

**West Valley Sewer Extension
Preliminary Engineering Report**

Executive Summary

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TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

- A. General 1
- B. West Valley Sewer Extension..... 3
 - 1. Preferred Alternative..... 4
 - 2. Estimated Project Cost and Expected Cost per User 4
- C. Existing Wastewater System Improvements 7
- D. Proposed Sewer Rate Increase 17
- E. Revenue Versus Expenditure Forecast 21
- F. Indeterminate Issues..... 25
- G. Recommendations 28

Chapter 1 – List of Tables

Table 1-1. West Valley Sewer Extension Summary of Estimated Costs 2

Table 1-2. West Valley Sewer Extension – Phase 1 / Phase 2 Cost Breakdown..... 4

Table 1-3. Cost Summary of Existing Wastewater System Improvements..... 15

Table 1-4. Estimated Project Cost and Sewer Rate Increase Summary 18

Table 1-5. Existing Wastewater System Improvement Projects – Proposed Implementation
Schedule 20

Table 1-6. Wastewater Project Funding – Revenue vs Expenditure Forecast..... 23

Chapter 1 – List of Figures

Figure 1-1 West Valley Sewer Extension Preferred Alternative (insert at end of chapter)

Figure 1-2 West Valley Sewer Extension Connection Alternatives (insert at end of chapter)

EXECUTIVE SUMMARY

A. General

This preliminary engineering report has been completed in accordance with the requirements of Montana's applicable grant and loan programs and adheres to the Uniform Preliminary Engineering Report outline recognized by these programs. This document serves as the technical background and evaluation for application to the grant and loan programs.

This report evaluates the condition of Anaconda's existing sewer collection and wastewater treatment facilities. Results of this evaluation indicate that operating changes and capital improvements are required to comply with DEQ regulations and to replace portions of the aging wastewater collection and treatment infrastructure. This report also evaluates wastewater collection and treatment alternatives for West Valley.

Anaconda-Deer Lodge has recognized the potential threat to individual wells and Anaconda's community drinking water supply from septic tanks and drainfields in the West Valley area. No central sewage collection or treatment is currently provided in West Valley. Individual, on-site septic tank and drainfield systems serve the residences, commercial, and public buildings in the area. Since the West Valley lies up gradient of Anaconda's drinking water supply wells, and many of the residences and businesses have wells immediately adjacent to the septic tanks and drainfields, drainfield systems are of concern as a potential pollution source. Coarse grained soils and shallow groundwater are common in the area. These conditions are not conducive to drainfield absorption systems, raising the potential risk of contamination to West Valley residents' wells, and the Anaconda drinking water supply. Forecast growth for the West Valley area will only elevate this risk, with increased numbers of individual septic tank and drainfield systems. Corridor development along Highway 1, and other peripheral development, results in numerous drainfields within as little as one-half mile of Anaconda's drinking water wells. Many of the parcels in the West Valley townsite are less than one acre in size, and in some cases the distance between residential wells and drainfields is as little as 60 feet, which doesn't meet the current regulatory standard of 100 feet. The proximity of drainfield systems to drinking water wells, coupled with the known high transmissivity of the groundwater aquifer, is a serious concern. This is a primary reason for considering central sewage collection and treatment for West Valley.

The highest ranking alternative for providing central sewage collection and treatment for West Valley consists of constructing a sewer collection system in the West Valley town site, extending a sewer trunk main from Anaconda to West Valley and conveying the West Valley wastewater to Anaconda's existing wastewater plant for treatment. This project would hook up approximately 295 new sewer customers and allow for the elimination of approximately 295 septic tanks.

Roughly 45 service connections would be along the north side of Highway 1 between Anaconda and West Valley, and 250 service connections would be in the West Valley town site. Most of the lot sizes in West Valley are one-third of an acre (100'x150'). Project components and estimated project costs are summarized in Table 1-1 below. The preferred sewer extension alternative is shown on Figure 1-1 located as an insert at the end of this chapter.

Table 1-1. West Valley Sewer Extension Summary of Estimated Costs

Component	Estimated Project Cost
Phase 1 - Sewer Extension to Theatre Drive 3.6 miles of 12-inch diameter sewer	\$2,572,100
Phase 2 - West Valley Townsite Sewer 3.6 miles of 8 and 12-inch diameter sewer	\$3,371,500
Total Project Cost	\$5,943,600

In addition to the West Valley sewer collection and treatment alternatives evaluation, this report also evaluates the condition of Anaconda’s existing sewer collection and wastewater treatment facilities. Results of this evaluation indicate that operating changes and capital improvements are required to comply with DEQ regulations and to replace portions of the aging wastewater collection and treatment infrastructure. The required changes can be separated into two main categories, the first being operating changes and relatively minor construction projects that are well defined and can be implemented as soon as funding becomes available. Projects in the second category are impacted by the DEQ requirement that ADLC apply for a Montana Ground Water Pollution Control System (MGWPCS) permit at the wastewater disposal facility (HIP Facility) on Lost Creek. The design requirements for any capital replacement or improvement projects at the wastewater treatment and disposal facilities will not be known conclusively until DEQ issues the MGWPCS permit, which is not expected until the second quarter of 2014 at the earliest.

Major capital improvement projects that have been identified in this report include replacement of the 28-year old wastewater lagoon liners, rehabilitation of the sewer collection system piping and upgrades to meet DEQ regulations and increase capacity at the HIP Facility. The combined cost of these major projects could exceed \$10,000,000. This report does not provide a detailed evaluation of alternatives for these projects, or look to immediately implement these projects, but instead identifies the planning needs and recommends a series of sewer rate increases with revenue accumulating in a sewer reserve account to help fund these projects in the future.

The following information is summarized in the remaining sections of this Executive Summary.

- Alternatives analysis, funding plans and implementation schedule for the West Valley Sewer Extension project;
- Findings of the existing wastewater system evaluation with respect to needed capital improvements and operating changes;
- Recommended sewer rate increases to fund the West Valley project together with increased O&M costs and capital upgrades for the existing wastewater facilities.
- Unresolved issues concerning the West Valley project and for the existing wastewater system.
- Recommendations for moving forward.

B. West Valley Sewer Extension

The alternatives considered for providing municipal wastewater collection and treatment for West Valley include 1) new centralized wastewater treatment and 2) conveyance to the existing Anaconda wastewater treatment plant. Under either alternative, a conventional gravity collection and conveyance system would be required. As shown on Figure 1-2 (located at the back of this chapter), this gravity collection system would consist of a 12-inch diameter trunk line installed within the former railroad right-of-way from Anaconda to the West Valley town site. The West Valley town site collection system would consist of 8-inch and 12-inch diameter gravity sewer. Another segment of the West Valley system is the North Cable Road sewer as shown on Figure 1-2. Expansion of the system beyond the West Valley town site could be accomplished in the future as shown by the dashed sewer lines on Figure 1-2. The above described sewer collection system is common to all alternatives, but is not a complete system in and of itself. The alternatives that will be evaluated in conjunction with the above described West Valley trunk line and town site sewer, resulting in a complete West Valley sewer system, include:

1. Alternative 1: Centralized Wastewater Treatment Plant.
2. Alternative 2: Conveyance to the Anaconda Wastewater Treatment Plant.
 - a. Alternative 2A: Connection to Fourth Street Trunk Line.
 - b. Alternative 2B: Flow Equalization and Connection to Fourth Street Trunk Line.
 - c. Alternative 2C: Connection to Main Street Sewer.
 - d. Alternative 2D: Connection to Pennsylvania Avenue Sewer.
3. No Action: Continue with current system of individual on-site treatment systems consisting of a septic tank and drain field.

A centralized wastewater treatment plant was considered too costly and too risky from the standpoint of ever changing regulations that can drive up costs even further. The no action alternative, while not ideal due to the potential health risks, is maybe the way to go given the state of the existing wastewater infrastructure and need for extensive and expensive capital investment. The preferred alternative, the no action alternative notwithstanding, was collection and conveyance of West Valley wastewater to the existing wastewater treatment plant.

1. Preferred Alternative

The preferred option is Alternative 2C, Sewer Extension to West Valley with Connection to the Main Street Sewer Line. This alternative consists of approximately:

- 2.4 mile long, 12-inch diameter West Valley trunk line sewer,
- 3.6 miles of 8 and 12-inch diameter sewer in the West Valley townsite, and
- 1.2 mile long, 12-inch diameter Connection to the Main Street sewer.

A schematic layout of the preferred alternative is shown on Figure 1-1.

2. Estimated Project Cost and Expected Cost per User

The total estimated project and annual operating costs are summarized in the following table.

Table 1-2. West Valley Sewer Extension – Phase 1 / Phase 2 Cost Breakdown

Component	Estimated Project Cost	Estimated Annual O&M Increase
Phase 1 Sewer Extension		
West Valley Trunk Line Sewer	\$1,541,600	\$3,850
Connection to Main Street Sewer	\$1,030,500	\$1,620
Additional power costs at WWTP	-	\$ 530
Subtotal Phase 1	\$2,572,100	\$6,000
Phase 2 Sewer Extension		
West Valley Townsite Sewer	\$3,371,500	\$5,760
Additional power costs at WWTP	-	\$6,770
Subtotal Phase 2	\$3,371,500	\$12,530
Total Estimated Cost	\$5,943,600	\$18,530

This project represents a significant financial challenge for West Valley and the community of Anaconda, and grant funding would be helpful towards providing a more affordable end user rate for the system customers. The city’s current sewer rate of \$5.25/month is significantly below the target sewer rate of \$19.73/month, and discussions with funding agency representatives indicate that expectations of grant funding with such a low sewer rate are not realistic.

The above mention of “target rate” warrants a brief explanation of the concept. Montana’s various grant programs typically determine financial eligibility for water and wastewater projects primarily by comparing the applicant's projected user rate to their "target rate". The grant agencies will typically not recommend funding for water and wastewater projects that would result in user charges below this “target rate”. The “target rate” is based on a percentage of the applicant's median household income (MHI) and is equal to the combined total of the water target rate and the sewer target rate. The water target rate is 1.4% and the sewer target rate is 0.9% of the MHI. Anaconda-Deer Lodge’s median household income from the 2000 census is \$26,305 and their target rates are \$30.69/month for water and \$19.73/month for sewer for a combined target rate of \$50.42/month. Anaconda-Deer Lodge’s actual rates are \$25.00/month water (approx. average) and \$5.25/month sewer for a combined actual rate of \$30.25/month. This actual combined rate is well below the target rate of \$50.42/month.

