APPENDIX B

REDDING RANCHERIA CASINO WASTEWATER MANAGEMENT & DRINKING WATER FEASIBILITY STUDY

REDDING RANCHERIA CASINO

Wastewater Management and Drinking Water

FEASIBILITY STUDY

Prepared by:

COLEMAN ENGINEERING

Coleman Project #: ANES16-002

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- *Capital Improvement Plan, 2015-16 to 2020-21*, City of Redding
- *City of Redding Water Utility Master Plan Update 2016*, prepared by the City of Redding Public Works Department, Engineering Division
- *Custom Soil Resource Report for Shasta County Area, California, Shasta County, CA – Redding Rancheria*, by USDA/NRCS, dated April 17, 2017
- *Custom Soil Resource Report for Shasta County Area, California, Anderson Site – Redding Rancheria*, by USDA/NRCS, dated April 17, 2017
- *Preliminary Evaluation of Water and Wastewater Service Requirements*, Cowlitz Casino, by Olson Engineering, dated 12/22/05
- *Draft EIS*, Graton Rancheria Casino, by AES, dated February 2007
- *Water and Wastewater Technical Study*, Karuk Tribe Casino and Hotel Development, by Bray & Associates, dated July 3, 2013
- *North Fork Water and Wastewater Feasibility Study*, by HydroScience Engineers, dated June 2008
- *Thunder Valley Casino Expansion Project Water & Wastewater Feasibility Study*, by HydroScience Engineers, dated February 2008
- *Water & Wastewater Feasibility Study*, Wilton Rancheria, by Summit, dated June 10, 2015

1 Introduction

1.1 Background

Coleman Engineering was retained by Analytical Environmental Services (AES) to prepare a wastewater management and drinking water feasibility study for the Redding Rancheria Casino (Casino) Environmental Impact Statement (EIS). This study includes estimated projections of wastewater flow, drinking water demand, and discussions regarding key wastewater and water facilities and services for the alternatives evaluated in the EIS.

This study is a report on consideration of two sites along Interstate 5: A primary site adjacent to the City of Redding and an alternate site in the City of Anderson. For both sites, wastewater and water options include service from new and independent onsite facilities or from the local municipality (City of Redding for Alternatives A, B, C, and D or the City of Anderson for Alternative E). Alternative F entails the expansion of the existing Redding Rancheria Casino. Exhibit 1 shows the proposed Alternative site locations.

1. Primary Site, Alternatives A, B, C, and D: City of Redding area, Shasta County, California. This site is commonly referred to as the Strawberry Fields Site. The property lies just outside the present City limits between I-5 and the Sacramento River, south of South Bonnyview Road. Each Alternative varies in size and the services and amenities offered, which subsequently effects the wastewater flow and water demand.
2. Alternate Site, Alternative E: City of Anderson, Shasta County, California. The property lies inside the current City limits west of and adjacent to I-5 and north of North Street.
3. Expansion of Existing Casino, Alternative F: City of Redding area, Shasta County, California. The property lies adjacent to the current City limits south of Redding. The property is bordered by Highway 273 on the east and Clear Creek to the north. This Casino is already receiving utility services from the City of Redding.

1.2 Project Description

Six Alternatives are being considered, including five new development concepts and expansion of the existing Casino. Site plans for each of the Alternatives are provided in the EIS. Total proposed building and amenity areas (square footage) for each Alternative are summarized in Appendix A, Table 1.

1.3 Project Objectives

The purpose of this study is to evaluate the feasibility of wastewater and water utility systems to serve each of the proposed Alternatives. This study is not intended for purposes of design and construction. The objectives of this feasibility study include:

Sewer

- Estimate wastewater flows based on the proposed amenities and comparable facilities, including the existing Casino.
- Present an onsite wastewater treatment and disposal strategy and discuss key onsite wastewater collection and treatment facilities.
- Present an offsite wastewater service option from the City of Redding and the City of Anderson and discuss necessary infrastructure upgrades, including the need for improvements to off-site pumping facilities and collection pipelines.

Water

- Estimate drinking water demands based on the proposed amenities and comparable gaming facilities, including the existing Casino.
- Present an onsite drinking water supply strategy and discuss key onsite water distribution, storage, and treatment facilities.
- Present an offsite drinking water supply strategy from the City of Redding and the City of Anderson and discuss necessary infrastructure upgrades, including the need for improvements to onsite and off-site distribution pipelines.

2 Projected Water Demands and Sewer Flows

Design of casino water and wastewater systems are dependent on accurate flow projections. Water and wastewater unit flows from several similar casino development projects were researched and compared as a means of verifying assumptions and calculations for these specific development project alternatives. Other development projects that were used as references are listed on Page iv of this report. Using this research, specific wastewater unit flows were derived for use with the Alternatives in this report. Once the wastewater flows were determined, the estimated domestic water demands were then back-calculated using acceptable assumptions.

Unique to this report undertaking is that the existing Casino has water usage recorded by the City of Redding. Therefore, once the above calculations are made, Alternatives A-E domestic water projections will be compared to actual water usage from the existing Casino to validate assumptions used in the initial water projection calculations. Validation of the water projections will also validate wastewater projection assumptions.

Alternative F will simply use existing water usage information and project increased demand due to the proposed expansion project.

2.1 Wastewater Flow Calculation Approach and Projections

Average wastewater production for Alternatives A-E were estimated using the following approach:

1. Each Alternative was broken up into smaller specified “amenities” and each amenity was further broken up into smaller facility designated uses (units). The uses under each amenity describes things like what type of restaurants are proposed and the respective number of seats, the number of hotel rooms, square footage of facility areas including retail, number of gaming seats, etc. From these descriptions and using unit flows derived from similar gaming facilities, wastewater flows were estimated.

2. Casinos differ from other business establishments in the hours they are open, the type of services they provide, and occupancy. There is a typical pattern to the rate of occupancy for casinos. The occupancy or use of the casino typically varies depending on whether it is a weekday or weekend. On a normal seven-day week, occupancy and flows are usually the lowest during the weekdays of Monday through Friday and usually the highest on Saturday and Sunday.

   A casino is open 24 hours per day and the number of guests varies throughout the day. Based on researched flows at other similar casinos, there are times of the day when the casino has a lower or higher occupancy rate and these times are different, depending on whether it is during a weekday or a weekend. For example, during a typical weekday in the morning and early afternoon the casino has an occupancy rate of roughly 30 to 50 percent but starting in the late afternoon, and extending into the night, the casino may have a 50 to 70 percent occupancy rate.

   Estimated flows were based on a summation of flows for two 12-hour cycles, a 12-hour morning (a.m.) cycle and a 12-hour evening (p.m.) cycle. The rates of occupancy for daily 12-hour cycles changes dramatically depending on whether it is during a weekday or a weekend day. For all Alternatives, an average estimated wastewater flow is calculated using the weekday and weekend flows. The average is weighted based on five days of weekday plus two days of weekend flows.

3. Considerations have been made to account for casino heating and air conditioning systems which consume water for their normal operations. Water is required to make up for water lost in the exhaust air as well as blow down water required to flush the system periodically. Based on other comparable facilities, noted in the references section of the report, the floor area of the central plant/cooling tower operations is estimated to be 4.5% of the total building floor area, and unit water demand is estimated to be 3 gpd/sf.

Appendix C contains worksheets that illustrate the above approach for each Alternative using the derived unit flows and following the same rationale of estimating occupancy rate based on time of day and day of the week. Appendix A, Table 2 summarizes the estimated weekend peak flows and average day flows, by building use, for each Alternative from the wastewater flow projections worksheets.

Table 3 below is a summary of the projected wastewater flows.

Table 3: Estimated Wastewater Flow Projections – Alternative Summaries

	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F [a]
Average Day Demand (ADD)	200,300	166,200	190,700	69,300	194,100	49,000
Typical Weekend Demands Maximum Day	289,600	247,100	277,450	91,000	281,800	76,500 [b]
Calculated Maximum Day Factor	1.4	1.5	1.5	1.3	1.5	1.6
Calculated Peak Hour Flow (2.5 x Avg.)	500,750	415,500	476,750	173,250	485,250	122,500

Units: gallons per day (gpd)

[a] *5% less than metered drinking water usage from City of Redding (Year 2016)*

[b] *Summer months (June-September)*

2.2 Drinking Water Demand Projections

When determining the average day water demand from wastewater flows, similar gaming facilities suggest about a 5% difference between wastewater and water, meaning not all potable water ends up as wastewater for various reasons such as consumption, evaporation, and leakage. Water demand, therefore, is calculated by adding 5% to the estimated wastewater flow projections found in Appendix A, Table 2, to create the estimated average day, maximum day (weekend), and peak hour water demands for each Alternative as summarized in Table 4 below.

In addition, an estimate of irrigation water demand is also included and added to the total site demand. Based on review of the site plans, it was estimated that approximately 20% of the total developed site area would be irrigated to account for landscaping, parking lot trees, entry road features, etc. This irrigation demand was added to the Average Day Demand which was then peaked to determine Maximum Day Demand and Peak Hour Demand.

Alternative F water demands are derived directly from three years of metered water usage data obtained from the City of Redding for the existing Redding Rancheria Casino and Hotel. Refer to Appendix A, Table 5 for information regarding the existing Casino metered water usage. The year 2016 information is used because the summer demand essentially represents the average of the three years.

Table 4: Calculated Water Demand Projections – Alternative Summaries

	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F [a]
Average Day Demand (gpd)	210,400	174,600	200,300	72,800	203,800	51,600
Landscape Irrigation [b]	10,919	7,935	10,546	5,094	10,311	
Calculated Weekend Demands Maximum Day (gpd)	315,000	267,400	301,900	77,894	306,300	80,500 [c]
Calculated Maximum Day Factor	1.4	1.5	1.4	1.3	1.4	1.6
Calculated Peak Hour Flow (2.5 x Avg.) (gpm)	385	317	367	135	372	90

[a] *Metered drinking water usage from City of Redding (Year 2016)*
[b] *Estimated at average daily demand of 5,000 gpd/acre of landscaping.*
[c] *Summer months (June-September)*

The peaking factors calculated for the water usage compare very well with actual peaking factors observed in the City. Note that per the data provided by the City of

Redding, presented in Table 5 of Appendix A, the City observes Max Day and Peak Hour factors of 1.5 and 2.3 respectively. These actual factors compare well with the calculated average Max Day Factor of 1.4 and assumed Peak Hour Factor of 2.5.

The maximum day demand expressed in gallons per minute (gpm) was provided to be useful in sizing a water supply to the site such as a well or City connection.

2.3 Alternative F Wastewater and Water Projections

Alternative F projections are based entirely on the metered water usage obtained from the City of Redding. The year 2016 information is used because the summer demand (June through September) essentially represents the average of the three years. Future water demand was calculated by multiplying the future Casino size (151,571 sf) by the rates in Table 6. The increased anticipated demand was simply the unit rate times the new 10,000-sq. ft. addition. A 5% reduction was applied to the water demand to estimate the wastewater flows. Table 6 below summarizes the projections associated with Alternative F.

Table 6: Alternative F Water and Wastewater Projections

	Water Demand (gpd)		Sewer Flow (gpd)
Average Day	55,300	4,000 +/- increase	52,600
Weekend Peak	86,200	6,000 +/- increase	81,900
Peak Hour (x 2.5)	138,300		131,500

Units: gpd

Because the relative increase in land use for Alternative F is so small, the projected increases in water and wastewater demand is less than 8%.

2.4 Recycled Water Reuse

Based on past experience, comparison to similar casinos used as references (see Page iv), and industry standards, the recycling of disinfected tertiary reclaimed wastewater typically ranges between 20-40% of total wastewater flow depending on multiple factors including type and extent of landscaping. Because actual planting schedules and areas are not yet available, a universal reuse rate of 30% was used for all calculations in this study. This assumption is commensurate with the level of detail available and required at this stage of the feasibility study. During preliminary and final design stages, the recycled water reuse rate will be refined.

Reclamation has the dual advantage of reducing the net potable water demand and reducing wastewater disposal requirements. Treated wastewater that would normally require disposal can instead be used to reduce potable water demand and be applied for beneficial reuse such as landscape irrigation and toilet flushing. If utility services from the local cities are not available, and onsite systems are necessary, reuse should be considered. Recycled water use on tribal land would be regulated by USEPA.

3 Wastewater – Basis of Design

This section presents general development assumptions and wastewater design criteria for each of the casino development Alternatives. Wastewater from the proposed Alternatives will be collected via a gravity collection system and then either treated and disposed of onsite or conveyed to the local municipality's sewer collection system and wastewater treatment plant. There is currently no service agreement between the Casino and the Cities for sewer collection, treatment, and disposal for Alternatives A-E. However, the City of Redding is currently providing sewer service to the existing Casino. It is assumed herein that the City will be agreeable to continue sewer service for the Alternative F expansion project.

3.1 Regulatory Requirements

This section identifies some regulatory requirements applicable to the casino development alternatives with respect to proposed wastewater treatment and disposal methods identified in this report. Regulatory requirements differ depending on the method of treatment and disposal. As discussed above, under each alternative, there are several options for wastewater treatment and disposal that would involve either the development of an on-site treatment and disposal system, or connection to municipal service providers.

Because the options for onsite systems will be on Tribal Lands ("Trust Land"), the primary regulatory agency will be the United States Environmental Protection Agency (USEPA). Options involving connection to the municipal service providers will be subject to state and local requirements.

The Regional Water Quality Control Board (RWQCB) does not have discretionary authority over actions on trust land, however, USEPA is expected to include the Redding office of the RWQCB in the development of any wastewater permitting in a consulting capacity. The local water quality goals and criteria which RWQCB is expected to recommend for implementation by USEPA are included in the Water Quality Control Plan for the Sacramento River Basin Plan.

Although USEPA is the regulatory agency on trust land, the Shasta County Sewage Disposal Standards, as amended through November 20, 2001, will be used as a basis of conceptual design of the onsite treatment and disposal options for this study. These standards are at least as restrictive as USEPA standards and they are tailored for local conditions. It is most likely that USEPA will utilize local design criteria as much as possible.

3.1.1 Surface Disposal

Wastewater land disposal options which would be subject to regulation include: spray application to a disposal field; irrigation of a crop grown on land; discharge to a percolation pond; or discharge to an evaporation pond. Land disposal on trust land is regulated by USEPA.

