The City of Ione requires treatment and disposal facilities to provide wastewater services to the community. These facilities should be planned and built in phases to allow the City to provide these services as growth occurs. Based on flow projections discussed in Section 4, a total treatment and disposal capacity of 1.6 MGD will be needed by 2030 for ADWF condition. The construction of these facilities should be organized such that each construction phase allows for standardization and sizing of equipment and processes. Therefore, the Master Plan proposes two construction phases for wastewater treatment each sized at 0.8 MGD for at total of 1.6 MGD. The Master Plan also proposes a first phase of construction of additional disposal of treated wastewater sized at 0.8 MGD. Descriptions of the proposed phased expansion scenarios are summarized below.

5.1 PHASE I EXPANSION – 0.8 MGD

The first expansion would involve expanding the existing treatment system or constructing a new treatment and disposal system that provides a capacity of 0.8 MGD. This system would accommodate the City of Ione's near-term growth, and would, at a minimum, be sufficient to meet the City's wastewater treatment needs until about 2016-2017. The City would not be able to accommodate any new connections or additional wastewater flows until Phase 1 is constructed. Similarly, the City would not be able to accommodate any connections or additional wastewater flows in excess of 0.8 MGD until Phase 2 is completed. These expansions may be required prior to or later than the approximate dates identified herein, depending on actual growth.

TREATMENT FACILITIES

The existing secondary treatment system involves the use of four aerated treatment ponds (Ponds 1 through 4) and associated operational and non operational facilities and equipment. The treatment system is both outdated and insufficient in size to meet the City's future needs. Therefore, this Master Plan recommends replacement of the aerated treatment pond system with a nutrient removal activated sludge and tertiary treatment system.

The majority of the new treatment system would be constructed immediately south of the existing treatment ponds on the property of the existing secondary WWTP. These facilities would be built outside the boundary of the existing treatment system and would be designed and constructed in a manner which does not interrupt the operation of the existing treatment plant.

At a minimum, the new system would consist of a headworks facility, activated sludge treatment system, biosolids management system, tertiary treatment system, and miscellaneous facilities. A brief description of each is discussed in the following paragraphs.

Headworks Facility

The new headworks facility consisting of a wet well containing multiple submersible influent pumps would collect the City's wastewater. Additional equipment at the headworks would include a screening and washer unit(s), and grit removal and washing system. The screening and grit handling equipment, including disposal containers will be housed in an above ground building. To minimize odors from the screening and grit handling systems, the above ground building will include an odor control system.

Activated Sludge System

The activated sludge system would consist of single or multiple tanks constructed of concrete below ground or partially below ground. This aerobic system would be designed to maintain low dissolved oxygen content and to provide both biological treatment and nutrient removal in the anoxic zones. The rate of flow and aeration would be controlled by an automated system. Monitoring of the dissolved oxygen content will also be automated

A clarifier or decant system will be utilized to separate solids (activated sludge) from the treated effluent. Accumulated solids will be controlled by sending waste activated sludge to the biosolids management system.

Biosolids Management System

The biosolids management system would consist of multiple aerobic digester tanks for digestion and storage of waste activated sludge. The tanks would be constructed of concrete and built below ground or partially below ground. The aerobic digesters would break down and digest the solids generated from the activated sludge system. The sludge produced by this process would then be thickened and dewatered mechanically using a rotary drum thickener, screw press, belt press, or centrifuge and temporarily stored onsite before hauling off site. Dewatering equipment and biosolids storage will be contained in a building. Odor control would be provided for the building.

Tertiary Treatment System

The City is considering two options for the tertiary treatment of wastewater. The first option involves constructing the tertiary treatment system in the same location as the new activated sludge system described above. The second option is to expand the existing City tertiary WWTP, located on the north side of Sutter Creek.

There are potential technical difficulties expanding the existing tertiary treatment plant to meet the Phase II capacity (1.6 MGD plus current capacity of 1.2 MGD). In addition, the City desires to centralize all the new facilities, and leaving the existing tertiary plant available for future expansion provides the City the ability to expand tertiary treatment capacity for water reclamation of water supplied by other agencies such as ARSA. Therefore, it is probable that the tertiary treatment facility would be located adjacent to the new activated sludge system for easier integration. This is the option currently preferred by the City, but no final decision has been determined.