Three general funding approaches have been explored, each of which takes advantage of an approximately \$0.97 million State and Tribal Assistance (STA) grant that has been awarded, with conditions, to Anaconda-Deer Lodge County. The STA grant program requires a 45% match from the owner, and the match can be provided through other state and federal grant and loan programs. The funding breakdown is as follows:

\$ 967,800	grant funds
\$ 791,836	matching funds
\$ 1,759,636	total funding amount

Brief descriptions of the funding approaches are provided below. It should be noted that the estimated costs and projected user rates do not include costs for installing the individual service connections and removing the existing septic tanks.

Plan A considers constructing the entire West Valley sewer extension project, Phase 1 and Phase 2, at one time and spreading the project costs equally to all existing sewer users in Anaconda together with all new West Valley sewer users. Two funding options for Plan A were considered, a 20-year State Revolving Fund (SRF) loan and a 30-year United States Department of Agriculture Rural Development (USDA RD) loan, resulting in user rates of \$15.04 and \$11.36 respectively, which are an increase of \$9.79/month and \$6.11/month over the existing sewer rate of \$5.25/month (\$63.00/year).

Plan B considers splitting the project into two phases, with Phase 1 extending only as far west as Theatre Drive, which would result in the elimination of an estimated 45 septic systems along the north side of Highway 1. Phase 2 would be the West Valley townsite sewer, which would eliminate an estimated 250 septic systems in West Valley. Plan B funding considers spreading the Phase 1 costs equally to all existing and new sewer users with Phase 2 costs borne entirely by the estimated 295 new sewer users in West Valley and along the north side of Highway 1. The Phase 1 project would result in a user rate for all existing sewer users in Anaconda and all new sewer users along the north side of Highway 1 of \$8.52/month, which is an increase of \$3.27/month over existing rate of \$5.25/month. The Phase 2 project would result in a user rate for the estimated 295 new sewer users in West Valley and along the north side of Highway 1 of \$31.18 per month. This is \$22.66/month more than the existing City of Anaconda sewer users would pay ($\$31.18 - \$8.52 = \$22.66$).

Plan C also considers splitting the project into two phases, the same as Plan B. However, funding for Plan C differs in that both Phase 1 and Phase 2 would be paid for equally by all new and existing sewer users. Phase 1 would be funded the same as described under Plan B above, resulting in an \$8.52/month user rate, which is an increase of \$3.27/month over the existing rate of \$5.25/month. Phase 2 costs would also be shared equally by all sewer users, existing and new, resulting in a user rate of \$11.01/month, an increase of \$2.49/month over the \$8.52/month rate upon completion of Phase 1. It should be noted that the \$2.49/month rate increase is a most favorable estimate, as it is based the assumption of receiving several sources of grant funding to help reduce impacts to the sewer users.

The preferred implementation and funding plan option is Plan C, with Phase 1 construction targeted for the summer of 2013. The timeline for Phase 2 construction is dependent on the funding cycles for the various grant programs. Funding applications are due in May of 2014, and are approved by the state legislature and governor in the summer of 2015. Therefore, if grant funding is awarded, Phase 2 construction would possible in 2016.

A means of funding the cost of the individual service connections and septic tank removals has not been determined at this time. Options range from full funding by Anaconda-Deer Lodge County to full funding by the property owner with unlimited cost sharing options in-between these two extremes. It should be noted that neither state nor federal monies can be used to fund the private service connection and septic tank removal work. The cost of the Phase 1 service connections and septic tank removals along the north side of Highway 1 is estimated at \$2,000 - \$4,000 for each property. The cost of the Phase 2 service connections and septic tank removals in West Valley are estimated at \$1,500 - \$3,000 for each property. Full funding by the property owner obviously makes him or her responsible for the entire cost. Total cost of the 295 Phase 1 and Phase 2 service connections is estimated at \$465,000 - \$930,000. Full funding by Anaconda-Deer Lodge County, which spreads the cost to all sewer users, equates to a cost to

each sewer user (existing and new) in the range of \$110 - \$220 which equates to \$0.37 - \$0.75 per new service connection.

C. Existing Wastewater System Improvements

Capital improvements and operating changes have been identified relating to the existing wastewater system. These include:

- Replacement of system components due to their age and condition.
- Installation of new equipment in order to comply with Montana DEQ regulatory standards.
- Operational changes to comply with Montana DEQ regulatory standards.
- New construction to provide additional capacity as needed to operate in compliance with Montana DEQ regulations.

The need to replace the 28-year old wastewater lagoon liners has been defined by the DEQ as a major facility modification and thus the DEQ is requiring that ADLC apply for a Montana Ground Water Pollution Control System (MGWPCS) permit. The MGWPCS permit application and approval process is expected to take roughly 18 months, and DEQ issuance of the permit is not anticipated until the second quarter of 2014 at the earliest. The anticipated MGWPCS permit will impact all aspects of the ADLC wastewater facilities from capital improvements to operations and maintenance. Although it is too soon to know the exact implications of the MGWPCS permit on the wastewater facilities, it can reasonably be assumed that the permit discharge limits will at the very least require the WWTP to operate at a high level of efficiency and possibly require capital and operational improvements at both the WWTP and HIP facility to enhance treatment effectiveness and reduce impacts to groundwater. ADLC has begun the MGWPCS permit application process. The required information for the MGWPCS permit application includes quarterly groundwater monitoring for a minimum of three calendar quarters along with WWTP effluent monitoring during the same time period.

The identified projects range from conceptual level, large scale planning projects for the purpose of understanding future budgetary needs, to smaller projects for new equipment and operating changes necessary to comply with Montana DEQ regulatory standards. The design requirements for any capital replacement or improvement projects at the wastewater treatment and disposal facilities will not be known conclusively until DEQ issues the MGWPCS permit. Therefore, this report does not provide a detailed evaluation of alternatives for these projects, or look to immediately implement these projects, but instead identifies the planning needs and recommends starting a sewer reserve account to help fund these projects in the future. Following are brief descriptions of these projects. Estimated project costs are summarized in Table 1-3 on page 15.

1. Lagoon Liner Replacement: The wastewater treatment plant lagoon liners are original components of the 1984 construction. The liners are nearing the end of their useful life and showing signs of significant deterioration. The liners should be replaced as soon as possible. However, the discharge limits in the upcoming MGWPCS permit, anticipated to be issued in the first half of 2014, may require operating and process changes at the treatment facility. Therefore, liner replacement must wait until the DEQ issues the MGWPCS permit and its effects on the wastewater treatment facility operations are evaluated. In the meantime, funding of a liner replacement reserve account should begin as soon as possible. Replacement would consist of the following:

- Isolation and draining of one lagoon while all wastewater is conveyed to the active lagoon for treatment.
- Removal, dewatering and disposal of accumulated biosolids (sludge).
- Removal of the in-lagoon aeration system piping and static tube aerators.
- Demolition of the existing hypalon lagoon liner.
- Regrading and compaction of the liner bedding as necessary.
- Installation of the new liner material.
- Replacement of the in-lagoon air lines and static tube aerators.

The estimated construction cost for liner replacement is \$2,900,000. An itemized cost estimate is included in Appendix 5-B. The above cost is based on using a hypalon liner with a 30-year warranty. Using a reinforced polypropylene liner with a 20-year warranty would reduce the above costs by approximately 40% to an estimated \$1,700,000. Evaluation of liner alternatives is beyond the scope of this report, as the purpose of this cost estimate is to show the general magnitude of the liner replacement costs.

2. Aeration System Blower Refurbishment: The wastewater treatment plant aeration system blowers are 28 years old. For replacement planning purposes, the operational life of the existing Spencer blowers with regular maintenance is typically 20-30 years. The replacement cost for the 4 existing custom fabricated Spencer blowers, including the electric motors, is in the \$300,000 range. Discussions with the blower manufacturer indicate that blower refurbishment can be an economical option in lieu of total blower replacement. Blower replacement is typically the best option when refurbishment costs exceed 50% of replacement costs. Depending on how well the existing blowers are running, refurbishment options include having a factory service technician visit the site to inspect the blowers, recommend any repair or part replacement and at a minimum replace the blower bearings, or send the blowers to the factory for refurbishing. The minimum field refurbishment effort would cost in the \$19,500 - \$22,500 range, plus the cost of any recommended repair(s) and/or part(s).

Factory refurbishment includes removing the blowers and sending them to Spencer's Windsor, Connecticut factory for inspection, and recommendation of any needed repair or part replacement(s) and at a minimum, replacement of the blower bearings. Additionally, the blower would be disassembled, cleaned, sandblasted, re-assembled, tested and painted. The price for the minimum refurbishment is \$9,800 per blower or \$39,200 for all four blowers. Freight to the factory and back to Anaconda is estimated at \$19,500 for a total estimated refurbishment cost of \$58,700. These estimated costs do not include removing the blowers from the plant, preparing them for shipment, loading onto the truck, and then unloading and re-installation of the refurbished blowers. The above cost estimate also does not include any additional parts or repair(s) discovered necessary during factory inspection. As the blower shaft is coupled to the motor shaft it will be necessary to check alignment after reinstallation, which would require a factory-trained technician to visit the site to assist in installation and alignment.

Evaluation of blower replacement/refurbishment options is beyond the scope of this report and will need to wait until the DEQ issues the MGWPCS permit.

3. Sewer Collection System Rehab/Replacement: Of the approximately 26.5 miles of sewer mains in Anaconda, approximately 19.5 miles of sewer were constructed prior to 1950. This report recommends a sewer rehabilitation and replacement plan to address the old sewers in Anaconda. Until a field study is performed to assess the condition of the sewer mains, the amount of rehabilitation required can only be assumed. For budgetary planning purposes, a conceptual plan would be to rehab or replace the entire 19.5 miles of sewer constructed prior to 1950 through a combination of cured-in-place pipe (CIPP) rehabilitation and total replacement by open trench excavation. This report realizes that CIPP rehabilitation would not be suitable for all mains due to known instances of offset pipe joints, crushed and broken pipes and mains that warrant upsizing in order to reduce maintenance needs and to allow for population growth. However, for purposes of developing a conceptual, planning level cost estimate, it is assumed that 100 percent of the older sewer mains would be good candidates for rehabilitation with the use of CIPP. It is also assumed that 25 percent of the associated manholes would be replaced and that 25 percent of the service connections would need to be excavated to install new service saddles. The estimated cost of rehab/replacement for 19.5 miles of sewer is \$7,660,000. An itemized cost estimate is included in Appendix 5-B.