Typical disposal system design features required by regulation include:

- Tailwater and runoff control.
- Installation of ground water monitoring wells.

Typical discharge prohibitions include:

- No discharge of pollutants or wastes to surface waters are allowed.
- Bypass around, or overflow from, the treatment plant and spray disposal area of untreated or partially treated waste is not allowed.
- Resurfacing of wastewater percolating from the spray disposal field is not allowed.

Typical discharge specifications include:

- Wastewater spray drift from the WWTP or spray disposal field must not migrate out of the plant's property boundaries.
- All tail water and/or stormwater reaching the downgradient limit of the recycled water use areas must be collected and returned to the WWTP at all times when wastewater is being applied to the spray disposal field.
- The discharger must not irrigate with recycled water during periods of rainfall and/or runoff or for 24-hours before rainfall is predicted.
- The discharger must not irrigate with recycled water during periods of high winds.
- Public contact with wastewater must be precluded through such means as fences, signs, and/ or irrigation management practices (or other acceptable methods).
- Objectionable odors originating at this facility must not be perceivable beyond the boundary of the WWTP and disposal areas.
- A limited-access buffer must be maintained around the spray disposal field's wetted area.

3.1.2 Subsurface Disposal

Wastewater subsurface disposal options which would be subject to regulations include: conventional leach fields, engineered (specially-designed) leach fields, mound systems, and injection wells. Subsurface disposal on trust land is regulated under USEPA's Federal Underground Injection Control (UIC) Program. Subsurface disposal is classified as a Class V injection well under the UIC Program.

For reference only, a few key disposal criteria have been summarized below from the Shasta County Sewage Disposal Standards.

"Disposal area shall not include:

- Land subject to flooding.
- Land within 100-feet of any existing or proposed well site for the parcel or any adjoining parcels.
- Land closer than 100-feet to an intermittent, seasonal, or perennial waterway.
- Land closer than 50-feet downhill from an irrigation ditch or canal.
- Land closer than 50-feet uphill from an existing or proposed cut.

"Disposal material characteristics. Usable disposal material has both the following characteristics:

- Percolation rates greater than 5 and less than 60 minutes per inch.
- Depth to seasonal high water table shall be at least 8-feet for…community disposal field.

"The leach line dimensions depend on the required capacity of the system. Disposal field construction criteria:

- Maximum length of each line: 100-feet
- Minimum bottom width of trench: 18-inches
- Minimum spacing of lines (edge to edge): 8-feet
- Maximum depth of earth cover over lines: 36-inches
- Maximum grade of lines: 4-in/100-feet
- Minimum grade of trench: Level
- Maximum grade of trench: 4-in/100-feet
- Minimum usable material below trench bottom: 12-inches
- Minimum filter material below trench bottom: 12-inches

- Minimum filter material over drain lines: 2-inches
- Maximum distance drain pipe to edge of trench: 18-inches
- All onsite sewage disposal systems shall be designed so that additional subsurface disposal fields, equivalent to at least 100% of the required area of the original system, may be installed in the future.
- The site of the initial and replacement disposal fields shall not be covered by asphalt or concrete or subject to vehicular traffic or other activity which would adversely affect the soil.
- Other 'specially-designed' systems may be acceptable and approved by the County that may be applicable and may reduce the leach field area."

3.2 Wastewater Characteristics

Most of the wastewater generated from the alternative development scenarios will be from the patrons who visit the proposed entertainment, hotel and retail facilities. Other wastewater flows will be generated from kitchens and other service areas integrated into the development. In short, the composition of wastewater will be typical of untreated domestic wastewater but with a higher grease content. Passive or active grease interceptors are likely to be required from the cities and onsite treatment processes. Table 7 below lists typical textbook ranges for the composition of untreated domestic wastewater.

Table 7: Typical Composition of Untreated Domestic Wastewater [a]

Contaminants	Unit	Range	Typical
Total Solids (TS)	mg/L	350 - 1200	700
Total Dissolved Solids (TDS)	mg/L	250 - 850	500
Total Suspended Solids (TSS)	mg/L	100 - 350	220
Biological Oxygen Demand (BOD5)	mg/L	110 - 400	220
Total Organic Carbon (TOC)	mg/L	80 - 290	160
Total Nitrogen	mg/L	20 - 85	40
Total Phosphorus	mg/L	4 - 15	8
Oils and Grease	mg/L	50 - 150	100
Volatile Organic Compounds (VOCs)	µg/L	<100 – >400	100-400

[a] (Ref: *Wastewater Engineering*, Metcalf & Eddy, Third Edition, Table 3-16 Typical composition of untreated domestic wastewater)

3.3 Onsite Option: Wastewater Management

If conveyance to and treatment at a municipal treatment plant is not possible, wastewater could be treated and disposed of onsite. This section discusses the onsite wastewater treatment and disposal option design considerations.

3.3.1 Wastewater Collection

It is recommended to use City of Redding Public Works Department, Sanitary Sewer Construction Criteria. Acceptable pipe materials for wastewater mains (8-to 12-inches) and trunk lines (15- to 30-inches) are PVC solid wall SDR 26 per ASTM D-3034 and PVC solid wall pipe (C900).

A sewer lift station will be required to lift the wastewater from the development site to an onsite treatment plant.

3.3.2 Wastewater Treatment and Disposal

Methods of onsite disposal systems considered in this report include land disposal (spray fields or overland flow irrigation), and subsurface disposal (seepage pits or leaching trenches).

The means of effluent disposal and/or water reuse will determine the level of treatment required. For example, spray fields and subsurface disposal require only primary non-disinfected effluent, quality which can be achieved from a typical facultative treatment pond.

Due to aesthetic and potential odor issues, a sewer treatment pond will not be considered further. This method of wastewater treatment is incompatible with the anticipated site development and uses. In order to provide the Casino with the greatest flexibility, produce high quality effluent, and reduce the wastewater treatment plant (WWTP) footprint, a membrane bioreactor (MBR) treatment is recommended. The MBR treatment facility will be located by the architect to be minimally impactful to the aesthetics of the site. Typically, the water and wastewater facilities and equipment can be combined into a single yard and located behind the structures so that they are not noticeable to casino visitors.

The following are a few additional design criteria of an onsite wastewater system:

Surface Disposal (Land Application) – Agronomic Rates

No onsite soil explorations and crop type research were done at either site to determine site specific design parameters for nutrient uptake and assimilation and water absorption. Design of any onsite land disposal system will require actual onsite explorations and soil and crop classifications. The primary factors for calculating the land area required for disposal can be:

- Nutrient loading, specifically nitrogen. The total nitrogen mass loading to Land Application Areas (LAAs) shall not exceed the agronomic rate for the crop grown
- Hydraulic loading, depending on the volume of water needed to be discharged
- Other constituent loading, like sodium and chloride

"Agronomic rate" is defined as the land application of irrigation water and nutrients (which may include process wastewater) at rates of application necessary to satisfy the plants' evapotranspiration requirements and in accordance with a plan for nutrient management that will enhance soil productivity and provide the crop with needed nutrients for optimum health and growth.

Application rates higher than the agronomic rate may lead to runoff or the accumulation of nutrients (nitrates and phosphates) and organic chemicals in the soil, which could then be flushed by winter rains into the groundwater.

For the proposed land application, a hydraulic loading of 0.2 gpd/ft^2 was assumed for use in primary sizing. This hydraulic loading rate was selected based on professional experience and based on the descriptions of the site soils in the Custom Soil Resource Reports prepared for both the Redding Site and the Anderson Site. The actual absorption rate will need to be determined by field-testing.

Seasonal Storage for Surface Disposal (Land Application)

A typical growing season is about 183 days (mid-May to mid-October). Therefore, winter storage, typically in the form of an earth pond, would need to be constructed in order to store 182 days of average day wastewater effluent during the non-growing months. A storage pond may be unlined if the water entering it has been treated. A pond should be sized to also accommodate rainfall accumulation during the winter months. The regulatory requirements for the operation of seasonal storage ponds are typically minor relative to other wastewater disposal facilities.

Subsurface Disposal – Soil / Subsurface Application Rates

No onsite soil and subsurface explorations were done to obtain percolation rates and other parameters necessary to fully evaluate and consider this disposal option in detail. Design of any onsite subsurface disposal system will require actual site specific explorations and soil classifications. Percolation tests will be required and possibly groundwater monitoring for design.

For purposes of this feasibility study, SCS Soils Maps and Surveys, NRCS Custom Soil Resource Report, and City GIS maps were reviewed. Said sources classified the majority of the Redding site as "Reiff fine sandy loam," "Riverwash," and "Tujunga loamy sand" and the majority of the Anderson site as "Wet alluvial land" and "Reiff loam."

For the proposed leach fields, a hydraulic loading of 0.45 gpd/ft^2 was selected for primary sizing. This hydraulic loading rate was selected based on professional experience and based on the descriptions of the site soils in the Custom Soil Resource Reports prepared by the Natural Resources Conservation Service for both the Redding Site and the Anderson Site. This percolation rate will need to be verified by site specific field-testing prior to detailed design of the sub-surface disposal systems.

Floodplain

FEMA maps indicate that a large portion of both the Redding and Anderson sites are in a floodplain. This is significant, keeping in mind that the Shasta County Sewage Disposal Standards that are used as design criteria for this feasibility level study state in part that subsurface disposal systems "shall not include land subject to flooding." However, spray irrigation disposal may include land in the floodplain. If the storage pond is located in the floodplain, levees could also be constructed around the pond to protect it from flood conditions, if required and necessary. However, there is adequate acreage on the site for a storage pond to be constructed outside the 100-year floodplain. During flooding conditions, land application would not be allowed. Floodplain considerations for the two sites include the following:

Redding (Primary Site)

- The study area contains 114.8 acres that are within the 100-year floodplain per a Draft Technical Memorandum from Mr. Paul Kirk, dated October 20, 2008 for the Strawberry Fields Floodplain Evaluation.
- Of the 232-acre site, approximately 111 acres is outside the 100-year floodplain (Zone X). The remaining 6.2 acres lie in Flood Zone AE.
- Appendix B, Exhibit 2A shows an approximate Alternative A development footprint and the floodplain for the site.
- There is a Churn Creek Floodway that may need to be addressed by piping or otherwise diverting potential flooding around the development so that water may continue to flow uninhibited to the river.

Anderson (Alternate Site)

- Of the 55-acre site, the floodplain encompasses over 80% of the proposed development site.
- Appendix B, Exhibit 2B shows an approximate Alternative E development footprint and the floodplain for the site.

3.4 Off-Site Option: City Provided Sewer Services

Both the City of Redding and City of Anderson provide collection/transmission, treatment, and disposal of wastewater for their residents and commercial, industrial, and institutional customers. City services are readily available to both sites. From initial dialogue, both Cities have expressed interest in serving the Casino.

3.4.1 City of Redding Wastewater Design Criteria

New Site – Alternatives A-D

According to City personnel and GIS maps, a 30-inch vitrified clay pipe (VCP) and the Sunnyhill Lift Station exists less than 300-feet from the northern property boundary (refer to Appendix B, Exhibit 3). According to the City of Redding 2012 Wastewater Utility Master Plan, the capacity of the Sunnyhill Sewer Lift Station exceeds the projected buildout flows by 4.12 MGD. Therefore, there is ample capacity for the lift station to provide services for any of the development alternatives, none of which are projected to exceed a sewer flow of 0.2 MGD from the Casino site.

With the exception of West Side Interceptor Phase III (which is programmed in the City's Capital Improvement Plan for construction completion in 2018) the existing collection system downstream of the Sunnyhill Lift Station has adequate capacity as well. After completion of the interceptor, the City reports that the system will have capacity to serve the casino site.

A new Casino onsite sewer lift station will be required to convey the Casino's wastewater from Alternatives A-D under the existing Anderson Cottonwood Irrigation District canal to the Sunnyhill Lift Station.

City of Redding Public Works Department, Sanitary Sewer Construction Criteria will be required.

The City currently operates two wastewater treatment plants, both of which are considered tertiary treatment facilities. Wastewater from this development would be treated at the Clear Creek Wastewater Treatment Plant (CCWWTP). The City has indicated that there is adequate capacity in the CCWWTP to accept the Casino wastewater.

<u>Existing Site Expansion – Alternative F</u>

There are no unique design criteria that are applicable to the expansion project. If the existing site were expanded as programmed in Alternative F, it is assumed that some minor upsizing of existing facilities may be required. This will be determined during design once details of existing on-site systems and equipment are available. The City has indicated that it has the capacity to convey, treat, and dispose of increased volumes of wastewater as anticipated by Alternative F.

3.4.2 City of Anderson Wastewater Design Criteria

According to City of Anderson staff and from maps provided by the City, an existing 21-inch sewer trunk line parallels Tormey Drain which bisects the proposed development property (refer to Appendix B, Exhibit 4). Dave Durette, City Engineer at the City of Anderson, there is capacity in the 21-inch trunk line to accept the Casino's wastewater flow. Mr. Durette also reports that the existing 2.0 MGD WWTP also has sufficient capacity.

Mr. Durette specifically reported that the 2007 Sewer Master Plan was his source for making this determination. No specific capacity study or modeling effort was completed as part of this study or by Mr. Durette.

The existing sewer pipe is 9.5-feet deep. Because there are no sub-surface structures such as basements, this depth will be sufficient to allow for gravity sewer flow from the site and to avoid a lift station to serve the new Alternative E development.

The City of Anderson uses the City of Redding Public Works Department, Sanitary Sewer Construction Criteria.

4 Drinking Water – Basis of Design

This section presents general development assumptions and water utility design criteria for the Alternatives. There is currently no service agreement between the Casino and the Cities for water supply for Alternatives A-E. However, the City of Redding is currently providing water service to the existing Casino. It is assumed herein that the City will be agreeable to continue water service for the Alternative F expansion project.

As documented in Table 4, the new water supply source needs to provide a flow between 50 and 176 gpm depending on the development alternative that is selected. A well would need to provide the maximum day flow which would be combined with an on-site water storage tank to provide local fire flow. If a connection is made to the City water system, City storage could provide the required fire protection and piped connections would need to be sized to accommodate fire flows during a max day demand condition.