The new tertiary treatment system would consist of filtration and disinfection. The filter system will reduce wastewater turbidity and chemical or ultraviolet radiation (UV) disinfection will destroy any remaining bacteria. The resulting tertiary treated effluent will meet all California Title 22 reuse requirements.

Miscellaneous Facilities

A modern treatment system requires a number of support systems and miscellaneous facilities, such as housing for operations staff and maintenance equipment, laboratory, plant water pumping facilities, area drain pump station, yard piping, utilities, electrical and control systems, emergency power generation and landscaping. These facilities can be contained in a single building or housed in multiple structures. Special consideration during design should be given to

the arrangement of these facilities and planning for the Phase II expansion. For example, electrical service and emergency power generation might be sized for the Phase II expansion.

Construction of a pump station and pipeline would be required to pump from the new treatment facilities to the Castle Oaks Golf Course. The pump station would consist of a wetwell containing multiple vertical turbine pumps designed to work in tandem with the existing effluent pumps located at the tertiary treatment plant. The new pipeline would be approximately 10 to 12 inches in diameter and accommodate flow up to 3.0 MGD. Crossing of Sutter Creek would occur on the underside of the bridge. With the exception of the bridge crossing, the new pipeline would be constructed underground and located entirely within City owned land or County roadway right-of-ways.

DISPOSAL FACILITIES

Existing percolation ponds 5, 6, and 7 do not have adequate capacity to meet the Phase I requirement of 0.8 MGD. Therefore, this Master Plan recommends construction of Pond 8. This pond would function similar to existing Ponds 5 through 7 and would be located to the south of Ponds 1 through 4 and west of Pond 7. Pond 8 would be approximately 365 feet by 730 feet in size, with a maximum depth of 10 feet and a maximum water depth of 8 feet in order to maintain a minimum 2 feet of freeboard. Once Pond 8 is constructed and operational, the City would have a disposal capacity of approximately 0.9 MGD. Pond 8 would tie into the existing disposal facilities (Ponds 5 through 7), through an approximately 150 foot long, 12-inch diameter pipeline connecting Pond 7 to Pond 8. This pipeline already exists, and was constructed in 2001 at the same time as Pond 7 in anticipation of the future construction of Pond 8.

Pond 8 would be constructed using a combination of excavated soils and imported soils to create berms that surround and enclose the pond. All water received would be tertiary effluent.

5.2 PHASE II EXPANSION – 1.6 MGD

A second expansion is anticipated to be required to meet future wastewater service obligations. This expansion might be required as early as 2016-2017 but depends upon the rate of development in the City of Ione. Due to the uncertainty of the City's growth, the economy, and regulations, details of any expansions beyond Phase I are not well defined and this Master Plan should be modified to accommodate such changes. However conceptual plans have been developed and are discussed in the following section. No planning level costs have been prepared for the Phase II expansion.

TREATMENT FACILITIES

Treatment facilities for the second expansion would be similar to the Phase I expansion. Essentially all Phase I treatment systems would be mirrored and built immediately adjacent to the Phase I facilities.

DISPOSAL FACILITIES

Additional effluent disposal will be required for the Phase II expansion. The City believes that disposal can be accomplished through expansion of water reclamation services to new customers, seasonal storage, and additional percolation ponds. The details of these disposal options are not well defined and are subject to change, but are briefly discussed below.

Additional planning will be required before implementation of the Phase II disposal systems and the City plans to develop a future Recycled Water Distribution System Master Plan.

Construction of Pond 9

This disposal option would involve the construction of Pond 9. The pond would be located north of Sutter Creek immediately west of the COWRP. Pond 9 would have the dimensions and operate similar to Pond 8 described above. Disposal capacity through percolation and evaporation of Pond 9 is anticipated to range from 0.3 to 0.5 MGD.