The collection system experienced very high levels of infiltration and inflow (I&I) in 2011. The magnitude of the recent I&I problems, coupled with the anticipated MGWPCS discharge permit and the need for the WWTP to operate at peak efficiency at all times most certainly elevates the importance of collection system rehabilitation. A

rehabilitation plan, as described under Item 6 below, should be commissioned as soon as possible pending funding availability.

4. Effluent Flow Meter and Automatic Sampler: New equipment at the wastewater treatment plant consisting of an effluent flow meter and automatic sampler will be required for wastewater monitoring in compliance with Circular DEQ 2 and the anticipated MGWPCS permit. A Parshall flume and flow meter level transducer would be installed on the lagoon outfall line in a new concrete vault. A flow meter console and automatic sampler would be housed in a small shed type building located over the flume vault. The building is proposed to be a 10'x12' insulated wood framed structure. The building would have electric heat and lights, a steel entrance door and steel siding and roofing. The estimated cost of the effluent monitoring building and equipment is \$91,500. An itemized cost estimate is included in Appendix 5-B. The timeline for installing the flow meter and automatic sampler would be after the DEQ issues the MGWPCS discharge permit. Determining a flow meter location and design development prior to issuance of the MGWPCS permit is risky in that the possible need for enhanced treatment could impact the lagoon discharge piping arrangement and ultimately the flow meter location.

5. HIP Facility Expansion and Upgrades: The original design of the holding ponds was in compliance with Montana DEQ regulations and provided adequate wintertime storage to hold all incoming wastewater from December through March. This is an important consideration because the original design operating practices at the holding ponds and infiltration percolation (IP) cells resulted in up to 2 feet of water level drawdown in the holding ponds in one day during discharge to the IP cells. This drop in water level would damage the holding pond liners when the ponds are covered with ice in the winter, thus the need for adequate wintertime storage to eliminate the need for wintertime discharge. The current storage pond capacity is less than one-third of the design capacity. This is because the original design relied on seepage from the bottom of holding pond 2 that allowed a longer time to fill the ponds. The seepage from the bottom of pond 2 while significant in 1991, the first year of operation, has since been reduced to almost zero. Thus, the holding ponds fill much faster with less inflow. In order to manage the situation, the HIP facility is operated with a constant discharge to the IP cells during the winter. This constant discharge matches the incoming flow to the holding ponds, and thus the water level in the ponds is held constant, and ice damage to the liner is prevented. However, this operating practice of constant discharge is contrary to Montana DEQ regulations. The DEQ has requested that ADLC evaluate the current operating practices at the IP cells to determine impacts to groundwater. It is possible that ADLC will have to switch from the current operating practice of continuous discharge to the IP cells to the original design of an alternating wet/dry cycle type of discharge.

Item 5A. New Holding Pond

In order to provide adequate wintertime storage capacity, plus some reserve for increased wastewater flows in the future, planning for the addition of a third holding pond is recommended. A third holding pond, the same size as holding pond 2, (approximately 14 acres) would add an additional 45 to 60 days of storage at current wastewater flows. This pond would be lined with a high density polyethylene liner the same as the existing ponds and be located adjacent to the existing ponds. Pond construction costs are estimated at \$1,800,000. An itemized cost estimate is included in Appendix 5-B. The need for additional capacity will not be fully understood until at least a year of groundwater monitoring is complete and the MGWPCS permit is issued. Complete evaluation of the wintertime storage requirements and IP cell capacity is beyond the scope of this report. The evaluation period will continue at least until DEQ issuance of the MGWPCS permit, anticipated in the second quarter of 2014 at the earliest. The purpose of this conceptual planning level cost estimate is simply to show the magnitude of the costs involved for rate increase and budgetary planning.

Item 5B. Holding Pond 2 Liner Replacement

The addition of a third holding pond would be considered as a major modification by the DEQ and thus existing HIP facility components would need to be upgraded to current DEQ design standards. Holding pond 2 is currently lined on the side slopes only and does not meet current DEQ design standards for allowable leakage. Calls to liner manufacturers indicate that keeping the 20-year old side slope liner and just lining the pond bottom is not recommended due to difficulty in sealing the old liner material to the new, as well as not being able to guarantee the seaming of old to new liner material. This report recommends planning for the removal of the side slope liner material and installation of a totally new pond liner. Costs of replacing the partial pond 2 liner with a full liner system are estimated at \$1,400,000. An itemized cost estimate is included in Appendix 5-B.

Item 5C. Infiltration Cell Expansion

Upgrading the HIP facility to current DEQ design standards would also require construction of additional infiltration capacity in order to meet the more stringent wet/dry ratio standards. The current IP cell area of 9.8 acres would need to be more than doubled to 21.1 acres. This report recommends planning to construct 5 additional IP cells directly north of the existing cells within the footprint of the DEQ permitted IP cell expansion area. The estimated cost for construction of 5 new IP cells is \$332,000. An itemized cost estimate is included in Appendix 5-B.

6. Develop Collection System Rehabilitation Plan: This report recommends development of a collection system rehabilitation plan starting with sewer video inspection and flow observations at manholes in the spring and summer of 2013 or 2014, pending the availability of funding. In order to develop an accurate cost estimate for development of this planning document, consultation with ADLC sewer department personnel will be required. The experience and knowledge of the sewer department personnel will help to target known I&I problem areas and to determine the initial scope and extent of the video inspection and manhole observation efforts. In addition to the length of the sewer mains to be inspected, the need for sewer jetting prior to video inspection will also affect planning costs. Higher flow sections of the sewer system may require bypass pumping during jet cleaning. Bypass pumping may also be required in these higher flow segments during video inspection. The amount of jet cleaning and bypass pumping will not be known until consultation with the sewer department and initial field inspection of the flow conditions. For budgetary planning purposes, based on an assumed 25,000 feet of video inspection with jet cleaning, a rough planning level cost for video inspection, visual observation of sewer flows at manholes and report preparation is \$80,000. It should be emphasized that development of a rehabilitation plan is typically not a one-time effort. It is more likely a long range, continually evolving plan that every couple of years inspects more of the collection system and continues to develop and prioritize areas of the collection system for rehabilitation. Therefore, for planning purposes, in addition to the \$80,000 initial planning effort, a \$20,000 annual contribution to the sewer reserve fund for the continued development of the rehabilitation plan is recommended.

7. Resolve Spray Irrigation into Gardner Ditch: The half circle irrigation pivot on Section 17 crosses over the Gardner irrigation ditch and sprays treated wastewater effluent directly into the ditch. The DEQ has indicated that the practice of spraying effluent into the irrigation ditch must be discontinued as not only was this a condition of the original lease agreement between the landowner and the county; it is also a violation of Montana water quality statutes (MT DEQ, 2012). The solution to this situation will require further study and consultation with Ueland Ranches. However, for planning purposes, this report considers resolving this issue by putting the ditch in a pipeline throughout the full reach of the irrigation pivot coverage area. This would entail installing approximately 2,000 feet of pipeline in the existing ditch alignment. Preliminary hydraulic design calculations indicate that a 72-inch diameter pipe or equivalent arch pipe will be required for the 2,000-foot reach through the irrigation area. The estimated cost of constructing 2,000 feet of 72-inch diameter pipeline is \$290,000. An itemized cost estimate is included in Appendix 5-B. The report recommends consulting with Ueland Ranches as soon as possible to resolve this issue.

8. MGWPCS Permit Application: As requested by the DEQ, ADLC has begun preparation of a permit application. Although not technically a wastewater system improvement, the effort of gathering information and preparing the permit application is significant and warrants discussion as a required “project”. Required information for the permit application includes collection of groundwater monitoring data for a minimum of three (3) calendar quarters in addition to wastewater effluent monitoring over the same time period. ADLC has consulted with DEQ as to the permit application requirements and is currently in the process of implementing a DEQ approved groundwater sampling and analysis plan (SAP). The SAP requires the installation of three new monitoring wells which are scheduled for construction the week of November 12-16, 2012. Preparation of the permit application will be completed in phases, with Phase 1 being the initial data gathering including groundwater and effluent monitoring. Phase 2 of the permit application process entails providing information for a mixing zone, which is expected to be a source specific mixing zone instead of the simpler standard mixing zone. The estimated cost of monitoring well construction, data gathering and completion of the permit application forms together with supporting documentation is \$105,000. An itemized cost estimate is included in Appendix 5-B.
9. Influent and effluent monitoring: Influent and effluent monitoring are recommended to monitor treatment plant performance and are needed to gather the necessary information for the MGWPCS permit application. Wastewater monitoring is expected to be a condition of the upcoming MGWPCS permit as well. The cost of labor for sample collection, shipment and record keeping plus laboratory analytical costs are estimated at \$19,100 per year. An itemized cost estimate is included in Appendix 5-B.
10. Groundwater Monitoring: Groundwater monitoring at the HIP facility is expected to be a condition of the anticipated MGWPCS permit. The required groundwater monitoring parameters and frequency can only be assumed at this time. For planning purposes the monitoring program is assumed to entail quarterly monitoring of the same parameters included in the DEQ approved SAP mentioned under Item 8 above. The estimated cost of annual groundwater monitoring is \$8,200. An itemized cost estimate is included in Appendix 5-B.
11. Increase Aeration Blower Operating Hours: The aeration system blowers are currently operated 12 hours per day and monitoring is ongoing to evaluate compliance with Circular DEQ 2 standards for dissolved oxygen and BOD₅ reduction. This report recommends continued monitoring and evaluation of the blower runtime to maintain the required dissolved oxygen levels and achieve optimum wastewater treatment. It should be noted that in order to maintain the required dissolved oxygen levels in the treatment lagoons, design calculations indicate the blowers should be operated a minimum of 19

hours per day. For planning purposes, this report recommends budgeting for the additional electricity costs to increase the blower runtime from 12 to 19 hours per day. The increase in power costs for extending the blower runtime from 12 hours per day to 19 hours per day is estimated at \$20,320 per year. An itemized cost estimate is included in Appendix 5-B. As previously mentioned, the upcoming MGWPCS permit will require the treatment lagoons to operate at very high efficiency; and as such, it is expected that the blower runtime will need to be increased.