4.1 Regulatory Requirements

This section identifies key regulatory requirements applicable for the Alternatives with respect to the proposed water supply. Because the proposed system is on Tribal lands ("trust land"), the primary regulatory agency would be the USEPA.

4.1.1 On-Site Public Water System

The development of a drinking water system using onsite wells would be classified as a public water system under the Safe Drinking Water Act (SDWA). A public water system is defined as any entity serving water for the purposes of human consumption to 15 or more active service connections or 25 or more people at least 60 days out of the year. More specifically, the drinking water system for the Casino would be classified as a Non-Transient/Non-Community (NTNC) public water system under the SDWA because it is not a community water system and it will regularly serve at least the same 25 persons over 6 months per year.

Baseline monitoring will be submitted to the USEPA before a new well goes online and the public begins to use the water. Similar facilities have requirements for monthly coliform testing, quarterly lead and copper testing, and other laboratory testing that must be conducted annually. Monitoring requirements for a new public water systems serving the proposed Casino will likely be similar, but will be determined by the USEPA based on the size of the facility, the anticipated population using the facility, and other factors specific to the project.

4.1.2 Source Water Protection Plan

The USEPA's Ground Water Office supports Tribes in their efforts to develop and implement a Source Water Protection (SWP) Program. Source water is untreated water from streams, rivers, lakes, or underground aquifers which supplies groundwater wells used for public drinking water.

The SWP Program outlines a comprehensive plan to achieve maximum public health protection. According to the plan, it is essential that every water user take the following six steps:

1. Delineate the source water protection area (SWPA)
2. Inventory known and potential sources of contamination
3. Determine the susceptibility of the Public Water System (PWS) to contaminant sources or activities within the SWPA
4. Notify the public about threats identified in the contaminant source inventory and what they mean to the public water system
5. Implement management measures to prevent, reduce, or eliminate risks to the drinking water supply
6. Develop contingency planning strategies that address water supply contamination or service interruption emergencies

4.2 Onsite Option: Drinking Water System

4.2.1 Water Supply and Quality

There are two possible options for on-site water supply: groundwater (well) or river intake and treatment.

<u>Groundwater Well</u>

There was no test well drilled or groundwater sampling on the project sites as part of this study. Research and exploration by drilling a test well will be required to finalize the production well details and to document groundwater quality. From research and discussions with the Cities, there should be ample groundwater supply for the Casino at either new location but there could be arsenic and/or manganese at levels requiring some form of treatment.

The Redding Groundwater Basin (RGWB) is the local groundwater source covering a large area, including the Cities of Redding and Anderson. From City of Redding documents, it appears groundwater from the RGWB will be a reliable water source. The City of Redding has wells of varying water quality in two areas within the RGWB: Enterprise in the southeast of the City and Cascade in the south-central area of the City (refer to Appendix B, Exhibit 5).

The following excerpt from the City of Redding Urban Water Management Plan is helpful to gaining an understanding of the groundwater in the vicinity of the Redding site.

> "The Redding Groundwater Basin (RGWB)…provided the City with approximately 7,500-10,000-acre-feet of water per year…through sixteen wells…. The wells range in depth from 170-feet to 600-feet…"
>
> "The RGWB is not an adjudicated basin. As the basin is not in overdraft, no legal pumping limit has been set—therefore, no overdraft mitigation efforts are currently underway. Though no safe yield has been established for the RGWB, groundwater modeling…indicates that the RGWB is resilient to severe drought conditions and is able to recover with one year of normal rainfall.
>
> "The well water is generally of very high quality with the exception of arsenic concentrations above the Primary Maximum Contaminant Level (MCL) at wells #11 and #13 and manganese levels above the Secondary MCL in all Enterprise wells except #3 and #4. As defined by the United States Environmental Protection Agency (USEPA), a Primary MCL provides a standard to protect public health while a Secondary MCL exists to prevent aesthetic issues such as taste, color and odor. In Enterprise area wells, leaching from natural deposits can result in dissolved manganese concentrations near or above the Secondary MCL and requires treatment in order to avoid the black color that develops as manganese precipitates out of solution. …iron levels above the Secondary MCL have not been encountered at any of the City's wells.
>
> "…[two City Enterprise] wells…have been placed on standby due to arsenic levels testing close to and above the Maximum Contaminant Level (MCL) of

> 10 mg/L…” (Draft City of Redding 2015 Urban Water Management Plan, pgs. 27-28).

The depth to groundwater is unknown. It is assumed that a well drilled 300- to 600-feet should produce sufficient water quantity and quality. A well drawing from the deeper aquifer should not impact the shallower local residential wells.

<u>River Intake</u>

The Tribe currently has a riparian water right from the Sacramento River; however, it is understood that the existing water right would not be sufficient to meet the demand of the Proposed Project. Because of the regulatory complexity associated with an increased river water right and the associated infrastructure, and because of the increased cost associated with treatment of river water, no further consideration is given to the use of river water as a supply for any of the Casino alternatives.

4.2.2 Distribution Pipeline System

It is recommended to use City of Redding Public Works Department, Water System Construction Criteria: Pipe sizes 6-inches and 8-inches use DIP AWWA C151-09 (Pressure Class 350) or PVC (C900) AWWA DR18 (Class 150). For pipe sizes 12-to-24-inches use DIP AWWA C151-09 (Pressure Class 350). All pipe and system facilities shall be designed to deliver water at the Maximum Day Demand (MDD) plus fire flow.

4.2.3 Storage and Fire Protection

The water supply source is planned to have the capacity to satisfy the maximum day demand. Therefore, the water storage will be required to provide fire protection, peaking storage, and operational storage.

The fire protection storage volume is dictated by the requirements of the California Building Code and the California Fire Code. In the case of the various casino alternatives, the code dictates that a maximum fire protection flow of 3,000 gpm be provided for a minimum of 3 hours. This flow and duration results in a fire protection storage requirement of 540,000 gallons for all alternatives.

Peaking storage is the difference between the maximum day demand and the peak hour demand, multiplied over the hour that the peak occurs. For planning purposes, we have extended the peaking time for four hours to be conservative.

Operational storage is typically a subjective calculation made by the design engineer to account for design criteria such as unusable tank volume, system requirements, unaccounted for system losses, and to generally provide a safety factor. A typical operational storage volume is 50% of the maximum day demand.

Table 8 below is a summary of the contributing data and the calculated storage component for each category. The total calculated water storage tank size for each alternative is shown in the table.

Table 8: Calculated Water Storage Tank Sizes

	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F
Max Day Demand (gpm)	219	186	210	70	213	56
Calculated Peak Hour Flow (2.5 x Avg.) (gpm)	385	317	367	135	372	90
Fire Storage (gal)	540,000	540,000	540,000	540,000	540,000	540,000
Peaking Storage (gal)	39,840	31,440	37,680	15,600	38,160	8,160
Operational Storage (gal)	157,500	133,700	150,950	50,350	153,150	40,250
Total Water Storage Required (gal) [a]	737,000	705,000	729,000	606,000	731,000	589,000

Units: gallons
[a] *Rounded up to the nearest 1,000*

4.2.4 Booster Pump Station

Pumping will be required to pressurize water provided by an on-site source. Assuming a well is constructed, it is most likely that a well pump will be used to pressurize water through any treatment processes that are required and into a ground level storage tank.

A booster pump station will be required to pressurize water from the ground level storage tank into the public water distribution system for use by customers.

In addition, a separate fire booster pump facility is also likely to be required to provide fire flows to the system.

4.3 Off-Site Option: City Provided Drinking Water Service

Both the City of Redding and City of Anderson provide potable water to their residents and commercial, industrial, and institutional customers. City services are readily available to both sites. From initial dialogue, both Cities have expressed interest in serving the Casino.

4.3.1 City of Redding Water System Design Criteria

<u>New Site – Alternatives A-D</u>

According to City personnel and GIS maps, a 24-inch ductile iron pipe exists less than 300-feet from the northern property boundary (refer to Exhibit 3 in Appendix B). According to David Braithwaite, Project Coordinator in the City of Redding Public Works Department, there is sufficient capacity in this transmission line to serve casino Alternatives A-D.

Mr. Braithwaite used the 2016 Water Utility Master Plan to make this determination. No other modeling or studies specific to this project were prepared by the City or by Coleman Engineering.

City of Redding Public Works Department, Water System Construction Criteria will be required.

The City of Redding uses both surface-water and groundwater supplies. The surface-water supply is governed under two separate contracts with the Bureau of Reclamation and one with Anderson Cottonwood Irrigation District (ACID). The City also has two groups of ground water wells: the Enterprise wells and the Cascade wells. On average, the City gets approximately 69 percent of its total annual supply from surface water and 31 percent from groundwater. Surface water is used seasonally throughout the year and groundwater is used minimally in the winter but peaks along with surface-water use in the summer.

Because the City receives source water from these two third parties, any agreement by the City to serve water outside of its existing City limits, or to adjust its City limits, is likely to require Local Agency Formation Commission (LAFCO) action and concurrence.

<u>Existing Site Expansion – Alternative F</u>

There appears to be no unique design criteria that are applicable to the expansion project. If the existing site were expanded as programmed in Alternative F, it is assumed that some minor upsizing of existing facilities may be required. The total calculated increase in water and sewer demand is less than 8% so it is also possible that existing systems will be sufficient. Infrastructure sizing will be detailed during design as necessary. The City has indicated that it has the capacity to provide increased volumes of water as anticipated by Alternative F.

4.3.2 City of Anderson Water System Design Criteria

According to City of Anderson personnel and from maps provided by the City, an existing high-producing well (Automall Well) is located near the northeast corner of the proposed project site. There is an existing 12-inch water line that parallels the northern property line and serves residences to the west of the well. The City Water System Master Plan includes plans to construct a 12-inch water pipe south, through the proposed project site, to serve residences to the south and provide better City-wide pressures and flows (refer to Appendix B, Exhibit 4). Working with the City, the alignment of the new 12-inch waterline could be planned to accommodate the proposed Casino development project.

City of Anderson uses the City of Redding Public Works Department, Water System Construction Criteria.

4.4 Water Conservation

Water conservation measures are likely to be required by both Cities and should be anticipated in any water planning and design effort for the Casino Alternatives. The following statement by the USEPA was provided in response to the solicitation for public comment on the potential Casino development. For the purposes of this feasibility study, the measures mentioned in the USEPA comment are assumed to be included in water system planning and design.

"While California's drought has eased in several counties, including Shasta, it is prudent to plan for maximum water use efficiency in light of changing precipitation patterns. The project description should include the purchase, installation, and implementation of water-efficient products and practices. This includes purchase of WaterSense labeled toilets and faucets, which use 20% and 30% less water respectively than conventional products. We recommend the project implement the 14 federal water efficiency best management practices, including those for boiler/steam systems, single-pass cooling equipment, cooling tower management, commercial kitchen equipment, and alternate water sources including rain water harvesting for irrigation, toilet flushing, and fire suppression. The federal water efficiency BMPs are available at http://energy.gov/eere/femp/best-management-practices-water-efficiency" (USEPA public comment letter dated December 28, 2016).

5 Wastewater Assessment

This Section will identify and discuss components necessary for onsite wastewater management, including effluent disposal options, and off-site sewer service.

Required wastewater facilities will need to be accounted for, located, and incorporated into the overall selected Casino Alternative site layout. All facilities and concepts described in this section are preliminary and should be considered for planning purposes only.

5.1 Onsite Wastewater Management

If connection to a municipal wastewater treatment plant is not feasible, it is recommended that a tertiary wastewater treatment plant capable of producing high quality effluent suitable for reuse be constructed. It is recommended that a membrane bio-reactor (MBR) wastewater treatment plant (WWTP) be used for the Casino development. The following is a discussion about the components of a sewer system centered around a MBR (refer to Appendix B, Exhibit 6). Onsite wastewater facilities must comply with all applicable permitting requirements.

5.1.1 Collection System and Headworks

Wastewater will be collected from the Casino via gravity to the influent pump station where it will be pumped to the influent screen (headworks) of the MBR WWTP. Proper removal of fats, oils, and greases (FOG) from the wastewater stream is crucial to the operation of a small WWTP, especially an MBR plant to prolong the life of the membrane units. Automatically cleaning grease interceptors located at the back of the Casino, prior to the WWTP, are recommended.

The influent pump station wet well can be constructed of concrete or fiberglass and may be approximately 6-feet diameter and 12- to 16-feet deep. It is likely that a triplex sewage lift station will be required to convey sanitary sewage to the treatment plant. The pumps could be grinder pumps or submersible non-clog pumps. Actual pump selection and pump station sizing will be completed during design.

The headworks for the onsite WWTP will utilize fine screens. Fine screens are necessary to keep any inert solids from coming into contact with the membranes; as they could damage the membranes. Fine screens should have 1 to 2 mm openings. There are several ways to manage the solids off the screens.

The most common methods include facilities and equipment for filtering inorganic solids from the influent waste stream, washing and dewatering the solids, then conveying the dewatered solids for proper landfill disposal.

5.1.2 Flow Equalization

An equalization tank should be utilized to reduce peak instantaneous hydraulic and organic loading rates on the MBR. A tank can distribute peak flows over multiple days, which would reduce the sizing requirements for the MBR and associated treatment system components.

5.1.3 Treatment Membrane Bioreactor System (MBR)

Tertiary treatment utilizing an MBR was assessed in this study because it provides the Casino the greatest flexibility for reuse and disposal. Primary and secondary treatment consist of gravity settling and biological processes necessary to break down wastewater. Tertiary treatment follows and generally includes both filtration and disinfection. A MBR WWTP is a proven technology excellent for close proximity to populated areas. Advantages include:

- Ease of permitting due to the high quality effluent
- Keeps the treatment plant footprint to a minimum
- The cost of the MBR system is competitive with more conventional treatment processes
- Reliably and consistently produce high-quality effluent ideal for a variety of disposal and reuse alternatives
- The effluent can be utilized for recycled water, when coupled with proper disinfection (refer to Appendix A, Table 9).

The treatment plant should be designed to treat the maximum day flow and biological loadings on a continuous basis. An anoxic/denitrification basin and aeration/nitrification basin can be provided, if required, for nitrate removal.