Water Reclamation at Charles Howard Park and Unimin Mine

Charles Howard Park and Unimin Mine have been identified by the City of Ione as potential end users of the City's Title 22 reclaimed wastewater. Since Charles Howard Park is owned and operated by the City of Ione, the City has full control of the park's irrigation needs. Unimin Mine, however, is a privately owned corporation, and the City has not yet reached an agreement with Unimin Mine that would allow the City to dispose of its Title 22 reclaimed water at the Unimin Mine property. In addition, Unimin Mine's water needs are currently being met by the AWA, which supplies raw water to Unimin Mine and a number of other water users in the Ione area. The AWA has indicated that it plans on terminating raw water service to the Ione area as soon as the year 2011, which would allow an opportunity for Ione to replace the raw water needs for Unimin Mine and other water users with the City's reclaimed water. However, should the AWA ultimately decide to not terminate its supply of raw water to Unimin Mine, then it is unlikely that the City will be able to negotiate a reclaimed water disposal contract with Unimin Mine. In addition, the mining operation operates under a permit from the RWQCB; therefore use of reclaimed wastewater would likely require revision to that permit.

Charles Howard Park uses approximately 50 acre-feet (16.3 million gallons) of water annually for irrigation purposes, predominantly during the drier, warmer months, with daily demands of 0.1 to 0.3 MGD. The park currently uses raw water supplied by AWA for this purpose.

Unimin Mine currently uses approximately 350 acre-feet (between 0.40 and 0.55 million gallons per day) of water annually in its mining operations. The mine currently uses raw water supplied by AWA to convey mineral slurries and wash-finished silica product. After use, the used raw water is captured into the various cache basins and ponds on the site and allowed to percolate naturally into the ground. Unlike other potential end users Unimin Mine operates year round, and thus the mine's need for water does not fluctuate with the seasons. This quality makes Unimin Mine a very desirable end user for the City of Ione's reclaimed wastewater, as the mine's year round operations would reduce the City's need to seasonally store wastewater during the wet winter months or to use percolation ponds for disposal.

Providing reclaimed water to these two end users would provide the City with a minimum of 0.40 MGD of disposal capacity during the wet winter months and up to 0.58 MGD of disposal capacity in the warm summer months.

In order to provide Charles Howard Park and Unimin Mine with Title 22 reclaimed wastewater, the City of Ione would need to construct pipelines to reach both of these potential end users. A total of six potential pipeline routes have been identified by the City. Ultimately, the chosen pipeline route will depend on factors such as right-of-way access, construction costs, and environmental impacts. All six pipeline routes identified thus far would require the cooperation of Caltrans and the County to allow construction of a new underground pipeline to be located

within a road or highway right-of-way. Shown in Figures 2.5-6 through 2.5-11 contained in the project EIR are the six pipeline routes.

Pipeline Route 1

The first pipeline route, EIR Figure 2.5-6 (Potential Pipeline Route #1), option would begin at the new treatment facility, and then continue south on Old Stockton Road then east along an existing dirt road that serves as a back entrance to the Unimin Mine property. From the Unimin Mine back gate, the route would continue generally southeast to the Unimin Mine raw water holding pond. From the water holding pond on the Unimin Mine site, the pipeline route would continue east and northeast within the main driveway entrance to Unimin Mine. At the intersection of the Unimin Mine driveway and SR 124, the pipeline route would continue north within the SR 124 right of way. The pipeline route would then travel east along the southern driveway entrance to Charles Howard Park and would follow this dirt roadway until reaching the irrigation water holding pond on the park site.

Pipeline Route 2

The second pipeline route, EIR Figure 2.5-7 (Potential Pipeline Route #2), option would begin at the facility, head south through the WWTP, and continue south through an agricultural field. This segment parallels the existing South Valley Trunk Line, one of the pipelines that deliver untreated effluent to the existing City's secondary WWTP. Where this segment intersects the Union Pacific Railroad right-of-way, the pipeline route would turn east and continue within the railroad right-of-way. Along the railroad right-of-way, an abandoned railroad spur branches off the main rail line. At this railroad spur, the pipeline would travel southwest along the spur right-of-way until connection to an existing roadway. The pipeline would then follow this roadway, where it would arrive at the back gate to the Unimin Mine property. From the back gate of the Unimin Mine property, pipeline route 2 would be identical to pipeline route 1.