12. Change IP Cells to Wet/Dry Cycle Operation: As described previously under Item 5 above, the current, continuously wet operation of the IP cells does not comply with Circular DEQ 2 standards for wet/dry cycles. This report recommends changing the IP cell operations to the typical wet/dry cycle where each of the five IP cells is completely filled on consecutive days and then allowed to dry to achieve the recommended wet/dry ratio. For planning purposes, this report evaluates the increased operating costs associated with changing the IP cell operations to a typical alternating wet/dry cycle where each of the five IP cells is completely filled on consecutive days and then allowed to dry to achieve at least the design 1.33 wet/dry ratio or preferably a 0.5 wet/dry ratio (i.e. 3 days wet, 6 days dry). Records would need to be kept for each cell for the number of days the cell is wet (has ponded water) and the number of days the cell is dry. This method of operating the cells would be significantly more labor intensive than for current operations. Additional labor to operate the IP cells on a wet/dry cycle basis is estimated at 6 – 8 hours per week. Based on \$25/hour labor costs, the additional labor costs to discharge to the IP cells 6 months of the year amount to \$5,200 annually (8 hrs/wk x 26 wks/yr x \$25/hr = \$5,200/yr).
13. Effluent Irrigation System O&M Manual: Circular DEQ 2 standards for effluent irrigation require that an O&M Manual be prepared and followed. Additionally, the DEQ has recently requested the development of an O&M Manual. Items to be addressed in the O&M Manual include, but are not limited to, an effluent monitoring program and an operating plan for management of the irrigation application rate with respect to nutrient and hydraulic loading and cropping practices. This report recommends preparation of an O&M Manual followed by implementation of the various operating procedures and record keeping requirements. The estimated cost of preparing the O&M manual is \$14,000. The costs to implement the various O&M manual procedures and record keeping requirements are estimated at \$4,500 annually for a 20 week irrigation season. An itemized cost estimate spreadsheet is included in Appendix 5-B.

Table 1-3 on the following page summarizes the estimated costs of the recommended improvements to the existing wastewater system. Detailed cost estimates, as mentioned in the above Item descriptions, are provided in Appendix 5-B.

Table 1-3. Cost Summary of Existing Wastewater System Improvements

Item	Description	Construction Cost	Annual O&M Cost Increase
1	Lagoon liner replacement	\$ 2,900,000	-
2	Aeration system blower replacement	\$ 297,000	-
3	Collection system rehab/replacement	\$ 7,600,000	-
4	Effluent flow meter & automatic sampler	\$ 91,500	-
5A	HIP Facility – New holding pond	\$1,800,000	-
5B	HIP Facility - Holding pond 2 liner replacement	\$1,400,000	
5C	HIP Facility – Infiltration cell expansion	\$332,000	
	Subtotal Items 1 – 5C	\$ 14,420,500	\$ 0
6	Develop Collection System Rehab Plan	\$80,000	\$20,000
7	Gardner Ditch Pipeline	\$291,000	
8	MGWPCS Permit Application (includes construction of 3 new monitoring wells)	\$105,000	
9	Influent and effluent monitoring		\$ 19,100
10	Groundwater Monitoring		\$ 8,200
11	Increase aeration blower operating hours		\$ 20,320
12	Change IP cells to wet/dry cycle operation		\$5,200
13	Effluent irrigation system O&M Manual ^A	\$14,000	\$ 4,500
	Subtotal Items 6 – 13	\$ 490,000	\$ 77,320

Footnotes:

A. Cost of O&M manual preparation plus annual O&M costs for monitoring and record keeping.

Items 1 – 5C in the above table are presented for planning purposes only. These projects are conceptual at this time and further study pending issuance of the anticipated MGWPCS discharge permit and development of a sewer rehabilitation plan is required in order to better define their scope and cost. Items 6 - 13 in the above table should be finalized and implemented as soon as possible for the following reasons:

- Item 6: Reduction of I&I is critical and arguably the most important system upgrade to improve the treatment efficiency of the aerated lagoons. Development of a rehabilitation plan should begin as soon as funding becomes available starting with field investigation work to determine and prioritize problem areas for rehabilitation.

- Item 7: The DEQ has indicated that spray irrigation into the Gardner ditch must be discontinued as it is a violation of Montana water quality statutes and “*The effluent will not be allowed to flow or be sprayed into any ditch that discharges of the owner’s property*” was a specific condition of the original lease agreement between the landowner and the county.
- Item 8: The DEQ is requiring ADLC to prepare a groundwater discharge permit application as a result of needing to repair the wastewater treatment lagoon liners and as a result of extending sewer to West Valley.
- Item 9: Influent and effluent monitoring are needed to fully evaluate the treatment plant’s performance and to confirm the ability of the plant to treat West Valley wastewater. This item is for continuation of wastewater monitoring once monitoring is complete for the Item 8 groundwater discharge permit application.
- Item 10: Groundwater monitoring will certainly be a condition of the MGWPCS permit anticipated to be issued in the second quarter of 2014. This item is for continuation of groundwater monitoring once monitoring is complete for the Item 8 groundwater discharge permit application.
- Item 11: Continue to monitor and evaluate the blower operating hours and, if necessary, increase the blower operating hours to comply with Circular DEQ 2 operating standards to provide adequately oxidized wastewater for discharge to the IP cells and for effluent irrigation. Although the need to increase the blower runtime is not conclusive at this time, budgeting for this possibility is recommended, as the Chapter 2 evaluation indicated the need for increased aeration.
- Item 12: Although not a requirement at this time, budgeting for this item is recommended. Changing the IP cells to a wet/dry cycle operating basis may be necessary to reduce impacts to groundwater and to determine the long term infiltration rate and ultimate capacity of the IP cells. IP cell wet/dry operation through the winter season is questionable as is the infiltration capacity of the IP cells. Should groundwater impact evaluation indicate a change to wet/dry cycle operation is necessary, careful monitoring and evaluation of wintertime operating performance as well as evaluation of percolation rates and wet/dry cycle ratios will be necessary to determine if constructing additional holding pond and/or infiltration capacity is necessary (Section 5 above and Items 5A, 5B and 5C in the above table).
- Item 13: Preparation of an effluent irrigation O&M manual and following the procedural and record keeping requirements therein is necessary to comply with Circular DEQ 2 standards and is required by the DEQ.

An implementation schedule for the various operating changes and capital improvements recommended for the existing wastewater system is presented as Table 1-5 on page 20 after the following discussion on proposed sewer rate increases.

D. Proposed Sewer Rate Increase

As shown in Table 1-3 above, recommended operating improvements to the existing wastewater system result in an estimated \$77,320 increase in annual operating costs. Based on 3,900 equivalent sewer users in Anaconda, a \$1.66 per month rate increase would be necessary to cover the increased operating costs ($\$77,320/\text{yr} \div 12 \text{ months/yr} \div 3,900 = \$1.66/\text{month}$).

Several large scale capital improvements projects are listed in Table 1-3 above, with conceptual construction cost estimates totaling approximately \$14,400,000. It should be noted that a significant portion of the \$14,400,000 is for rehabilitation of over 19 miles of old sewer mains (Item 3 in Table 1-3). Based on discussions with the ADLC Sewer Department, it is believed that a significant portion of the sewer mains experiencing groundwater infiltration are located west of Larch Street. This area is characterized by high groundwater and concrete sewer main piping constructed in the 1950s. It has been reported by Sewer Department personnel that some segments of this 1950s era concrete pipe have exhibited substandard joints and that groundwater infiltration is problematic. It is anticipated that a significant amount of infiltration could be eliminated by focusing on the area west of Larch Street. It is believed that this could be accomplished for a fraction of the \$7,600,000 estimate described above. For budgetary planning purposes at this time, 30% of the \$7,600,000 estimate or \$2,300,000 will be used for reserve fund and user rate projections. As described previously, a sewer rehabilitation program is recommended that focuses on incremental rehabilitation, with the worst offending sections of sewer main being first on the rehabilitation list.

Table 1-4 on the following page presents a summary of the estimated costs for all of the anticipated projects, including the West Valley Sewer Extension, together with projected rate increases needed to fund the projects. The estimated sewer rate increases indicated for the large scale capital improvement projects are based on a hypothetical financing method using a State Revolving Fund (SRF) loan with a 20-year term and 3.75 percent annual interest. These rate increases are further described in Chapter 6.

Table 1-4. Estimated Project Cost and Sewer Rate Increase Summary

Proj. No.	Project Description	Estimated Project Cost	Estimated Annual O&M Cost	Estimated Per Month Sewer Rate Increase ^A	Cumulative Per Month Sewer Rate Increase
1	Phase 1 West Valley Sewer Extension (Table 6-4)	\$ 2,572,100	\$ 6,000	\$ 3.27	\$ 3.27
2	Existing System Improvements (Table 6-1) Sewer Rehabilitation Plan Wastewater Influent and Effluent Monitoring Groundwater Monitoring at HIP Facility Increase Blower Operating Hours Change IP Cells to Wet/Dry Cycle Operation Effluent Irrigation System Monitoring and Recordkeeping	-	\$ 77,320	\$ 1.66	\$ 4.93
3	Existing System Improvements (Table 6-1) ^B Develop Collection System Rehab Plan Gardner Ditch Pipeline MGWPCS Permit Application Effluent Irrigation System O&M Manual	\$ 490,000	-	-	-
4	Lagoon liner replacement (Table 5-4)	\$ 2,900,000	-	\$ 5.99	\$ 10.92
5	Aeration system blower replacement (Table 5-4) ^B	\$ 297,000	-	-	-
6	Effluent flow meter and automatic sampler (Table 5-4) ^B	\$ 91,500	-	-	-
7	Sewer collection system rehabilitation ^C	\$ 2,300,000	-	\$ 4.75	\$ 15.67
8	HIP Facility upgrades to meet current DEQ Standards ^D	\$ 1,752,000	-	\$ 2.69	\$ 18.36
9	Phase 2 West Valley Sewer Extension (Table 6-4)	\$ 3,371,500	\$ 12,600	\$ 2.50	\$ 20.86
10	New holding pond at HIP facility (Table 5-4)	\$ 1,800,000	-	\$ 2.73	\$ 23.59
	Total Estimated Cost	\$ 15,574,100	\$ 95,920	\$ 23.59	-

Footnotes:

- A. Refer to Funding Plan C in Table 6-4 for West Valley Sewer Extension projects 1 and 9. Refer to Table 6-5 for projects 4, 7, 8 and 10.
- B. Projects funded from sewer budget reserve funds and do not add to rates.
- C. Estimated project cost based on 30% of the Table 5-4 cost as explained under the "Proposed Sewer Rate Increase" section on page 17.
- D. Replacement of holding pond 2 liner to meet allowable leakage requirement (\$1,420,000) and expansion of IP cell area to meet wet/dry ratio requirement (\$332,000). Refer to Table 5-4.