There are packaged MBR wastewater treatment plants that can be provided factory assembled and tested on a truck trailer roughly 8.5-ft wide x 45-ft long x 12-ft tall. The package unit comes equipped with an influent screen, process tanks, membrane units, air blowers, pumps, instrumentation, controls and instrumentation. Ancillary equipment not installed on the skid that may be necessary include oxygen generation units and additional flow equalization tanks. Whether to install a “package” unit or not can be determined during the design.

5.1.4 Disinfection

Disinfection from a MBR is required if water reuse takes place on landscaped areas and other features with the possibility of human contact. Direct surface discharge also requires disinfection. However, disinfection from a MBR is not required when spray field (under certain circumstances) or subsurface disposal is used.

5.1.5 Solids Handling and Disposal

Biosolids handling is typically one of the most land intensive and odorous process in a wastewater treatment plant. Therefore, this feasibility assessment has assumed that biosolids produced at the Casino site will simply be dewatered, hauled off-site, and disposed of at a designated landfill approved to accept biosolids.

The process of dewatering reduces hauling weight and volume. All liquid extracted from the sludge dewatering process is sent back to the fine screens for treatment. This approach will result in a facility that is much more conducive to the aesthetic site constraints at the Casino site.

5.1.6 Seasonal Storage Pond

For spray irrigation disposal, as discussed in Section 5.2, treated effluent would need to be stored during the winter months until spray irrigation could take place. For leach field disposal, storage would not be required since year-round sub-surface disposal is possible.

5.1.7 Irrigation Pump Station and Spray Field System

Spray irrigation will require a pump station, associated transmission pipes, and a sprinkler system. The pumps will take the water from the storage pond and deliver it to the sprinkler system via a transmission pipeline. The spray fields could be irrigated using traditional rows of impact head sprinklers mounted on wheels. The sprinklers would need to be moved as required within the spray field site to ensure even application of water and to minimize the piping infrastructure required. Land requirements for disposal are discussed in Section 5.2.

5.1.8 Site Conditions and Constraints

Redding (Strawberry Fields Site / Primary Site, Alternatives A-D). The site doesn't appear to have technical constraints prohibiting or restricting a treatment plant facility and associated pumps and tanks. There is also sufficient land available for treatment, storage, and disposal of the wastewater effluent (surface or subsurface) as shown on Exhibit 7 in Appendix B.

Anderson (Alternative E). As shown in the tables that follow, there is not sufficient land available for disposal on the Alternative E site. Surface disposal is not possible due to the small area constraint, nor would a large winter storage pond in close proximity to the Casino and the neighbors be aesthetically pleasing or acceptable. Subsurface disposal is also not possible due to the lack of suitable land. As Table 12 indicates, 65 acres would be required to accommodate the required sub-surface disposal design but there are only 8 acres available for sub-surface or surface disposal on the Alternative E site.

5.1.9 Wastewater System Operation

A certified wastewater operator will be required to operate the onsite wastewater treatment system. This operator can either be an employee or a contract operator.

5.1.10 Recycled Water Reuse

Because an MBR WWTP produces treated and filtered effluent that meets tertiary treatment standards, there are many uses allowed by CCR Title 22 regulations which are summarized in Table 9 in Appendix A.

If the effluent is disinfected, a combination of ultraviolet (UV) and chlorine disinfection is recommended to ensure the inactivation of pathogens. UV disinfection will be used to treat wastewater to meet Title 22 disinfection standards. Additional chlorine disinfection will be applied to leave a disinfectant residual for continued protection from pathogens downstream. This added disinfection step provides a safety factor for meeting Title 22 requirements and reduces customer concerns about the safety of recycled water.

A recycled water storage tank should also be constructed to provide equalization storage for onsite recycled water use for toilet flushing, landscape watering, etc. This separate tank should be sized to hold one to two days of peak treated water reuse demand.

5.2 Onsite Wastewater Disposal Options

The onsite disposal options are spray field, leach field, surface water discharge, or a combination. The following table summarizes the land available for wastewater disposal by taking the total parcel area and subtracting the actual site development area and the floodplain influence.

Table 10: Available Land for Disposal – Alternative A as Worst Case

Alternative	Land Parcel Size	Casino Development Area	Flood Plain Area Not Including Development Area	Land Available for Subsurface Disposal	Land Available for Surface Disposal
A	232	(47)	(115)	46	190

Units: acres

Appendix B, Exhibit 7 illustrates the Alternative A land area available for disposal and the land required for both spray field irrigation and leach field disposal based on the following discussion and tables. Since Alternative A is the most land intensive, it was illustrated in Table 10 above and in Exhibit 7. Because it is demonstrated that there are multiple wastewater disposal options that work on the site for Alternative A, the other Alternatives can also work since they are less land intensive.

5.2.1 Spray Field Disposal (Surface Land Application)

For purposes of this study, the hydraulic agronomic rate was used to calculate land application acreage. Actual design should confirm whether or not nutrients and/or other constituents from the effluent may be the driving force behind the agronomic loading rate. The type of crop grown and subsequent water and nutrient uptake will also impact the Land Application Area (LAA) requirement.

A seasonal winter storage earth pond will be necessary for land application. The storage pond should be a depth of 10-feet to minimize algae, plant growth, and the potential for odors. The following criteria was used for the LAA calculations:

- Typical Irrigation Season = 183 days (mid-April – mid-October)
- Hydraulic Loading Rate = 0.2 gpd/ft^2
- Winter Storage = 182 Days (6 months)
- Winter Storage Pond Depth = 10-feet
- Annual Average Rainfall (Western Regional Climate Center, 1971-2000) = 40.42-inches. Assume 100-Year rainfall to be 2x the annual average rainfall.

Water Balance worksheets for each Alternative are found in Appendix C that was used to populate the following table. The table summarizes the estimated land requirements for winter storage and spray field irrigation. The table also shows the effect wastewater reuse would have on the land requirement. Alternative F is not applicable because it is assumed that any expanded uses at the existing site will be served by City utilities.

Table 11: Land Application Area (Surface Disposal) – Alternative Summaries

	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Winter Storage [a]	15	13	14	5	14
LAA (Spray Field Irrigation) [a]	71	62	69	22	71
Reclaim Treated Wastewater: Area Reduction [b]	50	44	49	16	50

Units: acres
[a] 20% contingency added for construction, setbacks, soil and crop type, etc.
[b] 30% reduction used due to reuse

5.2.2 Leach Field Disposal (Subsurface)

In order to design a disposal system appropriate for the project site, soil testing and identification is required at each location. Exploratory excavations should be constructed to conduct percolation tests to determine infiltration rates; note any confining soil layers; identify shallow groundwater table; and classify soil types and soil structures. Depending on site-specific soil and subsurface information, conventional or specially-designed leach fields may be used.

<u>Conventional Leach Fields</u>

For purposes of this study, since there were no onsite investigations and percolation tests performed, general assumptions were made and calculations performed to estimate an approximate land requirement for a conventional leach field system. The following criteria was used for the land area calculations for each Alternative:

- Peak Flows used
- Percolation rate (hydraulic loading) = 0.45 gallons per day (gpd) per square foot (Note: this rate is consistent with the Custom Soil Resource Report prepared by the Natural Resources Conservation Service and will need to be verified by field testing prior to detailed design)
- 100% replacement area accounted for
- No storage required, assume year-round disposal
- Subsurface disposal allowed during rain events

<u>Redding (Strawberry Fields Site / Primary Site, Alternatives A-D).</u> The required absorption area for Alternative A is calculated by dividing the average 24-hour

volume of wastewater by the absorption capacity of the soil. Required Absorption Area = (200,300 gallons) / (0.45 gallons/day/ft^2) = 445,111 ft^2. The approximate total land area required for Alternative A based on Shasta County design criteria found in Section 3.1.2 is 54 acres, including 100% replacement and 20% contingency addition. The Redding site has land available for a conventional leach field system.

Conventional leach field land requirements were calculated and are summarized below in Table 12 and Alternative A is illustrated in Appendix B, Exhibit 7. The table also shows the effect wastewater reuse could have on the land requirement assuming at least 20% of the wastewater is recycled. A final design by a licensed engineer will be necessary to determine actual size and placement. Alternative F is not applicable because it is assumed that any expanded uses at the existing site will be served by City utilities.

Table 12: Leach Field Land Area (Subsurface Disposal) – Alternative Summaries

	Alt A	Alt B	Alt C	Alt D	Alt E
Sub-Surface Disposal Land Area incl. 100% Replacement [a]	54	46	52	20	53
Reclaim Treated Wastewater: Sub-Surface Disposal Area [b]	45	36	42	16	42

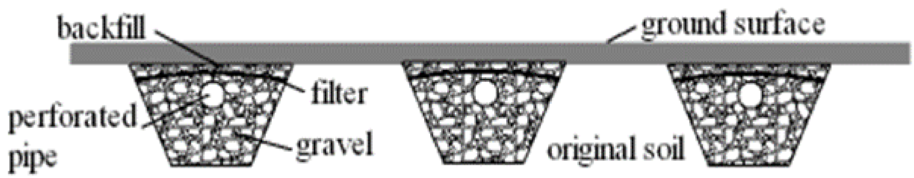
Units: acres
[a] *20% contingency added to avoid over saturation of the soil and to handle high peak flows*
[b] *20% reduction used due to reuse*

<u>Anderson (Alternative E).</u> Based on the assumptions above, a conventional leach field does not appear possible at the Anderson site. The property site is not large enough to account for a casino development and a complete sub-surface disposal system with a 100% replacement area. There may be one option for Alternative E – the design and use of a specially-designed system as discussed below. The application of appropriate technology may reduce the land requirement enough to fit in the open spaces that are outside the flood zone.

Field-testing on both sites may reveal that only certain portions of the respective sites have soils conducive to leach field disposal. Design of a leach field is dependent on the percolation characteristics of the soil. Different percolation rates yield varying hydraulic loading rates. In addition, hydraulic loading rates also vary depending on the effluent quality – untreated wastewater discharged to leach fields would require a lower hydraulic loading rate to allow additional treatment by microorganisms in the soil.

The advantage of an MBR is that it produces a higher quality effluent thereby reducing the organic loading on the leach field soils and allowing an increase in the hydraulic loading rate. The higher loading rate allows for a smaller disposal field. MBR-quality effluent also reduces the risk of soil clogging and system failure and increases the lifespan of the leach field.

Typical leach lines consist of trenches filled with washed rock/gravel to flow level with a perforated pipe on the top. Rock is added to cover the pipe and an approved filter material is used to keep soil from filtering down into the rock as shown in the graphic below.



<u>Specially-Designed Leach Fields</u>

Engineered or Specially-Designed leach fields are high capacity designs that can accept higher hydraulic loading rates than conventional leach fields, thus reducing the required land. This is possible since the water quality of the MBR effluent being discharged to the engineered leach field is treated to such a high level that reliance on the soil media to provide additional treatment, typical of a conventional leach field design, is not necessary. Engineered leach fields can provide a much smaller footprint than a conventional leach field and should be researched and considered during design. The above land area requirement associated with a conventional leach system could be a “worse-case” scenario.

5.2.3 Surface Water Discharge

Although a National Pollutant Discharge Elimination System (NPDES) permit may be possible for the Sacramento River, there are significant requirements and possible constraints to surface discharge of treated wastewater. Surface water discharge as a disposal option can have high operational costs, increased responsibilities, and liability associated with a NPDES surface water discharge permit. Since other disposal methods appear viable and possible, surface water discharge is not recommended. As such, detailed research and consideration of surface water discharge was not conducted.

5.2.4 Disposal Combination and Selection Criteria

There is the reasonable possibility that final design could utilize a combination spray field / leach field disposal strategy on the Primary Site. The advantage to this approach would be the elimination of the winter storage pond. Most wastewater would be disposed using spray fields in the flood plain. Spray field disposal in the floodplain would work for most summer months and many winter days that are not subject to rainfall and river flooding.

During times of rainfall or river flooding, wastewater would simply be disposed in the leach fields to be located out of the floodplain. As Exhibit 7 demonstrates, there is sufficient land on site to accommodate this approach if desired at a future date.

Site designers will need to select surface disposal, sub-surface disposal, or a combination for use on the site. Each disposal method has its advantages and both can be appropriate in different circumstances. Surface disposal is advantageous because plants and surface evaporation result in more water disposal per unit area of land used. Also, beneficial reuse of treated wastewater can offset the need for drinking water to be used for irrigating landscaping.

But, surface disposal requires a storage pond to allow for times when precipitation precludes the ability to irrigate. Storage ponds can be large and unsightly and can be a source of odors.

Subsurface disposal is advantageous because it can be utilized in any weather conditions and does not require a storage pond to be paired with it. Also, it is possible for subsurface disposal to be applied under parking lot areas though that approach is not recommended unless absolutely necessary.

The site designers will select the best combination of surface and subsurface disposal that will result in the most efficient use of land, best site aesthetics, and most reliable wastewater disposal method.

5.3 Off-Site City Provided Sewer Services

The off-site disposal option is to connect to the respective City wastewater system. As stated previously, David Braithwaite at the City of Redding and David Durette at the City of Anderson have both expressed interest in providing sewer service to the Casino.

Further, both Cities have confirmed that they have sufficient capacity, or plans to add sufficient capacity, in their existing systems to provide service to the new Casino.

Services are readily available and in very close proximity to each proposed site (see Appendix B, Exhibits 3 and 4). Physical connection to either system appears to be technically feasible and relatively accessible. A lift station will be required at the Redding site to pump Casino sewer into the City's system. The sewer pipe at the Anderson site is 9.5-feet deep, which is sufficient for gravity discharge thereby precluding the need for a lift station.

For the Primary Site, the area under consideration is outside Redding City Limits and therefore will need to obtain approval from the Redding City Council to obtain wastewater service. Additionally, the City's service area boundary change could require Local Agency Formation Commission (LAFCO) approval.

The wastewater generated from the primary site (Alternatives A-D) will flow to the Sunnyhill Lift Station, through the wastewater Westside Interceptor pipe, and into the Clear Creek WWTP for treatment and disposal to the Sacramento River.

The Sunnyhill Lift Station has sufficient existing capacity to accommodate flows from the primary site according to the City of Redding 2012 Wastewater Utility Wastewater Master Plan. The available capacity in the Sunnyhill Lift Station exceeds the projected buildout flows by 4.12 MGD. There is capacity for the lift station to provide services for 0.501 MGD wastewater flow from the Casino site.