Pipeline Route 3

The third pipeline route, EIR Figure 2.5-8 (Potential Pipeline Route #3), option would begin at the new treatment facility, head north through and travel east along West Marlette Street. The route would then turn south along an existing unnamed roadway, where it would intersect the Union Pacific Railroad right-of-way. The pipeline route would then travel west until reaching the railroad spur that heads southwest toward the Unimin Mine property. At this railroad spur, the pipeline route would be identical to pipeline route 2.

Pipeline Route 4

The fourth pipeline route, EIR Figure 2.5-9 (Potential Pipeline Route #4), option would begin the same way as pipeline route 2, but would continue traveling east for the entire length of West Marlette Street. At the terminus of West Marlette Street, the pipeline would travel north within the South Buena Vista Street right-of-way for one block, and then travel east on Market Street for one block. At the intersection of Market Street and Church Street/Highway 124, the pipeline would travel south in the Church Street/Highway 124 right-of-way.

At the intersection with the northern of the two entrance driveways into Charles Howard Park, the pipeline would split into two lines. The eastern line would travel up the Charles Howard Park driveway and then terminate in the irrigation water holding pond located near the southeast corner of the park site. The western line would continue south within the right-of-way for SR 124,

and then would continue west along the roadway entrance to the Unimin Mine property before terminating at the Unimin Mine raw water holding pond.

Pipeline Route 5

The fifth pipeline route, EIR Figure 2.5-10 (Potential Pipeline Route #5), option is nearly identical to pipeline route 4. The exception is the location of the split into the eastern and western pipelines that would access the park and the mine, respectively. Instead of splitting at the northern driveway entrance to the park, pipeline route 5 would split at the southern driveway entrance. The eastern pipeline would then travel east along the southern driveway to the irrigation water holding pond, while the western route would continue to Unimin Mine as described in pipeline route 4.

Pipeline Route 6

The first half of the sixth pipeline route , EIR Figure 2.5-11 (Potential Pipeline Route #6), option would be identical to pipeline route 4, traveling east on West Marlette Street, north on South Buena Vista Street, and then east on West Market Street. Instead of only going east for one block on West Market Street, pipeline route 6 would travel east for two blocks before continuing south and southeast on Foothill Blvd/SR 104.

Pipeline route 6 would travel south and southeast on SR. The proposed pipeline would intersect an existing 12-inch, raw water pipeline owned by Unimin Mine. The proposed pipeline would tie into this existing pipeline, which travels west and south through the Wildflower Subdivision and terminate in the irrigation water holding pond located near the southeast corner of the Charles Howard Park.

From the park's irrigation water holding pond, the proposed pipeline would travel west along the southern driveway entrance to Charles Howard Park. At the driveway intersection with SR 124, the pipeline route would then travel south within the SR 124 right-of-way, and then west along the main entrance to Unimin Mine before terminating at the Unimin Mine raw water holding pond.

Other Reclamation Locations

The City is also exploring the supply of reclaimed wastewater to the Preston Youth Facility, irrigation to open spaces and parks, cemeteries, recreation areas and agricultural/pastoral lands. Regardless of the end user, conveyance of the reclaimed wastewater would likely require construction of one or more new pipelines. The size and route of any new pipeline(s) would be dependent on the needs and location of the end user. Disposal capacity of these additional uses is also not known.

Preston Reservoir

The Preston Reservoir is located north of the Preston Youth Facility and east of the Mule Creek State Prison and is owned by the State of California. The Preston Reservoir has a storage capacity of 235 acre-feet and a percolation and evaporation capacity of approximately 163 acre-feet per year. The Preston Reservoir receives secondary treated effluent from the Mule Creek State Prison, ARSA and backwash water from the Preston Youth Facility Water Treatment Plant when in operation. ARSA also diverts some raw water from Sutter Creek to the reservoir each year in order to maintain water rights. The reservoir's entire storage capacity has been

allocated between these three users. Currently, no additional capacity is available for other users.