As summarized in Table 1-4 above, the potential magnitude of future rate increases is substantial. As previously mentioned, several of the projects in the above table depend on the anticipated MGWPCS permit and as such the estimated costs may change significantly. However, the overall need for capital improvements is not in question, and this report recommends starting a wastewater system reserve fund in anticipation of future projects. The reserve fund would be used to fund projects 3, 5 and 6 indicated in Table 1-4 above as well as to pay for engineering services, pay for the individual West Valley service connections and help offset the amount of money borrowed for the major construction projects. As an example, based

on 3,900 EDUs, a \$7.00 per month rate increase would bring in annual revenue of \$327,600 for the reserve fund ($\$7.00/\text{month} \times 12 \text{ months/yr} \times 3,900 \text{ EDUs} = \$327,600$).

This report recommends that ADLC consider raising sewer rates \$7/month immediately with a second \$7/month increase in one year, and a third \$7/month increase in two years. A \$14/month increase would fund up through Project 4 in Table 1-4 with remaining revenue accruing to the sewer reserve fund. When the phased rate increase reaches \$21.00 per month the total sewer rate will be \$26.25 per month ($\$5.25 + \21.00). Based on an average water user rate of \$25.00 per month, the combined water and sewer rate for ADLC would then be \$51.25 per month ($\$25.00 + \26.25). This combined rate is 102% of ALDC's \$50.42 target rate, which opens up grant funding possibilities as indicated for the West Valley Phase 2 sewer extension funding examples described in Chapter 6.

ADLC's sewer fees are billed to customers on the twice annual property tax notices, and are due by November 30 and May 30 of each year. Fiscal year 2012 property tax statements, which have payment due dates of November 30, 2012 and May 30, 2013, have already been mailed to property owners. Therefore, the earliest that any rate increase could be billed to the ADLC sewer customers is on the 2013 property tax notices, which will be mailed in early November 2013 and the first of which will be due November 30, 2013. The earliest that revenue from any 2013 rate increase would be available to the sewer/wastewater budget is January 2014. This revenue timing has been discussed with the SRF loan program, and they have said that West Valley Phase 1 sewer construction could be carried out and paid for in the summer and fall of 2013, with the first loan payment not due until January 2014. Other wastewater improvement projects and operating changes that would be paid for with revenue from any 2013 rate increase would have to wait until January 2014 due to the above described timing for receipt of revenue. Receipt of new revenue from any rate increase and project timing issues are further described in Section E – Revenue Versus Expenditure Forecast beginning on page 21.

An implementation schedule for the various operating changes and capital improvements needed for the existing wastewater system is presented as Table 1-5 on the following pages.

Table 1-5. Existing Wastewater System Improvement Projects – Proposed Implementation Schedule

No.	Item Description	Duration	Start Date	End Date
1	Increase Aeration Blower Operating Hours			
2	Increased blower runtime from 6 hrs/day to 12 hrs/day		16-May-12	
3	Evaluate blower runtime effectiveness w/ dissolved oxygen monitoring	continual daily monitoring		
4	Evaluate blower runtime effectiveness w/ effluent BOD ₅ monitoring		19-Nov-12	ongoing
5	Consider increasing blower runtime from 12 hrs/day to 18 hrs/day		10-Dec-12	
6	Prepare Ground Water Pollution Control System (MGWPCS) Permit Application			
7	Construct new monitoring wells	1 week	12-Nov-12	16-Nov-12
8	Conduct groundwater and WWTP effluent monitoring	7 months	19-Nov-12	19-Jun-13
9	Aquifer pump tests and mixing zone evaluation	8 weeks	19-Jun-13	14-Aug-13
10	Finalize permit application and submit to DEQ	6 weeks	14-Aug-13	25-Sep-13
11	DEQ completeness review of application materials	60 days	25-Sep-13	25-Nov-13
12	Prepare and submit additional permit application information to DEQ	45 days	25-Nov-12	10-Jan-14
13	DEQ issuance of tentative permit		10-Feb-14	
14	Public notice of permit and notice of public hearing	30 days	10-Feb-14	10-Mar-14
15	Public hearing, receive comments, respond to comments and issue permit	60 days	10-Mar-14	10-May-14
16	Renew HIP Facility and Effluent Irrigation Lease Agreement			
17	Renew HIP Facility and Effluent Irrigation Lease Agreement	8 months	Aug-12	Mar-13
18	Effluent Irrigation O&M Manual & Buffer Zone Issue			
19	Prepare effluent irrigation O&M manual	2 months	Jan-13	Feb-13
21	Resolve buffer zone issue depending on project cost and availability of funding	early start	Feb-13	Apr-13
22	Resolve buffer zone issue depending on project cost and availability of funding	late start	Feb-15	Apr-15
23	Sewer Collection System Rehabilitation			
24	Develop Sewer Rehabilitation Plan utilizing video inspection and flow observations in manholes during the high ground water season	4 months	May-14	Aug-14
25	Begin rehabilitation efforts focusing on worst case sewer mains. The Table 1-6 example balance sheet shows annual funding from the sewer reserve fund becoming available in 2015. It is important to fund these projects through the use of reserve funds and not go into debt, thus tying up valuable sewer revenue for 20-years to make loan payments.	ongoing	Jul-15	yearly
26	Resolve Spray Irrigation into Gardner Ditch			
27	Tentative solution to this problem is to put the ditch in a pipeline throughout the footprint of the irrigation pivot machine. This is estimated to cost \$290,000 and due to the availability of funds from the proposed rate increases, the earliest this project could be constructed is prior to the 2017 irrigation season. Funding for this project would be available July 2016 as shown in the Table 1-6 example balance sheet.			
28	Aerated Lagoon Liner Replacement			
29	Will need to wait until the ground water discharge permit application process is complete and DEQ issues the discharge permit. The resulting discharge limits will dictate the level of treatment that is required and whether or not the existing aerated lagoons can be used for future treatment, or if modifications for enhanced treatment are required to meet the discharge permit limits. With anticipated issuance of the discharge permit in the second quarter of 2014, treatment system evaluation is tentatively scheduled for the third quarter of 2014 with final design in late 2014 and early 2015 with possible construction late in the 2015 construction season, or more likely early in the 2016 construction season. SRF loan funding for this project could be available as early as the 2015 construction season, with the first loan payment due January 2016 as shown in the Table 1-6 example balance sheet. Once the MGWPCS permit is issued, the need for WWTP improvements should be evaluated and documented in an addendum to this PER.			
30	Continued on next page.			

**Table 1-5. Existing Wastewater System Improvement Projects –
Proposed Implementation Schedule (continued)**

31	Effluent Flow Meter and Automatic Sampler			
32	This project will need to wait until the ground water discharge permit application process is complete and DEQ issues the discharge permit. As described for the Lagoon Liner Replacement project, the MGWPCS permit limits will potentially require modifications to the WWTP. Such modifications could affect the treatment plant outlet piping configuration and thus the location of the flow meter and automatic sampler building. This project is tentatively scheduled for construction in 2015. Funding for this project would be available July 2015 as shown in the Table 1-6 example balance sheet.			
33	Evaluate Current Operating Practices at the HIP Facility			
34	Evaluation of current operating practices will require at least one year's worth of quarterly groundwater monitoring. Groundwater monitoring is scheduled to begin in November of 2012. This report recommends continuing to operate the IP cells in continuous discharge mode until November 2013 to determine if operation of the IP cells is causing impacts to groundwater. If impacts are indicated, this report recommends switching to alternating wet/dry discharge cycles beginning in the winter of 2013-14. Under the new operating regime, further evaluation would be required to evaluate the infiltration capacity of the IP cells and the ability of the IP cells to operate through the winter together with the resulting wintertime storage capacity. Should the evaluation indicate additional infiltration and/or wintertime storage capacity is needed, then such project(s) would be required as described below.			
35	HIP Facility Upgrades to Meet Current DEQ Design Standards			
36	Holding pond 2 is currently not lined on the bottom and stored wastewater continuously percolates to groundwater. This groundwater discharge will almost certainly come under fire in the MGWPCS permit application process. Current DEQ regulations require that holding ponds leak (or percolate) no more than 6 inches per year. As described in Chapter 2 the measured percolation (leakage) rate from pond 2 was 0.1 feet/week, which equates to over 60 inches per year, well above the 6-inch minimum allowable. Additionally, current IP cell capacity is not sufficient to meet current DEQ regulations regarding percolation rate and wet/dry cycle ratios. Although not conclusive until the MGWPCS permit application process is complete, replacement of the holding pond 2 liner and expansion of the IP cell capacity is included in the Table 1-6 example budget spreadsheet, with SRF loan funding available January 2017, which would support liner replacement and new IP construction in the summer of 2016.			
37	Additional Storage Capacity at the HIP Facility			
38	The need for additional storage is inconclusive at this time and depends on the upcoming MGWPCS permit and the evaluation of current operating practices at the HIP facility. Similar to the lagoon liner and aeration blower replacement projects, the need for additional storage capacity will need to be evaluated upon issuance of the MGWPCS permit and completion of current operating practices evaluation with findings documented in an addendum to this PER. A New Holding Pond project is included in the Table 1-6 example budget spreadsheet, with SRF loan funding available January 2018, which would support holding pond construction in the summer of 2017.			
39	Aeration System Blower Refurbishment/ Replacement			
40	Similar to the lagoon liner replacement above, it will be necessary to wait on this project until the groundwater discharge permit is in place and funding is available. Once the MGWPCS permit is issued, the need for and type of blower refurbishment/replacement should be evaluated and documented in an addendum to this PER.			

E. Revenue Versus Expenditure Forecast

A balance sheet extending from 2014 through 2021, illustrating the timing of the increased O&M costs and various capital improvement projects with respect to the semi-annual receipt of sewer fee revenue is presented as Table 1-6 on the following page. Note that this balance sheet example considers only new revenue and expenses and does not include any line items from the current sewer/wastewater budget. The estimated \$105,000 cost of the MGWPCS permit application would be paid from the existing sewer budget and is not included in Table 1-6.

The balance sheet example illustrates the importance of funding the sewer reserve account to be able to pay cash for the various small projects including as much sewer rehabilitation as possible.