The Westside Interceptor currently exceeds its capacity during storm events and does not have additional existing capacity to accept flow from the primary casino site during peak flow events. However, according to the City of Redding Capital Improvement Plan for 2015-16 to 2020-21, the Westside Interceptor Phase III project is a planned sewer expansion project that includes building an additional 42-inch sewer pipe in parallel with the current pipe, which will double the wastewater conveyance capacity. The parallel pipe will be installed along Girvan Road and then continue south for a short run until it reaches the Clear Creek WWTP. This will provide sufficient conveyance capacity during all flow events for the wastewater generated from the casino.

The Westside Interceptor Phase III project is programmed to be designed in 2015-16 and constructed in 2016-2018. The City has reported that they are currently behind that schedule but that they plan to pursue the project in a timely manner with current plans to construct the project and have the additional capacity on line by the end of 2021.

In the interim, the Casino site will need to include flow equalization storage as part of the wastewater design. According to the City of Redding, the Westside Interceptor has sufficient capacity to accept and convey wastewater flows during dry conditions. System modeling indicates that from the onset of a 10-year, 24-hour storm event, it takes 30 hours for the wastewater conveyance system to return to flows below the system capacity. Therefore, the project will be required to construct flow equalization storage sufficient to store Maximum Day Flows for 30 hours so that no discharge occurs that would further tax the undersized conveyance system.

The Maximum Day Flow for Alternative A is shown in Table 3 above to be 289,600 gpd. Therefore, 362,000 gallons (289,600 gpd / 24hrs/day * 30 hrs) of equalization storage is required to be constructed on the Casino site. This storage will retain peak flows during and after a storm event so that wastewater from the site does not discharge into the downstream system until the peak event has resided and flow is below the capacity of the pipeline conveyance system.

Using the planned flow equalization storage on site until the downstream conveyance system is complete in 2021 will mitigate the possibility of the project contributing to overflows or spills as a result of flows exceeding the capacity of the pipe system. After the conveyance capacity increase project is complete in 2021, the on-site storage should not be needed.

The Clear Creek WWTP currently treats about 9 MGD per day of wastewater and has a capacity of about 20 MGD. The peak flow that can be handled is approximately 50 MGD. The existing WWTP is confirmed to have sufficient current capacity to treat the peak flow of 0.501 MGD generated by the primary site.

For the Alternate Site (Alternative E), the City of Anderson Sewer System Management Plan provides detailed information on the pipe diameter, length, current flow, and flow capacity. The City's topography slopes from west to east so the majority of wastewater flows by gravity to the City's Wastewater Treatment Plant located at the east end of the city.

The wastewater from the alternative site will enter the City sewer system at manhole D310M, which has a current peak wet weather flow of 1.39 MGD versus a pipe capacity of 3.54 MGD. The wastewater peak flow from the Alternate Site would 0.486 MGD, only slightly adding to the carrying load of the pipe. The flow was routed from the entry point into the sewer system all the way to the end of the sewer line where it enters the WWTP. The wet peak weather flow in the sewer system before entering the WWTP at manhole B603M is 5.08 MGD. The carrying capacity of this section is 14.91 MGD, meaning that there is plenty of room for the wastewater generated from the Alternate Site.

The WWTP currently treats about 1.1 MGD, but it has capacity to treat 2.4 MGD, leaving plenty of space for the additional flow from the proposed Alternate Site.

For the Existing Site (Alternative F), the city currently treats the wastewater at the Clear Creek Water Treatment Plant. There is a private sewer pipe that runs from the existing Casino to the WWTP where the wastewater is treated and then discharged into the Sacramento River. As documented above, the calculated increase in wastewater flow is anticipated to be less than 8% which should easily be accommodated in the existing sewer conveyance system.

6 Drinking Water Assessment

This Section presents a summary of the water system components needed to supply onsite water to each of the six Alternatives, including supply and water quality, treatment, distribution and pumping, and storage. Off-site city supply will also be discussed.

Required water facilities will need to be accounted for, located, and incorporated into the overall selected Casino Alternative site layout. All facilities and concepts described in this section are preliminary, and should be considered for planning purposes only.

6.1 Onsite Drinking Water System

It is feasible for the Casino to have their own onsite water supply system. The onsite drinking water system would be classified as a non-transient, non-community public water system. Appendix B, Exhibit 8 shows a process flow diagram of a typical groundwater supplied drinking water system.

6.1.1 Water Supply

There are two feasible water sources for the proposed Alternatives: (1) onsite groundwater for Alternatives A-E; and (2) river intake for Alternatives A-D.

<u>Groundwater</u>

The 1992 Assembly Bill 3030 (AB3030) provided a systematic procedure for an existing local agency to develop a groundwater management plan. In November 1998 Shasta County developed the “Coordinated AB 3030 Groundwater Management Plan for the Redding Groundwater Basin.” This Plan was updated in May 2007. Overall water balance and current water demands in the basin suggest that a sufficient quantity of water is available on a regional basis to meet current demands and support future development.

An excerpt from the Plan states the following:

> "Section 2.29. Over the long term, groundwater levels in the Redding Basin have remained steady. There are seasonal fluctuations (summer to winter), and there are some fluctuations caused by climatic patterns (wet or dry years), but overall, groundwater levels have not changed significantly throughout the period of record." (Coordinated AB 3030 Groundwater Management Plan for the Redding Groundwater Basin, November 1998, Updated May 2007).

Depending on the water-bearing formation tapped into, yields from 100 to 1,000 gallons per minute are possible, which is more than enough to support the Casino. As part of the well development and to confirm that the actual yield potential is sufficient to meet the Casino's demand, a 72-hour pumping test with a consistent and constant pumping rate should be performed.

<u>River Intake</u>

River intake is not the preferred or best option due to the apparent availability of groundwater. The use of surface water would require water rights in addition to what is already held by the Tribe; permit for an intake structure and all its regulatory conditions; and more expensive water treatment. This option was not researched and is not discussed further.

6.1.2 Groundwater Quality

The Coordinated AB 3030 Groundwater Management Plan for the Redding Groundwater Basin also includes the following relevant information about regional groundwater quality.

> "Section 2.32. The general quality of groundwater in the Redding Basin is considered good to excellent (TDS between 95 and 424 mg/L) for most uses, except for that water from shallow depths along the margin of the basin where pre-Tertiary formations may be tapped. Some wells in those areas yield water with constituents that are above limits for drinking (primarily metals, TDS, chloride and sulfate)…" (Coordinated AB 3030 Groundwater Management Plan for the Redding Groundwater Basin, November 1998, Updated May 2007).

Based on the groundwater quality of some City of Redding wells, an onsite groundwater well may produce water requiring treatment. Specifically, arsenic and/or manganese could be encountered. Arsenic is considered a primary contaminant and limits must be below 10 parts per billion. Manganese is considered a secondary contaminant in water and does not create a health hazard but in high concentrations will cause brownish-black staining of laundry, porcelain, dishes, utensils, and even glassware.

If contamination is found, another possible approach to take before conceding to treatment is to perform aquifer zone testing. A zone testing well isolates and tests water quality within each distinct zone, or aquifer. If “clean” water is found in certain zones, then a production well can be designed and constructed to only pump water from these “clean” zones with the contaminated zones being sealed off.

6.1.3 Distribution Pipeline System

A distribution system should be designed to accommodate all drinking water demands, irrigation demands, and firefighting demands. Unless an elevated tank is constructed, a pressure pump station will be required to provide and maintain pressure to the Casino from the storage tank.

6.1.4 Storage

Section 4.2.3 provided the basis of design for storage and fire protection. A water storage tank(s) will be required for each Alternative to store water produced by onsite wells.

The tank could be of welded steel construction or a bolted steel tank. Tank dimensions can vary and can be optimized for aesthetic and functional purposes in order to be integrated into the Alternative site layout. The tank at the Redding site could even be partially or completely buried, which would require a concrete tank.

If recycled water is used to satisfy fire suppression, fire suppression and potable water storage would need to be contained in two separate tanks (refer to Appendix B, Exhibit 8). To prevent stagnation of the fire protection water, the fire supply would need to be drained periodically or used regularly for irrigation.

6.1.5 Booster Pump Station

Unless an elevated storage tank is constructed at either site, a pump station will be required to convey water from the storage tank to the facilities and to keep the distribution system pressurized. The pump station configuration may consist of multiple pumps of increasing horsepower, coupled with a variable frequency drive (VFD), to provide the range of demand that will take place throughout a day. A designated fire pump large enough for the volumes needed should be incorporated into the pump station.

6.1.6 Treatment

Arsenic limits above 10 parts per billion (10 µg/L) will require treatment. For manganese, treatment is not required but is usually desirable. Groundwater sampling and quality testing must be performed to verify the water quality at the site before actual treatment requirements can be determined.

Iron and manganese is typically treated with pressure filters loaded with greensand media. Arsenic removal may be achieved using media adsorption, coagulation and filtration, or oxidation filtration methods.

6.1.7 Site Conditions and Constraints

The Redding site appears not to have any technical constraints for the location of a well, storage tank, treatment facility (if necessary), and booster pump station. However, the Anderson site, being a smaller land parcel with a proposed large casino complex, and wastewater components that also need to be sited, will require thoughtful design in order to accommodate a well, tank, and pump station. At least 100-feet separation from any new well and any sewer leach field must be maintained. This includes leach fields that may be located on neighboring properties.

6.1.8 Water System Operation

A certified water treatment plant operator will be required to operate any onsite water treatment system. If no treatment is found to be required, a certified distribution system operator will be required. This operator can either be an employee or a contract operator.

6.2 Off-Site City Provided Drinking Water Supply

As mentioned previously, both David Braithwaite at the City of Redding and David Durette at the City of Anderson have stated that their respective systems have the capacity and ability to supply the Casino with potable water, though neither has made any offer to do so at this time. Both cities have pipelines within a few hundred feet of both Casino properties. These representatives from the Cities have stated that there is sufficient capacity and pressure with their water systems to serve the Casino. Physical connection to either system appears to be technically possible, and relatively easy due to close proximities of the systems. Both Cities will require a master meter be installed in order to track water usage and bill accordingly.

The site for Alternatives A-D is outside Redding City Limits. Therefore, approval from the Redding City Council and the Local Agency Formation Commission (LAFCO) is likely to be required in order for the site to receive water service.

According to the City of Redding 2016 Water Utility Master Plan, drinking water for the Primary Site (Alternatives A-D) comes from the Enterprise Zone of the City's water supply system. The Enterprise Zone receives water from the Foothill Water Treatment Plant, located on Foothill Blvd on the west side of the City. The source of the water of the Foothill WTP is the Sacramento River.

When drinking water demand is high, the Enterprise Zone is also supplied by the Enterprise Wells, which include of a total of 12 wells. The water quality at the wells is generally considered good, but chlorination is provided at each well, and 10 wells have a treatment process to reduce iron and manganese. The Enterprise Zone has current maximum and average daily demands of 6.22 MGD and 12.09 MGD respectively. There are also other areas of the City that either fully or party rely on the Foothill WTP for their water, including the Hill 900/Mary Lake Booster, Cascade, and Hilltop-Dana Zones. All of these zones combined have an average daily demand of 9.5 MGD and a maximum daily demand of 21.74 MGD.

The Foothill WTP can treat 24 MGD and the Enterprise Wells can produce 19 MGD, for a total existing capacity of 43 MGD. For the given area that is supplied water, the total average daily demand is 15.72 MGD and the maximum daily is 33.83 MGD. The Primary Site will need a supply of 0.555 MGD. Therefore, there is a sufficient supply of water for the site.

At the Alternate Site (Alternative E), the City of Anderson gets all of their water from 10 wells. The water is treated with a small amount of chlorine before it is sent to the public. There is groundwater for the wells to pump from the range of 20-feet down to about 1,000-feet. Usually, only one well is needed for the City's domestic water, however occasionally a second well will be used during peak hours. The City consumes approximately 2 MGD. The site would need a supply of 0.535 MGD. Near the proposed site there is a 12-inch water pipe which would feed the site, plus there is a 10-inch water pipe on the back side of the property which can serve as a looped connection.

For the Existing Site (Alternative F), according to the City of Redding 2016 Water Utility Master Plan the drinking water for this site is provided by the Cascade Zone of the City's water supply system. The Cascade Zone was discussed above and receives its water from the Foothill Water Treatment Plant. If there is a high demand, water will be used from the Bonnyview Pump Station, however under average demand the pump station is not required. The water for the Bonnyview Pump Station comes from the Enterprise Zone, which is supplied water from the Foothill WTP and the Enterprise Wells when needed. The Cascade Zone has an average daily demand of 2.37 MGD and a maximum daily demand of 5.76 MGD. As stated previously the water provided to this area of the city can total 43 MGD and with taking into account the other areas that will use this water supply, there is an adequate amount of water for the site which is only calculated to need less than 8% more water than currently demanded.

7 Conclusion and Recommendation

Each of the six project Alternatives were evaluated. Alternatives A-D and F were found to be feasible in terms of onsite water and wastewater service. Alternative E was found to be feasible in terms of onsite water only; onsite wastewater disposal appears to be unfeasible.

As demonstrated by this Study, connections to the existing City utility systems will be less costly to the expanded Casino operation than providing their own on-site utilities. However, on-site water and wastewater utilities are well within the capability of the Casino to plan, construct, and maintain as has been demonstrated on many similar sites.

This Section summarizes wastewater and water, onsite and off-site service for each site. Advantages and disadvantages are presented.

7.1 Wastewater Management

7.1.1 Primary Site – City of Redding (Alternatives A, B, C, and D)

Onsite:

A. Requires collection system; lift station; treatment facilities; and disposal system be built and operated onsite.
B. A lift station will be required to convey raw wastewater from the development to the new WWTP.
C. MBR technology is recommended for treatment. MBR facilities are compact systems ideal for close proximity to populated areas. Tertiary treatment can be achieved using an MBR which provides greater flexibility for disposal and reuse options.
D. Wastewater disposal can be either (1) spray field; (2) leach field; or (3) a combination of both.
E. Seasonal storage will be required with spray field disposal.