Storage capacity may be available at the Preston Reservoir in the future, particularly if ARSA terminates sending any of its wastewater to the Ione treatment and disposal system or the State no longer allows ARSA access to the lower system. Should capacity be available in the future, the City of Ione would have the opportunity to use Preston Reservoir for the storage of treated wastewater. The amount of storage capacity that could be available to the City is unknown at this time, and would require negotiations with the State of California.

The City would need to construct a pipeline to the Preston Reservoir in order to use the reservoir for wastewater storage. A pipeline route to the reservoir has not been identified at this time, but would likely involve the extension of the City's existing 10-inch diameter pipeline that currently carries tertiary effluent from the existing City's tertiary WWTP to the Castle Oaks Golf Course. In the event that the City is able to use Preston Reservoir for wastewater storage, the City could send tertiary effluent through this extended pipeline. The existing State-owned, 12-inch diameter pipeline that currently delivers ARSA secondary treated wastewater to the existing tertiary WWTP could potentially be used to bring stored wastewater back from the reservoir to the tertiary WWTP for retreatment, if required, and eventual disposal. Reuse of the pipeline would require negotiations with the State of California.

Ione Water Reservoir

The AWA owns the Ione Water Reservoir located approximately 0.25 miles east of the City of Ione. This reservoir has a capacity of approximately 27 acre-feet and is currently used by the AWA for the storage of raw water for the City of Ione. The AWA has stated its intention to terminate the supply of raw water to users in the City of Ione. If this termination occurs, the City could have the opportunity to take over the use of both the Ione Water Reservoir, as well as several of AWA's existing pipeline infrastructures. The City could then use a combination of new pipelines and AWA's existing pipelines to bring treated wastewater to and from the City's treatment facilities, while using the Ione Water Reservoir for seasonal or year-round storage of treated wastewater.

Other Water Reservoirs

No other existing storage reservoirs have been currently identified in the immediate area that could be used in the future for the City's wastewater storage needs. However, if the City determines that additional storage capacity beyond that identified in this Master Plan is required, the City may investigate the construction of one or more reservoirs to store reclaimed wastewater or use the use of an existing reservoir currently not identified. The size and location of such additional reservoirs is unknown at this time.