Loan funding should only be used when absolutely necessary for the major capital improvement projects. Note that the balance sheet example shows a modest level of sewer rehabilitation each year beginning in 2015. This is in contrast to the \$2,300,000 sewer rehabilitation project with SRF loan funding example presented in Table 1-4. The ultimate level of annual sewer rehabilitation is unknown at this time, but will be better understood upon field investigation and completion of the Sewer Rehabilitation Plan, scheduled for the summer of 2014 (see item 7 in the following table).

Table 1-6. Wastewater Project Funding – Revenue vs Expenditure Forecast

Item	Date	Transaction Description ^A	Payment	Deposit	Balance
1	Jan. 1, 2014	Receipt of sewer fees (3,945 EDUs x \$7/mo x 6 mos.)		\$ 165,690	\$ 165,690
2	Jan. 1, 2014	SRF Loan Payment - WV Sewer Phase 1	\$ 74,424		\$ 91,266
3	Jan. 1, 2014	O&M cost increase (1/2 annual amount from Table 6-6)	\$ 38,660		\$ 52,606
4	July 1, 2014	Receipt of sewer fees (3,945 EDUs x \$7/mo x 6 mos.)		\$ 165,690	\$ 218,296
5	July 1, 2014	SRF Loan Payment - WV Sewer Phase 1	\$ 74,424		\$ 143,872
6	July 1, 2014	O&M cost increase (1/2 annual amount from Table 6-6)	\$ 38,660		\$ 105,212
7	July 1, 2014	Sewer Rehabilitation Plan (from Table 6-1)	\$ 80,000		\$ 25,212
8	Jan. 1, 2015	Receipt of sewer fees (3,945 EDUs x \$14/mo x 6 mos.)		\$ 331,380	\$ 356,592
9	Jan. 1, 2015	SRF Loan Payment - WV Sewer Phase 1	\$ 74,424		\$ 282,168
10	Jan. 1, 2015	O&M cost increase (1/2 annual amount from Table 6-6)	\$ 38,660		\$ 243,508
11	Jan. 1, 2015	West Valley Phase 1 Service Connections (45 x \$2,000)	\$ 90,000		\$ 153,508
12	July 1, 2015	Receipt of sewer fees (3,945 EDUs x \$14/mo x 6 mos.)		\$ 331,380	\$ 484,888
13	July 1, 2015	SRF Loan Payment - WV Sewer Phase 1	\$ 74,424		\$ 410,464
14	July 1, 2015	O&M cost increase (1/2 annual amount from Table 6-6)	\$ 38,660		\$ 371,804
15	July 1, 2015	Rehabilitate Sewer Collection System	\$ 100,000		\$ 271,804
16	July 1, 2015	Effluent flow meter and automatic sampler	\$ 91,500		\$ 180,304
17	Jan. 1, 2016	Receipt of sewer fees (3,945 EDUs x \$21/mo x 6 mos.)		\$ 497,070	\$ 677,374
18	Jan. 1, 2016	SRF Loan Payment - WV Sewer Phase 1	\$ 74,424		\$ 602,950
19	Jan. 1, 2016	O&M cost increase (1/2 annual amount from Table 6-6)	\$ 38,660		\$ 564,290
20	Jan. 1, 2016	SRF Loan Payment - Lagoon Liner Replacement	\$ 140,214		\$ 424,076
21	July 1, 2016	Receipt of sewer fees (3,945 EDUs x \$21/mo x 6 mos.)		\$ 497,070	\$ 921,146
22	July 1, 2016	SRF Loan Payment - WV Sewer Phase 1	\$ 74,424		\$ 846,722
23	July 1, 2016	O&M cost increase (1/2 annual amount from Table 6-6)	\$ 38,660		\$ 808,062
24	July 1, 2016	SRF Loan Payment - Lagoon Liner Replacement	\$ 140,214		\$ 667,848
25	July 1, 2016	Rehabilitate Sewer Collection System	\$ 100,000		\$ 567,848
26	July 1, 2016	Gardner ditch pipeline (from Table 6-1)	\$ 291,000		\$ 276,848
27	July 1, 2016	West Valley Phase 2 Service Connections (245 x \$1,000)	\$ 245,000		\$ 31,848
28	Jan. 1, 2017	Receipt of sewer fees (4,200 EDUs x \$21/mo x 6 mos.)		\$ 529,200	\$ 561,048
29	Jan. 1, 2017	SRF Loan Payment - WV Sewer Phase 1	\$ 74,424		\$ 486,624
30	Jan. 1, 2017	O&M cost increase (1/2 annual amount from Table 6-6)	\$ 38,660		\$ 447,964
31	Jan. 1, 2017	SRF Loan Payment - Lagoon Liner Replacement	\$ 140,214		\$ 307,750
32	Jan. 1, 2017	SRF Loan Payment - WV Sewer Phase 2	\$ 56,641		\$ 251,109
33	Jan. 1, 2017	SRF Loan Payment - Replace Holding Pond 2 Liner and IP Cell Exp.	\$ 62,951		\$ 188,158
34	July 1, 2017	Receipt of sewer fees (4,200 EDUs x \$21/mo x 6 mos.)		\$ 529,200	\$ 717,358
35	July 1, 2017	SRF Loan Payment - WV Sewer Phase 1	\$ 74,424		\$ 642,934
36	July 1, 2017	O&M cost increase (1/2 annual amount from Table 6-6)	\$ 38,660		\$ 604,274
37	July 1, 2017	SRF Loan Payment - Lagoon Liner Replacement	\$ 140,214		\$ 464,060
38	July 1, 2017	SRF Loan Payment - WV Sewer Phase 2	\$ 56,641		\$ 407,419
39	July 1, 2017	SRF Loan Payment - Replace Holding Pond 2 Liner and IP Cell Exp.	\$ 62,951		\$ 344,468
40	July 1, 2017	Rehabilitate Sewer Collection System	\$ 200,000		\$ 144,468
41	Jan. 1, 2018	Receipt of sewer fees (4,200 EDUs x \$21/mo x 6 mos.)		\$ 529,200	\$ 673,668
42	Jan. 1, 2018	SRF Loan Payment - WV Sewer Phase 1	\$ 74,424		\$ 599,244
43	Jan. 1, 2018	O&M cost increase (1/2 annual amount from Table 6-6)	\$ 38,660		\$ 560,584
44	Jan. 1, 2018	SRF Loan Payment - Lagoon Liner Replacement	\$ 140,214		\$ 420,370
45	Jan. 1, 2018	SRF Loan Payment - WV Sewer Phase 2	\$ 56,641		\$ 363,729
46	Jan. 1, 2018	SRF Loan Payment - Replace Holding Pond 2 Liner and IP Cell Exp.	\$ 62,951		\$ 300,778
47	Jan. 1, 2018	SRF Loan Payment - New Holding Pond at HIP Facility	\$ 63,822		\$ 236,956
48	July 1, 2018	Receipt of sewer fees (4,200 EDUs x \$21/mo x 6 mos.)		\$ 529,200	\$ 766,156
49	July 1, 2018	SRF Loan Payment - WV Sewer Phase 1	\$ 74,424		\$ 691,732
50	July 1, 2018	O&M cost increase (1/2 annual amount from Table 6-6)	\$ 38,660		\$ 653,072

Footnote:

A. SRF loan payments are 1/2 of the annual debt service with reserve and coverage amounts from Tables 6-4 and 6-5.

Table 1-6. Wastewater Project Funding – Revenue vs Expenditure Forecast (continued)