F. Recommend effluent be recycled to reduce wastewater disposal requirements.
G. Advantages: (1) autonomy from the City; (2) recycled water may be used for toilets, landscape irrigation, and fire suppression (refer to Appendix A, Table 9); (3) No connection fee or on-going monthly billings; and (4) can accommodate future expansion.
H. Disadvantages: (1) higher capital cost due to the requirement to construct several components; (2) requires regular and ongoing operation and maintenance of the systems; (3) requires certified operator; (4) may require seasonal storage which would be very land intensive; (5) requires crop/soil management; (6) future casino expansion may be limited due to land required to be committed to disposal; and (7) responsible for permitting and compliance of treated wastewater and biosolids disposal

<u>Off-site – City-Provided Wastewater Service:</u>

A. Will require approval from the City Council and the Local Agency Formation Commission (LAFCO) to receive wastewater service.
B. Requires a utility service agreement with the City and physical connection to the sewer system.
C. Onsite lift station required to convey raw wastewater from the development to the City's lift station.
D. Pretreatment, such as FOG removal, may be required.
E. Advantages: (1) lower capital costs; (2) the City is responsible and liable for disposal of treated wastewater and biosolids, operation and maintenance, and regulatory compliance; (3) No employed or retained certified sewer operator is necessary; (4) no wastewater treatment components and structures to incorporate into the site layout and design; and (5) land would be available for other purposes and possible future casino or retail expansions.
F. Disadvantages: (1) monthly fees; (2) no ability to recycle; and (3) at the will and discretion of the City – any improvements, expansions, etc. will require discussions with the City and possibly LAFCO as well.

7.1.2 Alternate Site – City of Anderson (Alternative E)

<u>Onsite:</u>

A. Surface land disposal not possible

B. Subsurface disposal not possible, even using specially designed leach fields, there is simply not enough land area
C. Onsite wastewater management appears not possible for this Alternate Site

Off-site – City-Provided Wastewater Service:

A. Requires a utility service agreement with the City and physical connection to the sewer system.
B. Pretreatment, such as FOG removal, may be required.
C. Gravity connection into the City's existing gravity pipeline appears possible.
D. Advantages: (1) City-service is readily available; (2) the City is responsible and liable for disposal of treated wastewater and biosolids, operation and maintenance, and regulatory compliance; (3) lower capital costs; and (4) no lift station required.
E. Disadvantages: (1) monthly fees; (2) no ability to recycle; and (3) at the will and discretion of the City.

7.1.3 Existing Site – City of Redding (Alternative F)

Onsite:

A. There are no wastewater management options available for this existing site.

Off-site – City-Provided Wastewater Service:

A. May require an updated utility service agreement with the City.
B. May require expansion of an existing sewer lift station or downstream pipelines.
C. Advantages: (1) service is already established and guaranteed, a good relationship already exists; and (2) disposal of treated wastewater and biosolids is the City's responsibility.
D. Disadvantages: There are no unique disadvantages as a result of the expansion project.

7.2 Water Supply

7.2.1 Primary Site – City of Redding (Alternatives A, B, C, and D)

Onsite:

A. Requires water supply (well); distribution system; pump station; possible treatment facilities; and storage.
B. Well development will be required: 72-hour drawdown testing and water quality analysis.
C. Advantages: (1) autonomy from the City; (2) no connection fee or on-going monthly billings; and (3) can design a water system to accommodate future expansion.
D. Disadvantages: (1) requires onsite construction of several components that must be included in the site layout; (2) requires regular and ongoing onsite operation and maintenance; (3) requires certified operator; (4) may require treatment facilities be built and operated onsite; and (5) requires storage for fire and emergency use.

<u>Off-site – City-provided Water Service:</u>

A. Will require approval from the City Council, the Local Agency Formation Commission (LAFCO), and Bureau of Reclamation to receive water service.
B. Requires a utility service agreement with the City and physical connection to the water system.
C. Advantages: (1) lower capital costs; (2) the City is responsible for operation and maintenance, quality of water, and regulatory compliance; and (3) no water components and structures to incorporate into the site layout and design.
D. Disadvantages: (1) monthly fees; and (2) at the will and discretion of the City.

7.2.2 Alternate Site – City of Anderson (Alternative E)

<u>Onsite:</u>

A. Requires water supply (well); distribution system; pump station; possible treatment facilities; and storage.
B. Well development will be required: 72-hour drawdown testing and water quality analysis.
C. Advantages: (1) autonomy from the City; (2) no connection fee or on-going monthly billings; and (3) can design a water system to accommodate future expansion.
D. Disadvantages: (1) requires onsite construction of several components that must be included in the site layout; (2) requires regular and ongoing onsite operation and maintenance; (3) requires certified

operator; (4) may require treatment facilities be built and operated onsite; and (5) requires storage for fire and emergency.

Off-site – City-provided Water Service:

A. Requires a utility service agreement with the City and physical connection to the water system.
B. Work with the City to accommodate their master plan of extending a large trunk line through the development.
C. Advantages: (1) lower capital costs; (2) operation and maintenance, quality of water, and regulatory compliance is the City's responsibility; and (3) no water components and structures to incorporate into the site layout and design.
E. Disadvantages: (1) monthly fees; and (2) at the will and discretion of the City.

7.2.3 Existing Site – City of Redding (Alternative F)

Onsite:

A. Although there may be other water supply options available for this existing site, it is recommended to continue service with the City.

Off-site – City-provided Water Service:

A. May require an updated utility service agreement with the City.
B. May require expansion of existing infrastructure.
C. Advantages: (1) lower capital costs; and (2) service is already established and guaranteed.
D. Disadvantages: There are no unique disadvantages as a result of the expansion project.

Appendix A

Tables 1, 2, 5 and 9

Table 1: Total Building and Amenity Areas

Amenities	Alt A Primary Site	Alt B Primary Site	Alt C Primary Site	Alt D Primary Site	Alt E Alternate Site	Alt F Existing Expansion
	Proposed Project Full Build-Out	Proposed Project w/ No Retail	Reduced Intensity	Non-Gaming	Alternative Site	Expansion – Increase Gaming
Hotel Area	182,288	182,288	182,288	89,717	165,788	71,208
Casino Area	69,515	69,515	56,412	--	69,515	64,861[a]
Food and Beverage	31,565	31,565	30,390	12,178	31,565	5,502
Events Center	52,200	52,200	52,200	--	52,200	+10,000[b]
Conference Center	10,080	10,080	10,080	--	10,080	--
Total Building Area (Casino Resort)	**345,648**	**345,648**	**329,370**	**101,895**	**329,148**	**141,571 (Existing)** **151,571 (New)**
Outdoor Sports Retail	130,000	--	130,000	120,000	120,000	--

Units: square foot (sf)

[a]*Casino area includes 9,826-sf of the existing event center which will be remodeled to expand gaming*

[b]*Event Center Addition*

Table 2: Estimated Wastewater Flows by Building Use

Amenities	Alt A		Alt B		Alt C		Alt D		Alt E	
	Typical WEEKEND Peak Flows	AVERAGE Day Flows[a]	Typical WEEKEND Peak Flows	AVERAGE Day Flows[a]	Typical WEEKEND Peak Flows	AVERAGE Day Flows[a]	Typical WEEKEND Peak Flows	AVERAGE Day Flows[a]	Typical WEEKEND Peak Flows	AVERAGE Day Flows[a]
Hotel area	53,500	34,000	53,500	34,000	53,500	34,000	26,600	17,300	50,700	32,100
Casino area	41,300	30,300	41,300	30,300	32,900	23,800	-	-	41,300	30,300
Food and Beverage	51,200	35,100	51,200	35,100	49,200	33,700	14,900	10,200	51,200	35,100
Events Center	48,200	22,400	48,200	22,400	48,200	22,400	-	-	48,200	22,400
Conference Center	17,800	9,300	17,800	9,300	17,800	9,300	-	-	17,800	9,300
Outdoor Sports Retail	29,300	20,900	-	-	29,300	20,900	27,000	19,300	27,000	19,300
Central Plant/Cooling Towers	48,300	48,300	35,100	35,100	46,600	46,600	22,500	22,500	45,600	45,600
Total	**289,600**	**200,300**	**247,100**	**166,200**	**277,500**	**190,700**	**91,000**	**69,300**	**281,800**	**194,100**

Units: gallons per day (gpd)

[a]Average Day Flow = 5/7 Weekday + 2/7 Weekend

Table 5: Metered Water Usage (Demands) of the Existing Redding Rancheria Casino from the City of Redding

Month	2016 Days	2016 Usage, ccf	2015 Days	2015 Usage, ccf	2014 Days	2014 Usage, ccf
December	30	1282	34	1387	34	1300
November	33	1535	29	1400	29	1201
October	29	1902	29	2116	31	1829
September[a]	*32*	*3510*	*32*	*3116*	*30*	*3008*
August[a]	*29*	*3278*	*29*	*2773*	*29*	*3334*
July[a]	*30*	*3267*	*30*	*3250*	*32*	*3959*
June[a]	*32*	*3183*	*31*	*3146*	*29*	*3109*
May	29	2054	30	2826	30	2042
April	29	1590	29	1911	29	1728
March	29	1178	29	1564	31	1414
February	32	1246	32	1342	30	1170
January	31	1163	31	1178	33	1492
Total Usage (Cubic Foot) (gallons)		2,518,800 (ccf) 18,840,624 (gal)		2,600,900 (ccf) 19,454,732 (gal)		2,558,600 (ccf) 19,138,328(gal)
Average Annual Day (gpd)		**51,618**		**53,301**		**52,148**
Average Summer Day (gpd)		**80,504**		**75,321**		**83,589**
Peaking Factor[b]		**1.56**		**1.41**		**1.60**

Source: David Braithwaite, City of Redding

Units: cubic foot (ccf); gallons per day (gpd)

[a]*Summer Flows*

[b]*Per City of Redding: Seasonal peaking factor is approximately 2.3 and diurnal peaking factor is 1.5*

Table 9: Recycled Water Uses Allowed in California (2013)

Recycled Water Uses Allowed[1] in California

Use of Recycled Water	Treatment Level: Disinfected Tertiary Recycled Water	Disinfected Secondary – 2.2 Recycled Water	Disinfected Secondary – 23 Recycled Water	Undisinfected Secondary Recycled Water
Irrigation of:				
Food crops where recycled water contacts the edible portion of the crop, including all root crops	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Parks and playgrounds	**Allowed**	Not Allowed	Not Allowed	Not Allowed
School yards	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Residential landscaping	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Unrestricted-access golf courses	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Any other irrigation uses not prohibited by other provisions of the California Code of Regulations	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Food crops, surface-irrigated, above-ground edible portion, and not contacted by recycled water	**Allowed**	**Allowed**	Not Allowed	Not Allowed
Cemeteries	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Freeway landscaping	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Restricted-access golf courses	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Ornamental nursery stock and sod farms with unrestricted public access	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Pasture for milk animals for human consumption	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Non-edible vegetation with access control to prevent use as a park, playground or school yard	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Orchards with no contact between edible portion and recycled water	**Allowed**	**Allowed**	Not Allowed[2]	Not Allowed[2]
Vineyards with no contact between edible portion and recycled water	**Allowed**	**Allowed**	Not Allowed[2]	Not Allowed[2]
Non food-bearing trees, including Christmas trees not irrigated less than 14 days before harvest	**Allowed**	**Allowed**	**Allowed**	**Allowed**
Fodder and fiber crops and pasture for animals not producing milk for human consumption	**Allowed**	**Allowed**	**Allowed**	**Allowed**
Seed crops not eaten by humans	**Allowed**	**Allowed**	**Allowed**	**Allowed**
Food crops undergoing commercial pathogen-destroying processing before consumption by humans	**Allowed**	**Allowed**	**Allowed**	**Allowed**
Ornamental nursery stock, sod farms not irrigated less than 14 day before harvest	**Allowed**	**Allowed**	**Allowed**	**Allowed**
Supply for impoundment:				
Non-restricted recreational impoundments, with supplemental monitoring for pathogenic organisms	**Allowed**[3]	Not Allowed	Not Allowed	Not Allowed
Restricted recreational impoundments and publicly-accessible fish hatcheries	**Allowed**	**Allowed**	Not Allowed	Not Allowed
Landscape impoundments without decorative fountains	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Supply for cooling or air conditioning:				
Industrial or commercial cooling or air conditioning involving cooling tower, evaporative condenser, or spraying that creates a mist	**Allowed**[4]	Not Allowed	Not Allowed	Not Allowed
Industrial or commercial cooling or air conditioning not involving cooling tower, evaporative condenser, or spraying that creates a mist	**Allowed**	**Allowed**	**Allowed**	Not Allowed

Recycled Water Uses Allowed[1] in California
(continued)

Use of Recycled Water	Treatment Level: Disinfected Tertiary Recycled Water	Disinfected Secondary – 2.2 Recycled Water	Disinfected Secondary – 23 Recycled Water	Undisinfected Secondary Recycled Water
Other uses:				
Groundwater recharge	**Allowed** under special case-by-case permits by RWQCBs[5]			
Flushing toilets and urinals	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Priming drain traps	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Industrial process water that may contact workers	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Structural fire fighting	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Decorative fountains	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Commercial laundries	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Consolidation of backfill material around potable water pipelines	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Artificial snow making for commercial outdoor uses	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Commercial car washes, not heating the water, excluding the general public from washing process	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Industrial process water that will not come into contact with workers	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Industrial boiler feedwater	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Non-structural fire fighting	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Backfill consolidation around non-potable piping	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Soil compaction	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Mixing concrete	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Dust control on roads and streets	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Cleaning roads, sidewalks, and outdoor work areas	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Flushing sanitary sewers	**Allowed**	**Allowed**	**Allowed**	**Allowed**

This summary is prepared from the December 2, 2000-adopted Title 22 Water Recycling Criteria and supersedes all earlier versions. Prepared by Bahman Sheikh and edited by EBMUD Office of Water Recycling, who acknowledge this is a summary and not the formal version of the regulations referenced above.

[1] Refer to the full text of the December 2, 2000 version of Title 22: California Code of Regulations, Chapter 3 Water Recycling Criteria. This chart is only an informal summary of the uses allowed in this version, with the exception of orchards and vineyards noted as "Not Allowed[2]" on page 1 and explained below.

