Moore and Ed Hibbard with Anderson Perry and Associates, Inc. at 541-963-8309.

Reminder:

Surveillance Camera Donated To Help Prevent Vandalism

by Hayley Sanders
of the Hells Canyon Journal

After struggling with multiple incidences of vandalism at the Heritage Square restrooms this summer, the City of Halfway received a generous offer to help alleviate the vandalism problem at the August council meeting.

Pat Lattin, General Manager for Pine Telephone System, Inc., was present at the meeting and stated the company would be willing to donate a surveillance camera system that would allow the city to monitor Heritage Square if there are problems in the future. Lattin explained that the system is easy to use, has motion-detecting and night vision capabilities, uses very little electricity, and has been popular with customers. Pine Telephone would donate and install the camera system, and the city would be responsible for operation and monitoring.

"We're not trying to garner favor with the council or anything; this is just something we would like to do for the city. Heritage Square is

an asset and vandalism there affects our whole community," said Lattin. "The camera system won't prevent problems, but it may help to deter them."

The council was very appreciative and unanimously accepted the offer from Pine Telephone.

"We sincerely thank you. This is a huge help," said Councilor Teresa Ekstrom.

Wastewater Update

Brett Moore and Ed Hibbard of Anderson Perry and Associates told the council that after talking privately with several property owners and holding a public information meeting on August 7, encouraging progress had been made on the land feasibility study. The study will be used to determine what options for irrigation and storage pond placement are available for the city's wastewater facility plan upgrade.

Several property owners had expressed interest in using the reclaimed irrigation water from the new system. The next step will be doing engineering layouts to determine what the costs will be for various options, with the goal of having a detailed study done by the September meeting to give the council enough information to make some key decisions.

"It is important to have flexibility in the system, and fortunately we do have some options," said Moore.

Moore also told the council that Anderson Perry is working hard to keep planning moving quickly and to minimize construction that would require lengthy permit processes, such as utilizing ar-

eas with streams and wetlands.

"If it seems like we are pushing you hard, that is because we really want to start construction next year," added Moore. "If we don't make construction next year, we estimate it will cost an extra \$100,000 more in inflation costs."

Public Works

In her report to the council, Public Works Director Page Frederickson stated the grant administrator contract with the Northeast Oregon Economic Development District (NEOEDD) had been signed and approved by all parties. She had met with NEOEDD's Lisa Dawson for several hours on August 8 to get everyone up to speed with all the paperwork and information on the wastewater upgrade project.

Frederickson also reported that a leak in a valve on one of the drinking water system blow offs had finally surfaced and was quickly replaced with minimal inconvenience to affected customers. The valve was very worn and had obviously been leaking large amounts of water for some time prior to being discovered. The day after replacement, Frederickson stated, the level in the sewer lagoons went down about three inches.

While she hadn't received any confirmation yet about getting a prison work crew to help with weeding at the lagoons, they should be able to hire a vacuum truck from Baker City to come out and do a long-overdue cleaning of the city's 36 storm drains. At

Continued on page 4

Halfway City Council

Continued from page 1
the quoted price of \$60 per hour, the city should be able to get the majority of the drains cleaned out for \$1,000 or less.

The city also received some unexpected revenue from a \$4,097 bulk water sale to an out of state contractor working in the area this summer.

Mayors Conference

Mayor Sheila Farwell informed the council she had attended the Oregon Mayors Association Conference in Pendleton the weekend of August 7 through 9. Pendleton Mayor Phillip Houk was the host, and Farwell said the host city "put on quite a show," which included visits and entertainment at Wildhorse Casino, the Pendleton Convention Center and a banquet at a downtown restaurant.

Around 80 of Oregon's 242 mayors came to the conference. Many of them were relatively new mayors, and she noticed many were also retired lawyers. Farwell stated that despite the close location, only a few eastern Oregon cities participated in the conference, including Halfway, Joseph, Enterprise and Athena. The mayors of larger eastern Oregon cities like LaGrande, Baker City and Ontario were not present.

The conference was largely dominated by cities in the Willamette Valley, and the two main topics of discussion were marijuana and trans-

portation. Farwell said the majority of cities seemed to be against having medical marijuana dispensaries within their limits, and although Halfway opted not to pass a temporary moratorium this spring, most cities had. There was a great deal of discussion on what the Oregon Legislature would do next with the marijuana issue, as well as other topics of interest.

Next year's Oregon Mayor's Conference will be hosted by Forest Grove.

Public Nuisance

Regarding the city's ongoing public nuisance issue at 151 N. Main Street, Farwell reported that she had made a recent inspection of the property, and owner Ray Vance had made progress towards cleaning up and tearing the building down when he was in Halfway during the month of July.