Item	Date	Transaction Description ^A	Payment	Deposit	Balance
		Balance from previous page			\$ 653,072
51	July 1, 2018	SRF Loan Payment - Lagoon Liner Replacement	\$ 140,214		\$ 512,858
52	July 1, 2018	SRF Loan Payment - WV Sewer Phase 2	\$ 56,641		\$ 456,217
53	July 1, 2018	SRF Loan Payment - Replace Holding Pond 2 Liner and IP Cell Exp.	\$ 62,951		\$ 393,266
54	July 1, 2018	SRF Loan Payment - New Holding Pond at HIP Facility	\$ 63,822		\$ 329,444
55	July 1, 2018	Rehabilitate Sewer Collection System	\$ 200,000		\$ 129,444
56	Jan. 1, 2019	Receipt of sewer fees (4,200 EDUs x \$21/mo x 6 mos.)		\$ 529,200	\$ 658,644
57	Jan. 1, 2019	SRF Loan Payment - WV Sewer Phase 1	\$ 74,424		\$ 584,220
58	Jan. 1, 2019	O&M cost increase (1/2 annual amount from Table 6-6)	\$ 38,660		\$ 545,560
59	Jan. 1, 2019	SRF Loan Payment - Lagoon Liner Replacement	\$ 140,214		\$ 405,346
60	Jan. 1, 2019	SRF Loan Payment - WV Sewer Phase 2	\$ 56,641		\$ 348,705
61	Jan. 1, 2019	SRF Loan Payment - Replace Holding Pond 2 Liner and IP Cell Exp.	\$ 62,951		\$ 285,754
62	Jan. 1, 2019	SRF Loan Payment - New Holding Pond at HIP Facility	\$ 63,822		\$ 221,932
63	July 1, 2019	Receipt of sewer fees (4,200 EDUs x \$21/mo x 6 mos.)		\$ 529,200	\$ 751,132
64	July 1, 2019	SRF Loan Payment - WV Sewer Phase 1	\$ 74,424		\$ 676,708
65	July 1, 2019	O&M cost increase (1/2 annual amount from Table 6-6)	\$ 38,660		\$ 638,048
66	July 1, 2019	SRF Loan Payment - Lagoon Liner Replacement	\$ 140,214		\$ 497,834
67	July 1, 2019	SRF Loan Payment - WV Sewer Phase 2	\$ 56,641		\$ 441,193
68	July 1, 2019	SRF Loan Payment - Replace Holding Pond 2 Liner and IP Cell Exp.	\$ 62,951		\$ 378,242
69	July 1, 2019	SRF Loan Payment - New Holding Pond at HIP Facility	\$ 63,882		\$ 314,360
70	July 1, 2019	Rehabilitate Sewer Collection System	\$ 200,000		\$ 114,360
71	Jan. 1, 2020	Receipt of sewer fees (4,200 EDUs x \$21/mo x 6 mos.)		\$ 529,200	\$ 643,560
72	Jan. 1, 2020	SRF Loan Payment - WV Sewer Phase 1	\$ 74,424		\$ 569,136
73	Jan. 1, 2020	O&M cost increase (1/2 annual amount from Table 6-6)	\$ 38,660		\$ 530,476
74	Jan. 1, 2020	SRF Loan Payment - Lagoon Liner Replacement	\$ 140,214		\$ 390,262
75	Jan. 1, 2020	SRF Loan Payment - WV Sewer Phase 2	\$ 56,641		\$ 333,621
76	Jan. 1, 2020	SRF Loan Payment - Replace Holding Pond 2 Liner and IP Cell Exp.	\$ 62,951		\$ 270,670
77	Jan. 1, 2020	SRF Loan Payment - New Holding Pond at HIP Facility	\$ 63,882		\$ 206,788
78	July 1, 2020	Receipt of sewer fees (4,200 EDUs x \$21/mo x 6 mos.)		\$ 529,200	\$ 735,988
79	July 1, 2020	SRF Loan Payment - WV Sewer Phase 1	\$ 74,424		\$ 661,564
80	July 1, 2020	O&M cost increase (1/2 annual amount from Table 6-6)	\$ 38,660		\$ 622,904
81	July 1, 2020	SRF Loan Payment - Lagoon Liner Replacement	\$ 140,214		\$ 482,690
82	July 1, 2020	SRF Loan Payment - WV Sewer Phase 2	\$ 56,641		\$ 426,049
83	July 1, 2020	SRF Loan Payment - Replace Holding Pond 2 Liner and IP Cell Exp.	\$ 62,951		\$ 363,098
84	July 1, 2020	SRF Loan Payment - New Holding Pond at HIP Facility	\$ 63,882		\$ 299,216
85	July 1, 2020	Rehabilitate Sewer Collection System	\$ 200,000		\$ 99,216
86	Jan. 1, 2021	Receipt of sewer fees (4,200 EDUs x \$21/mo x 6 mos.)		\$ 529,200	\$ 628,416
87	Jan. 1, 2021	SRF Loan Payment - WV Sewer Phase 1	\$ 74,424		\$ 553,992
88	Jan. 1, 2021	O&M cost increase (1/2 annual amount from Table 6-6)	\$ 38,660		\$ 515,332
89	Jan. 1, 2021	SRF Loan Payment - Lagoon Liner Replacement	\$ 140,214		\$ 375,118
90	Jan. 1, 2021	SRF Loan Payment - WV Sewer Phase 2	\$ 56,641		\$ 318,477
91	Jan. 1, 2021	SRF Loan Payment - Replace Holding Pond 2 Liner and IP Cell Exp.	\$ 62,951		\$ 255,526
92	Jan. 1, 2021	SRF Loan Payment - New Holding Pond at HIP Facility	\$ 63,882		\$ 191,644
93	July 1, 2021	Receipt of sewer fees (4,200 EDUs x \$21/mo x 6 mos.)		\$ 529,200	\$ 720,844
94	July 1, 2021	SRF Loan Payment - WV Sewer Phase 1	\$ 74,424		\$ 646,420
95	July 1, 2021	O&M cost increase (1/2 annual amount from Table 6-6)	\$ 38,660		\$ 607,760
96	July 1, 2021	SRF Loan Payment - Lagoon Liner Replacement	\$ 140,214		\$ 467,546
97	July 1, 2021	SRF Loan Payment - WV Sewer Phase 2	\$ 56,641		\$ 410,905
98	July 1, 2021	SRF Loan Payment - Replace Holding Pond 2 Liner and IP Cell Exp.	\$ 62,951		\$ 347,954
99	July 1, 2021	SRF Loan Payment - New Holding Pond at HIP Facility	\$ 63,882		\$ 284,072
100	July 1, 2021	Rehabilitate Sewer Collection System	\$ 150,000		\$ 134,072

F. Indeterminate Issues

The proposed implementation plan relies on breaking the West Valley sewer extension project into phases, such that the additional wastewater flow from the first phase is less than 10 percent of the projected wastewater flow from the entire West Valley study area (i.e., 45 homes first phase versus a 2031 design year projection of 651 homes for the entire West Valley study area from Table 2-3). This phased implementation will allow the first phase to proceed immediately with future phases to follow pending issuance of the MGWPCS permit and confirmation that the ADLC wastewater facilities can handle the additional wastewater from the entire West Valley study area.

Items that have the potential to delay or prevent the West Valley Phase 1 Sewer Extension project from going forward are listed below.

1. Individual Service Connections: A method of funding the construction of individual sewer service lines and the abandonment of individual septic tanks and drain fields within the PER study area has not been determined at this time. The cost of the majority of service lines for the Phase 1 sewer extension is estimated at \$2,000 - \$4,000 depending on length and type of surface restoration. The cost of individual residential wastewater system improvements on private land is generally not covered by State and Federal funding sources and as such must be addressed before sewer service could be extended to the West Valley study area. The CDBG grant program is a potential funding source for low to moderate income households. An income survey would be necessary to determine qualifying households.

Other issues concerning service connections involve requirements to connect and the timeline for connection. The main premise of this project is to eliminate individual septic systems. If connection to the sewer system is not mandatory, the USEPA would not approve the use of STA grant funds for this project. A means and a timeline for requiring hookup must be determined. The ADLC county attorney has indicated that this can be accomplished with passage of a new ADLC ordinance. This report recommends constructing the sewer connections at the same time as mainline construction. This would be accomplished with two construction contracts. The sewer main contractor would install the sewer main and service connections up to the ROW/property line. The service connection contractor would install the individual service lines from the ROW/property line to connect to the house sewer prior to the septic tank.

2. Land Requirements for Easements: As identified in Chapter 4, Section 5 – Land Requirements, easements on private property are required for sewer line construction. Discussions with the affected property owners should begin as soon as possible to confirm approval of the proposed sewer alignment. Additionally, permitting

requirements have been identified for encroachments on MDT and Patriot Railroad property. Permit applications should be prepared and submitted as soon as possible.

3. Sewer Rate Increases: The SRF loan method of funding the West Valley Phase 1 sewer extension in 2013 requires that sewer rates be raised in time to be included on the 2013 property tax notices. This will require ADLC approval of the sewer rate increase no later than July or August of 2013. The additional O&M costs due to the recommended operating changes also require a rate increase. And finally, the numerous capital improvements projects, both small and large, will not be possible without increasing sewer rates.

Items that have the potential to delay or prevent the West Valley Phase 2 Sewer Extension project from going forward are listed below.

4. WWTP Influent and Effluent Monitoring: This is very important to the understanding of the treatment plant operating capacity and efficiency. Limited monitoring has been conducted. Monitoring through the upcoming winter, spring and summer months will be needed in order to confirm that existing WWTP operating practices are effective in providing treatment and that the WWTP has the capacity to treat additional wastewater from West Valley Phase 2.
5. Ground Water Monitoring and MGWPCS Permit: Ground water monitoring is a requirement of the DEQ in order to evaluate the impacts from the HIP facility. The first round of monitoring in support of the MGWPCS permit application is scheduled for November 2012, with at least two more quarterly monitoring events to follow in February and May of 2013. Continued quarterly monitoring is expected to be a condition of the MGWPCS permit. Pending the monitoring results and discharge permit limits, changes may be required at the HIP facility in the form of additional storage and infiltration capacity as well as operating changes as described under the following Item 6.
6. HIP Facility Wet/Dry Cycle Operation: The DEQ has requested that current operating practices be evaluated for impacts to groundwater. This report recommends an initial one-year evaluation period. If impacts are indicated, switching to an alternating wet/dry cycle operating method will be required followed by a storage and infiltration capacity evaluation. The capacity analysis in this report relied on the measurement of a single IP cell wet cycle. Switching to alternating wet/dry cycle operation will allow for determination of a long term, reliable percolation rate. Monitoring of wet/dry cycle operation through the winter months will be important to see if there will be any wintertime operating problems. This information is needed to confirm that the HIP facility has capacity for West Valley Phase 2 wastewater. Additional infiltration and/or wintertime storage capacity may be needed as described in chapters 3 and 5.

Resolution of the following issues is required in order to have a clear understanding of overall system capacity

7. Effluent Irrigation Agreement: DEQ standards require that a 20-year lease or similar assurance must be negotiated in order to ensure control of irrigated land. The original, DEQ approved 20-year lease agreement expired in the summer of 2011 and the DEQ has indicated that the agreement needs to be renewed as soon as possible to assure continuance of the irrigation practices. This report recommends renewal of the original agreement prior to the 2013 irrigation season. Anaconda-Deer Lodge County and Ueland Ranches have both indicated their desire to renew the lease agreement and renewal efforts are currently underway.
8. Effluent Irrigation Buffer Zones: The DEQ has requested resolution of this issue, which is directly related to the capacity of the irrigation system. Ueland Ranches should be consulted to determine the feasibility of various buffer zone widths, and a buffer zone proposal should be submitted to the DEQ as soon as possible. This issue relates directly to the irrigation system having adequate capacity to handle current Anaconda wastewater volumes as well as additional wastewater from West Valley.
9. Effluent Irrigation Surface Water: The DEQ has indicated that spray irrigation of effluent into the Gardner ditch must be discontinued. Resolution of this issue could significantly reduce irrigation capacity should the irrigation system need to be modified to avoid the ditch. Rather than changing the irrigation coverage, an alternative considered by this report is to route the irrigation ditch through a pipeline to eliminate spraying of effluent directly into the ditch. This is a costly option and Ueland Ranches should be consulted to determine the feasibility of routing the irrigation ditch through a pipeline. This issue relates directly to the irrigation system having adequate capacity to handle current Anaconda wastewater volumes as well as additional wastewater from West Valley Phase.