[2] Per California Department of Public Health letter of January 8, 2003 to California Regional Water Quality Control Boards.

[3] Allowed with "conventional tertiary treatment." Additional monitoring for two years or more is necessary with direct filtration.

[4] Drift eliminators and/or biocides are required if public or employees can be exposed to mist.

[5] Refer to Groundwater Recharge Guidelines, available from the California Department of Public Health.

2013

Appendix B

Exhibits

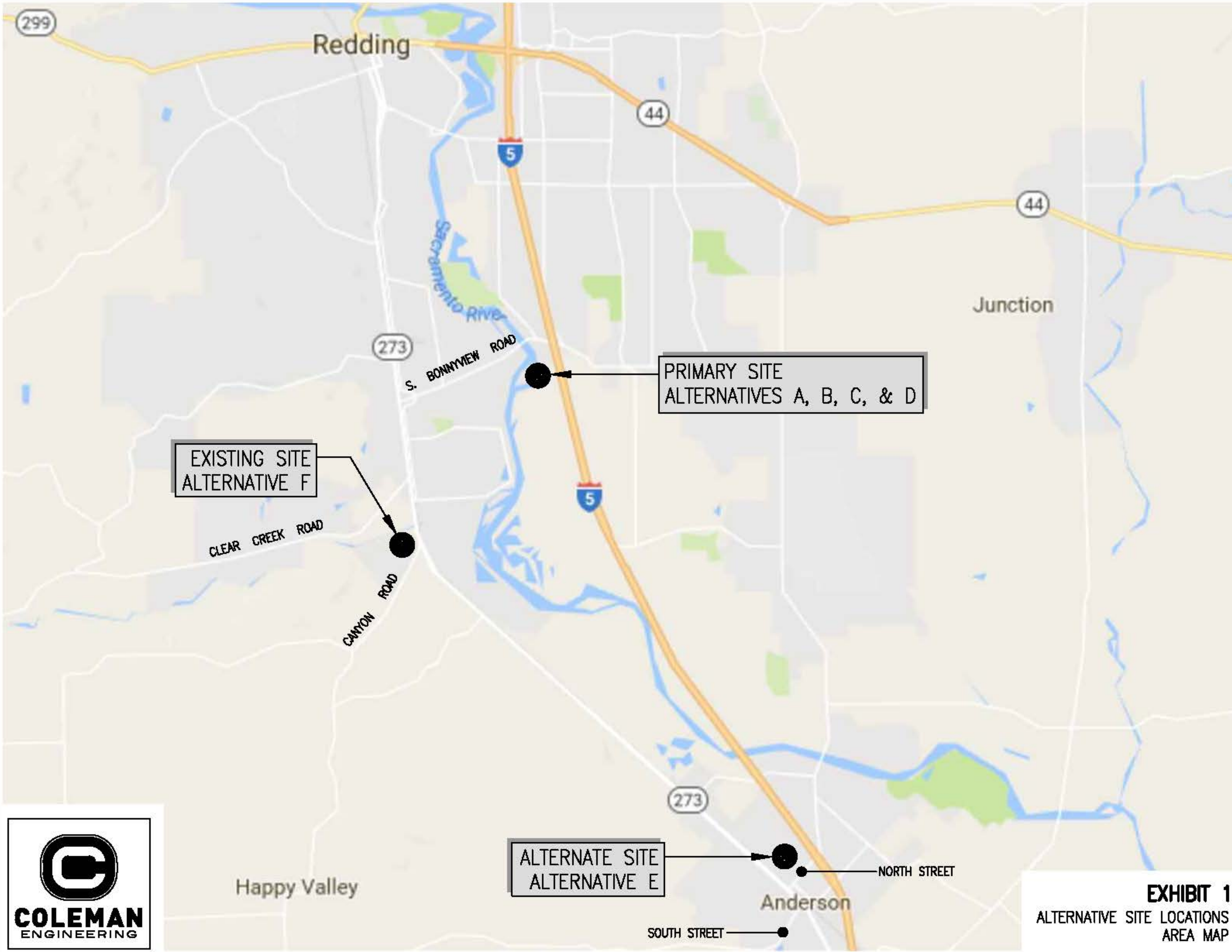
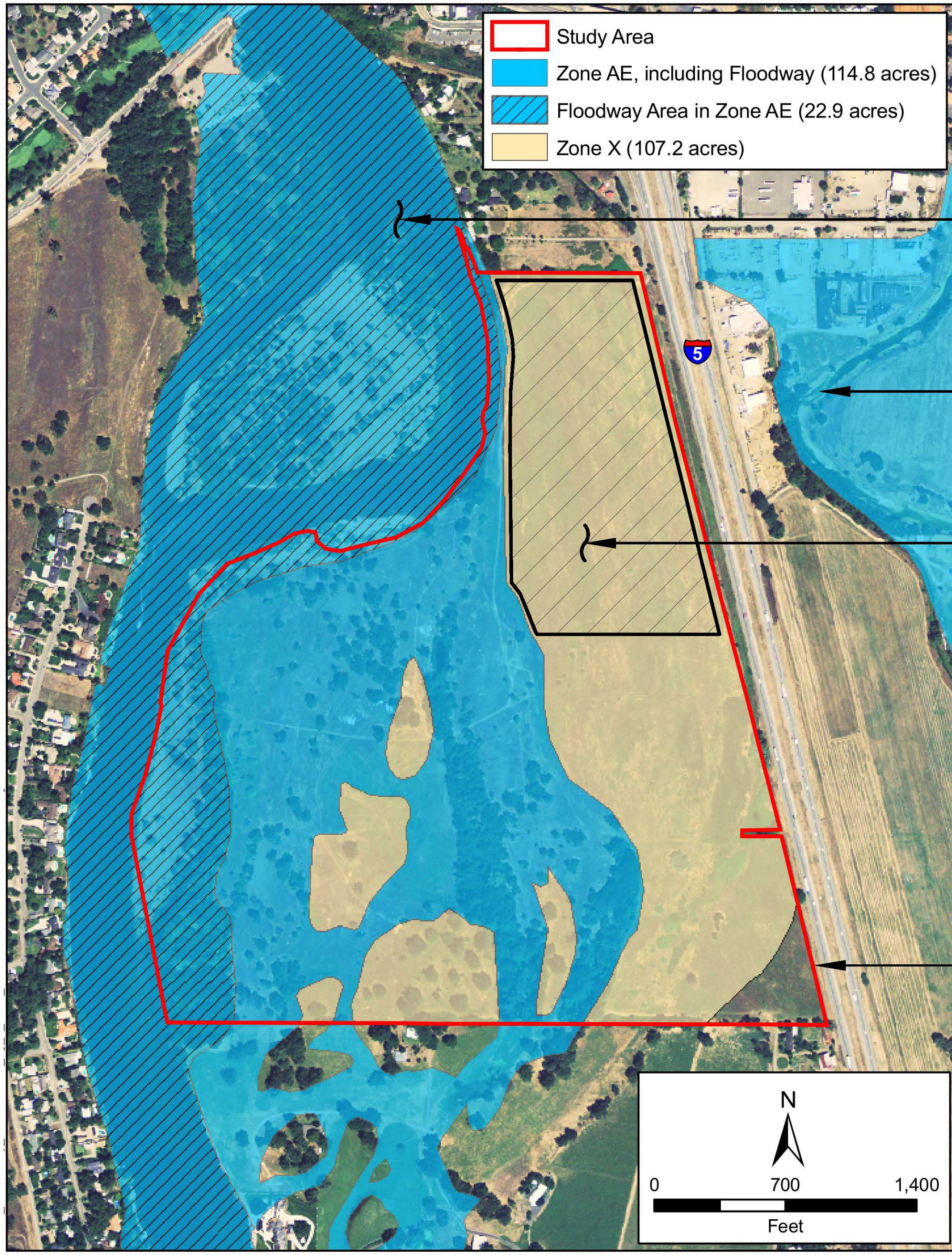