Vance had told her he no longer had any plans to try and restore the historic front portion of the building, but would be salvaging what lumber he could. He said he intended to return to town August 17 to resume demolition, and believed that the building could be completely torn down in a couple of weeks.

Some members of the council expressed concern about demolition on Main Street happening so close to Labor Day weekend and the upcoming Baker County Fair - Half-

way, which typically brings in a large influx of people to the area. Despite the concern, the council was relieved that progress was being made.

"But if it is not down by the next council meeting, we will need to have some discussions," added Farwell.

Vision Committee

Members of the Vision Committee met for several hours earlier in the month to discuss what they envision for the City of Halfway in the future. The hope is a comprehensive vision will be a useful aid when the city tackles the task of updating its land use ordinances.

The meeting brought to light a lot of the challenges a land use update will present.

"What we determined was that when we do redo our land use we would like someone from LCDC in Salem to come out here to see what we are up against and to make a presentation on how to go about updating them," said Farwell. "We have questions like, how technical do we want to get? Ours is only a couple of paragraphs, but Baker's sign ordinance is six pages long. It could take us a year just to update the sign ordinance. So we need to ask a lot of questions and get samples from other cities. This is just going to take time."

The next vision committee meeting is scheduled for Monday, September 8. Anyone interested in serving on the committee is welcome to attend.

A big thank you goes out from the City of Halfway to the U.S. Bank branch in Halfway for donating three nice office chairs to City Hall.

The next regular meeting of the Halfway City Council will be Thursday, September 11 starting at 5:00 p.m. in City Hall.

Appendix B
Public Meeting Record

**City of Halfway, Oregon
Public Information Meeting
August 7, 2014
Agenda**

1. Welcome and introductions
2. Background (purpose and need)
3. Amount of available water
4. Process description
5. System layout
6. Regulatory requirements
7. City requirements
8. Questions and answers
9. What happens next?
10. Contact information:

Page Frederickson, City of Halfway	541-742-4741 (City Hall)
Brett Moore, P.E., Anderson Perry & Associates, Inc.	541-963-8309 (Office)
Ed Hibbard, Anderson Perry & Associates, Inc.	541-963-8309 (Office) 541-519-6806 (Cell)

City of Halfway, Oregon
Public Information Meeting
August 7, 2014

Name

Phone No.

Ed Hibbard (Anderson Perry)

541-519-6806

Don West

541-540-2590

GEORGE COLLINS (PINE VALLEY RANCH)

541-540 4610

PAUL DANIELLO (DEQ)