5.3 MASTER PLAN RECOMMENDED PROJECT – PHASE I AND PHASE II

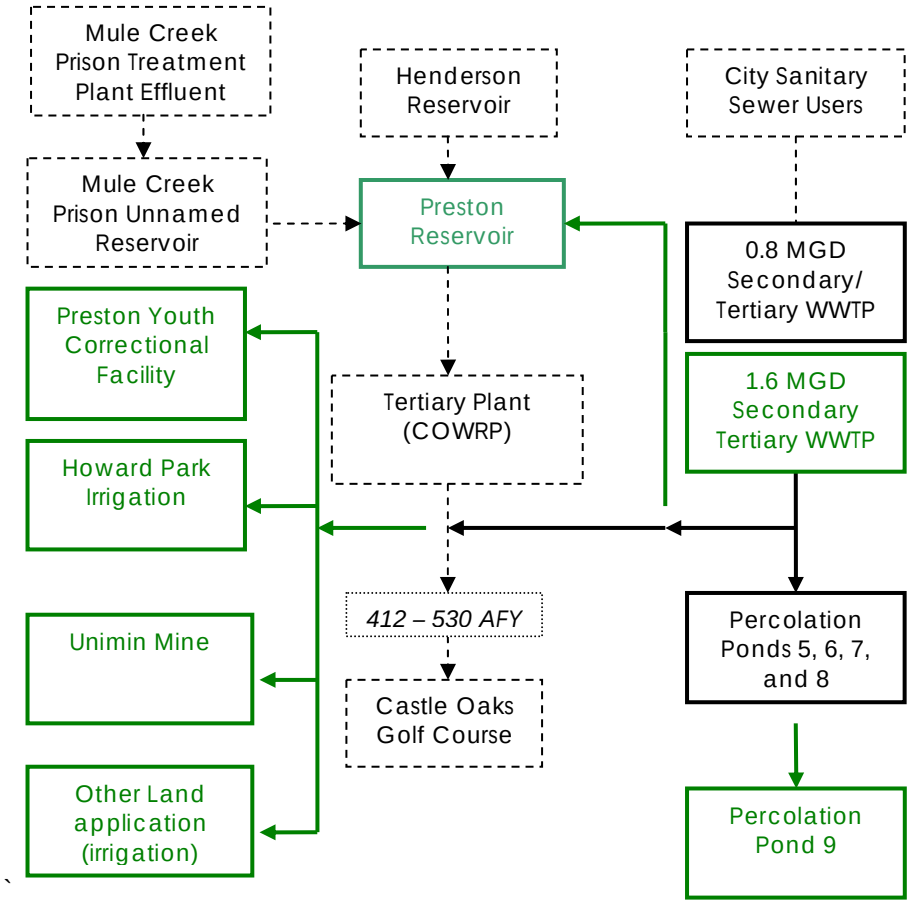
The City does not have need, ability, or adequate financial capacity to construct all treatment, disposal and storage facilities for the projected ultimate demand in 2030. Instead it is recommended that the facilities be constructed in phases in anticipation of growth. Due to the uncertainty of the City's growth and changes, details of any expansions beyond Phase I are not well defined and this Master Plan should be modified to accommodate such changes.

The first expansion (Phase I) would include additional treatment facilities similar to Phase I, as well as additional disposal capacity. A summary of the proposed Phase II recommendations is provided below and detailed discussions of each can be found in the previous paragraphs.

- Treatment facilities similar to Phase I
- Biosolids management system, including aerated sludge treatment system, a dewatering system, and dry solids storage and hauling site
- Miscellaneous facilities, including operations building, electrical building, emergency power generation system, and landscaping
- Tertiary treatment system, including filtration and disinfection
- Percolation Pond 8
- Pump station and pipeline that connects to the existing effluent line to the Castle Oaks Golf Course to allow tertiary effluent to be sent directly to the golf course from the new treatment facility

Figure 5.3-1 (Recommended Project Flow Diagram) shows the relationship of the new facilities to be built both in Phase I and Phase II to the existing treatment facilities. Potential future project elements (Phase II) are shown in green.

FIGURE 5.3-1: RECOMMENDED PROJECT FLOW DIAGRAM



PHASE I PLANNING LEVEL COST ESTIMATE

Planning level costs for the Phase I Expansion is shown in Table 5.3-1 (Phase I Project Planning Level Cost Estimate). Phase II costs are not defined. The costs presented in Table 5.3-1 (Phase I Project Planning Level Cost Estimate) anticipate construction of the new facilities by a Design-Build contract in 2010-2011 and do not include the cost of current planning efforts or administration costs by the City associated with the Design-Build contract. A breakdown of project element costs is contained in **Appendix 7.9**.

TABLE 5.3-1: PHASE I PROJECT PLANNING LEVEL COST ESTIMATE

Project Element	Description	Planning Level Cost	
		Minimum	Maximum
1	Construction of a new 0.8 MGD nutrient removal and tertiary treatment system, including influent pumps, screening equipment , grit removal, aerated sludge treatment system, dewatering system, dry solids storage, tertiary filtration, disinfection, operations building, maintenance yard, electrical building, emergency power generation system, and landscaping	$7,810,000	$10,160,000
2	Elimination of Ponds 1 through 4 and the filling of the northern edge of Ponds 5 and 6	$810,000	$1,050,000
3	Construction of a new effluent pump station and pipeline crossing Sutter Creek for connection to the existing City tertiary WWTP effluent pump station	$910,000	$1,150,000
4	Construction of Percolation Pond 8	$720,000	$930,000
Total Probable Project Cost		**$10,250,000**	**$13,320,000**