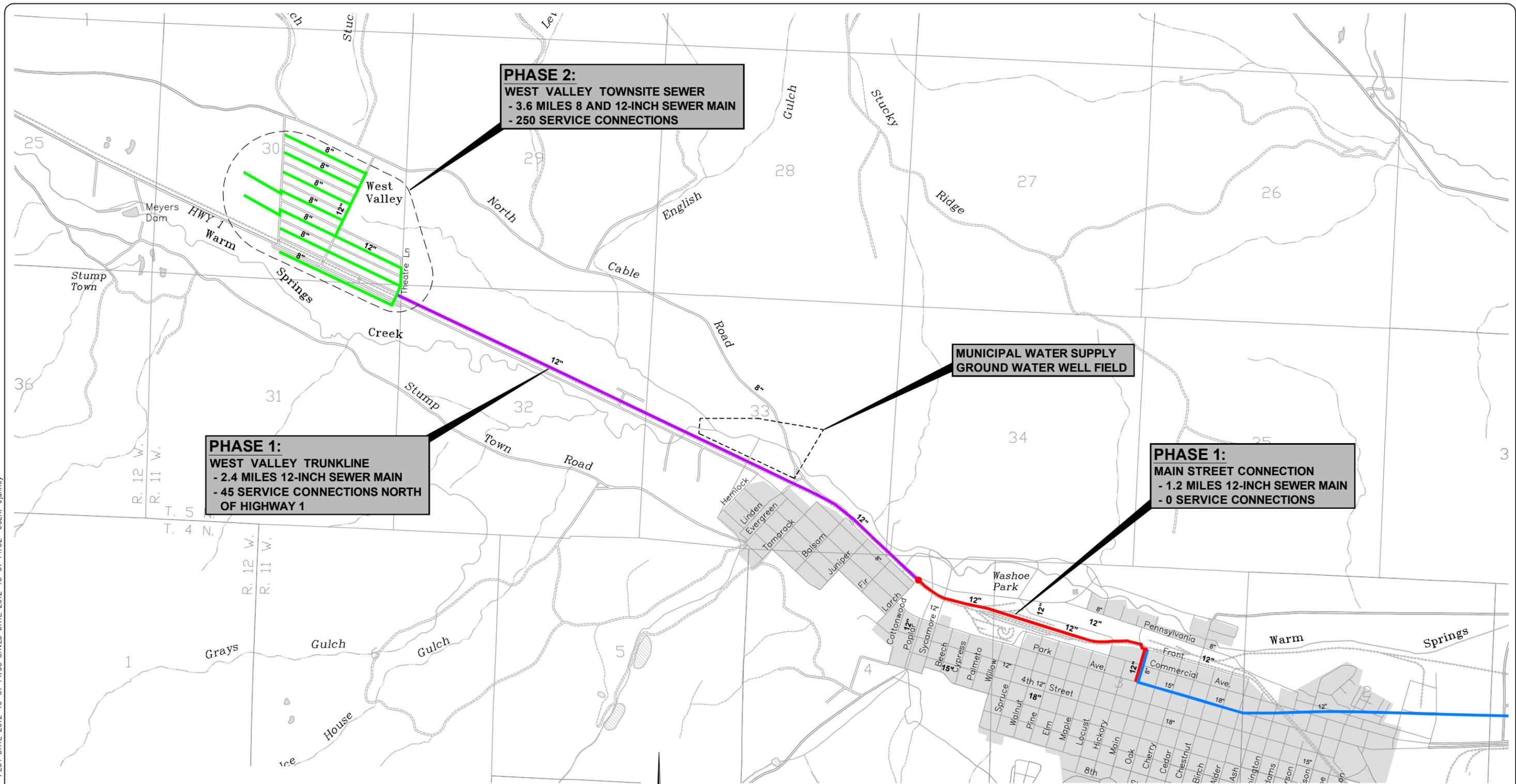
The above items may be resolved quickly and favorably, at low cost, but resolution may also involve significant costs. Concerning item 6 above, upgrades to the HIP facility to meet current DEQ regulations, plus additional wintertime storage, if needed, are estimated to cost \$3.5 million. Resolution of these items, while critical to understanding capital improvement and funding needs, is ultimately dependent on the MGWPCS permit anticipated to be issued by the DEQ in the second quarter of 2014.

G. Recommendations

The following steps are recommended whether or not the West Valley sewer extension project is further pursued.

1. Measure sludge depths in the lagoons and plan for sludge removal and disposal if necessary.
2. Renew the expired irrigation agreement with Ueland Ranches.
3. Resolve the irrigation system buffer zone issue.
4. Resolve the irrigation system surface water issue.
5. Prepare and comply with an O&M Manual for the irrigation system.
6. Increase sewer rates as necessary to cover increased operating costs and to fund a reserve fund for needed capital improvements.
7. Conduct a sewer rehabilitation and replacement study and follow the study recommendations for rehab/replacement of old sewer mains.

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PHASE 2:
WEST VALLEY TOWNSITE SEWER
 - 3.6 MILES 8 AND 12-INCH SEWER MAIN
 - 250 SERVICE CONNECTIONS

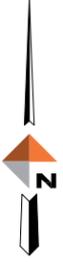
PHASE 1:
WEST VALLEY TRUNKLINE
 - 2.4 MILES 12-INCH SEWER MAIN
 - 45 SERVICE CONNECTIONS NORTH OF HIGHWAY 1

MUNICIPAL WATER SUPPLY
GROUND WATER WELL FIELD

PHASE 1:
MAIN STREET CONNECTION
 - 1.2 MILES 12-INCH SEWER MAIN
 - 0 SERVICE CONNECTIONS

LEGEND:

- = Existing Sanitary Sewer Trunk Line
- = Phase 1 - Proposed West Vally Trunk Line Sewer
- = Phase 1 - Proposed Main Street Connection
- = Phase 2 - Proposed West Valley Townsite Sewer



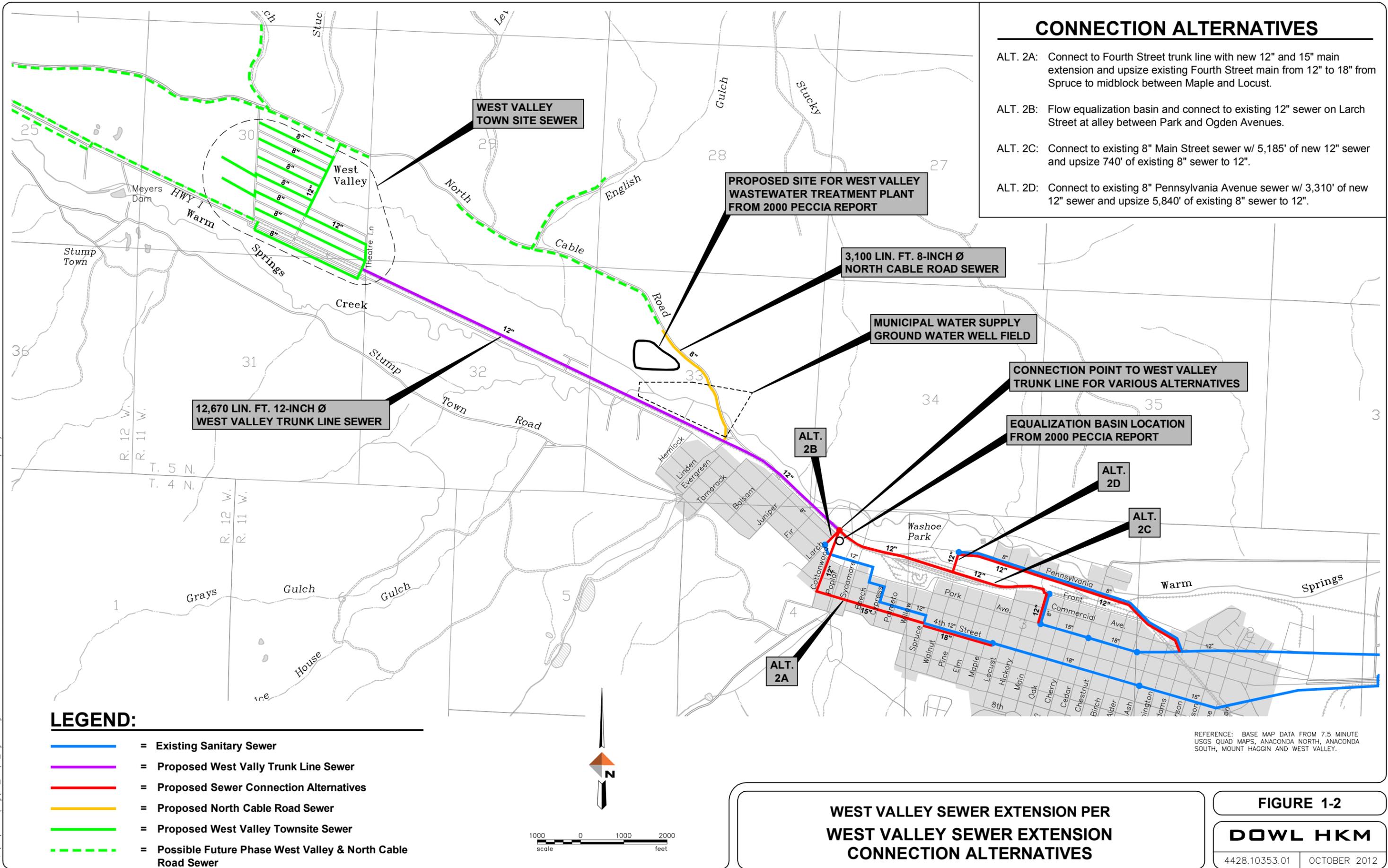
REFERENCE: BASE MAP DATA FROM 7.5 MINUTE USGS QUAD MAPS, ANACONDA NORTH, ANACONDA SOUTH, MOUNT HAGGIN AND WEST VALLEY.

WEST VALLEY SEWER EXTENSION PER WEST VALLEY SEWER EXTENSION PREFERRED ALTERNATIVE

FIGURE 1-1
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 4428.10353.01 | OCTOBER 2012

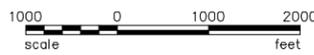
CONNECTION ALTERNATIVES

- ALT. 2A: Connect to Fourth Street trunk line with new 12" and 15" main extension and upsize existing Fourth Street main from 12" to 18" from Spruce to midblock between Maple and Locust.
- ALT. 2B: Flow equalization basin and connect to existing 12" sewer on Larch Street at alley between Park and Ogden Avenues.
- ALT. 2C: Connect to existing 8" Main Street sewer w/ 5,185' of new 12" sewer and upsize 740' of existing 8" sewer to 12".
- ALT. 2D: Connect to existing 8" Pennsylvania Avenue sewer w/ 3,310' of new 12" sewer and upsize 5,840' of existing 8" sewer to 12".



LEGEND:

- = Existing Sanitary Sewer
- = Proposed West Vally Trunk Line Sewer
- = Proposed Sewer Connection Alternatives
- = Proposed North Cable Road Sewer
- = Proposed West Valley Townsite Sewer
- - - = Possible Future Phase West Valley & North Cable Road Sewer



WEST VALLEY SEWER EXTENSION PER WEST VALLEY SEWER EXTENSION CONNECTION ALTERNATIVES

FIGURE 1-2

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4428.10353.01 | OCTOBER 2012