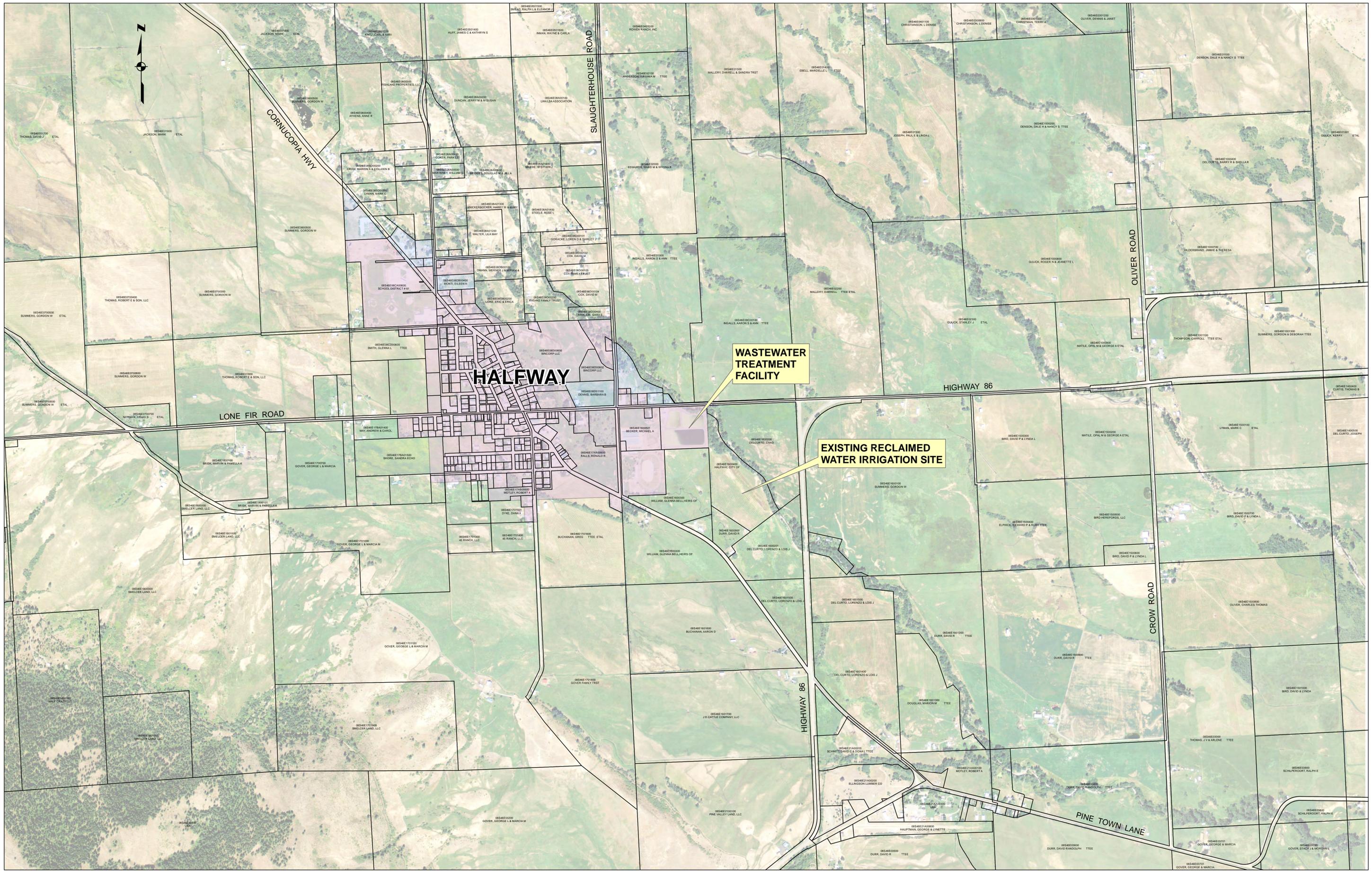
541-278-4617

J. Chad ~~ONS~~

City of Halfway, Oregon
Public Information Meeting
August 7, 2014
Outline

1. Welcome and Introductions
 - a. Mayor Sheila Farwell
 - b. Page Frederickson – City of Halfway Public Works Director
 - c. Brett Moore – Project Manager
 - d. Ed Hibbard – Field Coordinator
 - e. Sign in sheet
2. Background (Purpose & Need)
 - a. Aerial Photo
 - b. Currently discharge to Pine Creek (winter) and irrigation (summer)
 - c. Water available exceeds need of existing irrigation site, would like to store winter flows (anticipate DEQ not allowing in the future) and increase irrigation
3. Amount of Water Available
 - a. 108 acre ft water
 - b. 41 acres irr area (hay and pasture assumed crops)
 - c. 65 acre ft storage
 - d. 16 acre storage
 - i. 21" rain, currently have 170 acre ft water/yr (looking to reduce I & I)
4. Process Description (Brett)
 - a. Treatment – lagoon system, 3 cell, secondary treatment
 - b. Disinfection – chlorine with a contact chamber, de chlorinate, discharge to river, or chlorinated and irrigated, future chlorinate to winter storage then irrigate from pond
 - c. Storage – currently using treatment lagoons, future larger storage
 - d. Irrigation – early spring through late fall, breaks for mowing/haying/pasturing, 7 days before cows, 24 hrs before mowing,
5. System Layout
 - a. Buffer zones dependent on irrigation type
 - i. Impact sprinkler – 100' to property line or human water source
 - ii. Direct application (i.e. socks) – 10' to property line
 - b. Typical Pivot
 - i. ½ circle needs 1100' radius
 - ii.
 - c. Typical wheel line
 - i. Possibly multiple lines,
 - ii.
6. Regulatory Requirements OAR 340, Division 55, under an NPDES or WPCF permit
 - a. Buffer zone
 - i. Signage
 - ii.
 - b. Crop requirements
 - i. Non-human consumption
 - ii. Trees
 - iii.
 - c. Reporting requirements (city-annual report)
 - d. Irrigation schedule
 - i. agronomic rate
 - ii. 7days before cattle access??

7. City Requirements
 - a. Options available to participate in an irrigation system
 - i. Farm bill (EQIP)
 - ii. Idaho Power programs?
 - b. System Operation and Maintenance
 - i. City paying to pump water to the site
 - ii. Negotiable depending on location and situation
 - iii. City is not responsible for farming
 - c. Use agreement
 - i. Long term agreement or purchase and lease-back
8. Q and A
 - a. Brochure review
9. What happens next?
 - a. Feasibility Study (options, cost analysis, trade-offs) - September
 - b. Negotiate/Prepare agreement - Fall
 - c. Design – Winter
 - d. Construct – Summer/Fall 2015
 - e. Initial Irrigation delivery starts Spring 2016, (full capacity 2017)
10. Contact information
 - a. City
 - b. AP
 - c. If interested in how this might work on your property,
 - i. Please call Ed Hibbard (cards available)
 - ii. or leave contact information



CITY OF HALFWAY
PUBLIC INFORMATION MEETING