EXHIBIT 1
ALTERNATIVE SITE LOCATIONS
AREA MAP

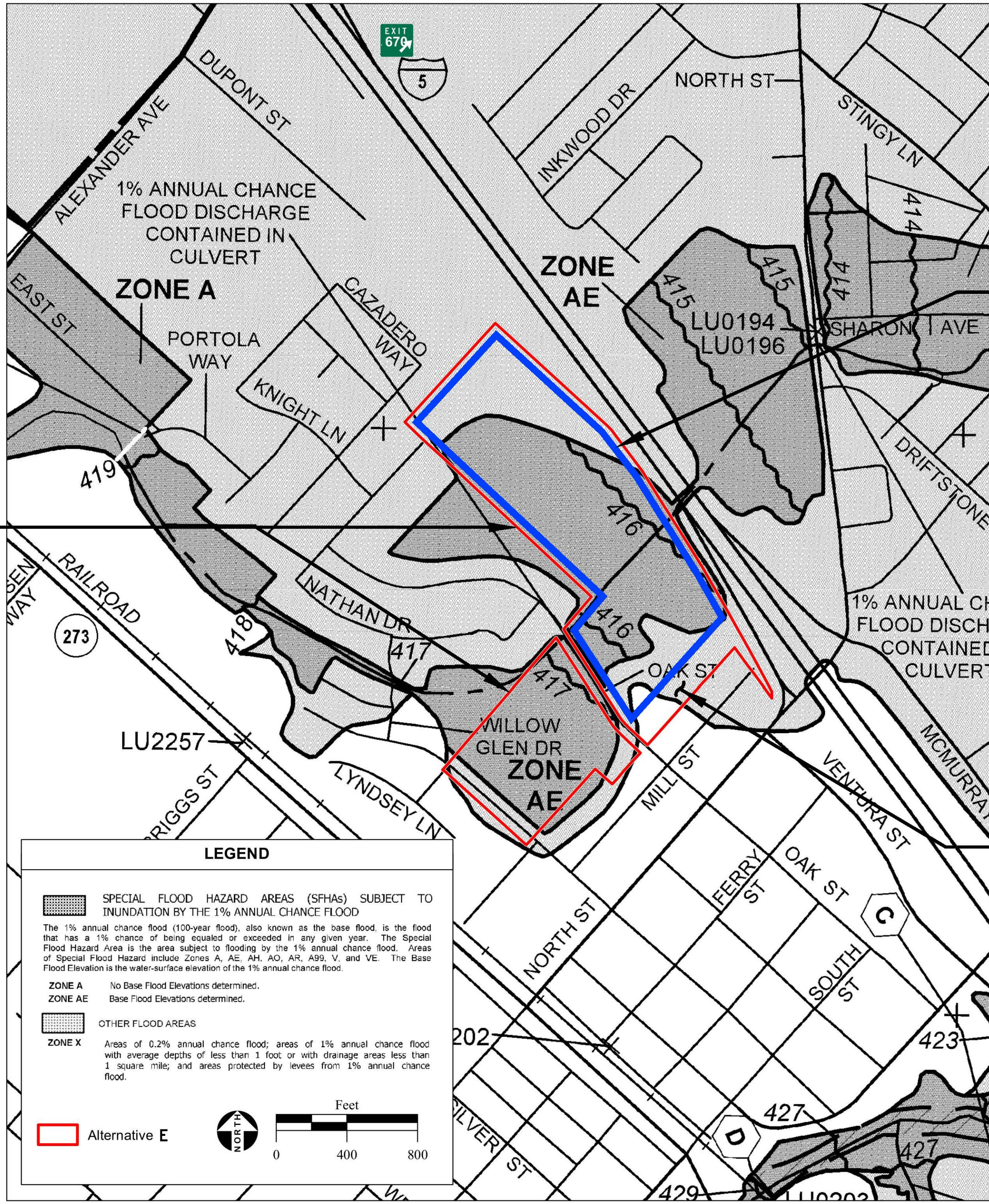


ORIGINAL FIGURE FROM THE DRAFT TECHNICAL MEMORANDUM, FIGURE 2 – OCTOBER 20, 2008 MR. PAUL KIRK

COLEMAN ENGINEERING

EXHIBIT 2A

REDDING PRIMARY SITE FLOODPLAIN MAP



TOTAL PROPERTY BOUNDARY AREA APPROXIMATELY 55 ACRES

ALTERNATIVE E DEVELOPMENT FOOTPRINT APPROXIMATELY 26 ACRES

APPROXIMATELY 8 ACRES OUTSIDE THE FLOODPLAIN AND NOT CLAIMED BY DEVELOPMENT

COLEMAN ENGINEERING

EXHIBIT 2B

ANDERSON ALTERNATE SITE
FLOODPLAIN MAP

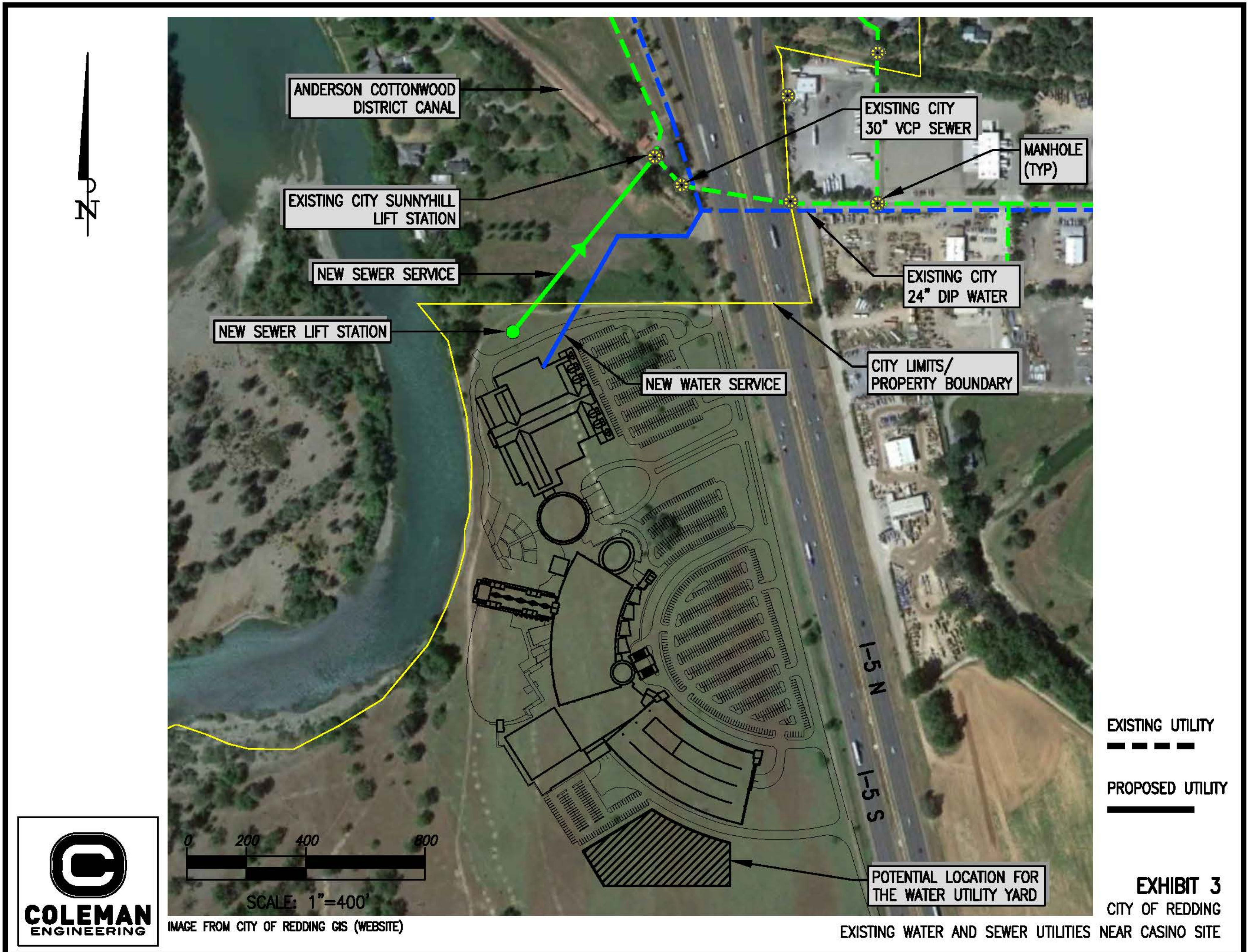
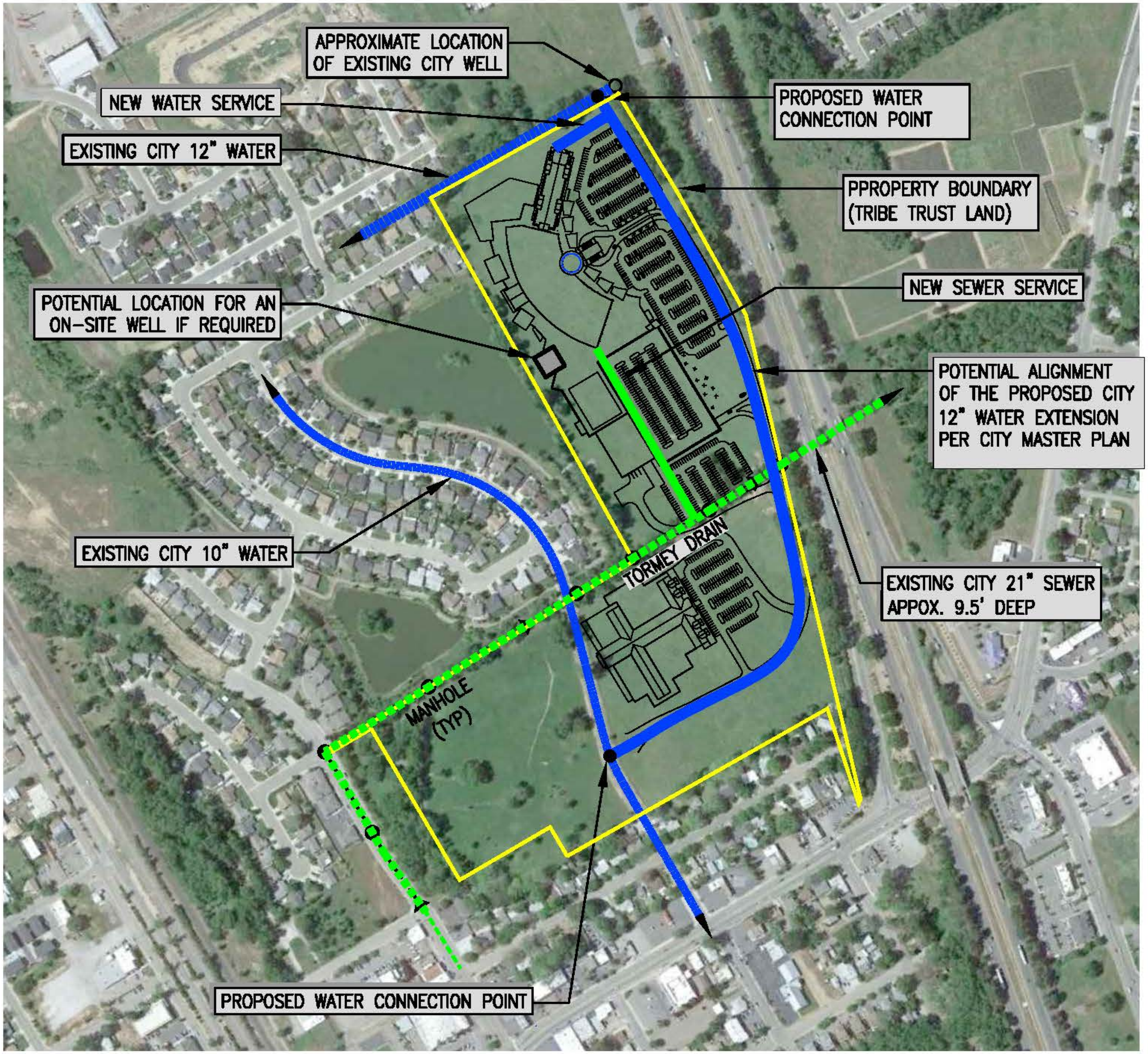


EXHIBIT 3
CITY OF REDDING
EXISTING WATER AND SEWER UTILITIES NEAR CASINO SITE



N
NOT TO SCALE

EXISTING UTILITY

PROPOSED UTILITY

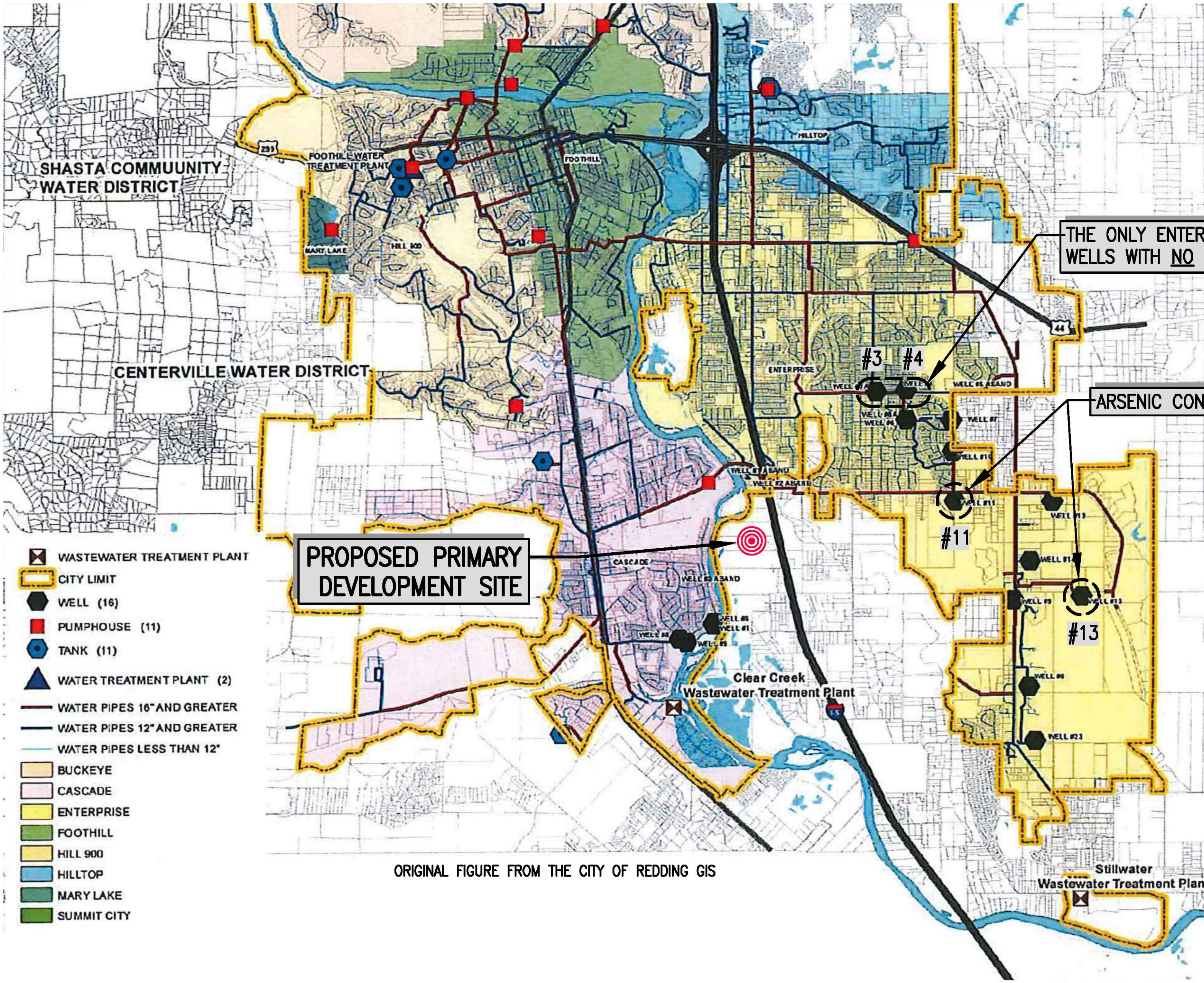
COLEMAN ENGINEERING

NOTE: NO ON-SITE WASTEWATER TREATMENT OR DISPOSAL IS RECOMMENDED AT THIS SITE.

EXHIBIT 4

CITY OF ANDERSON

EXISTING WATER AND SEWER UTILITIES NEAR CASINO SITE



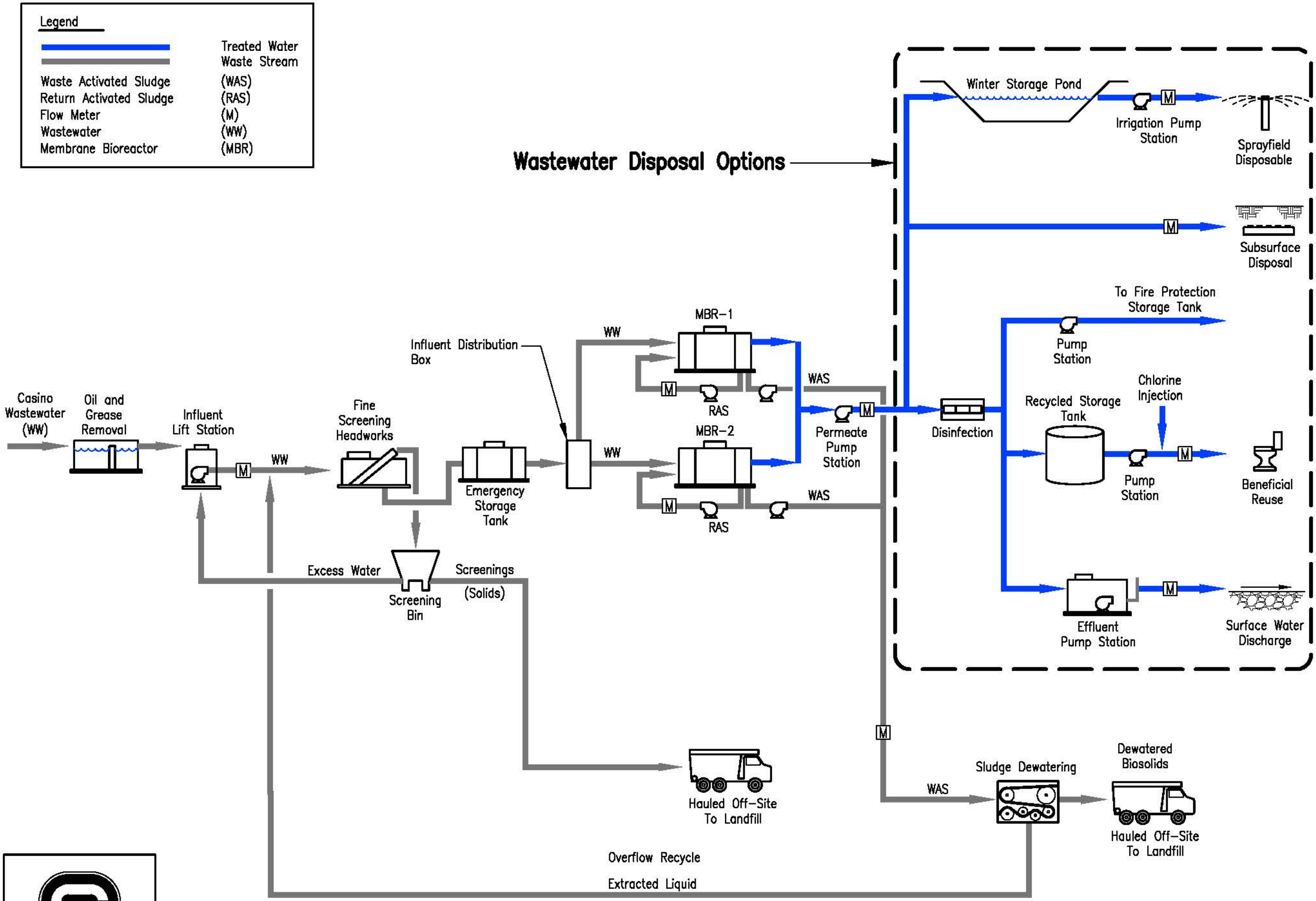
ORIGINAL FIGURE FROM THE CITY OF REDDING GIS

COLEMAN ENGINEERING

EXHIBIT 5

CITY OF REDDING

MUNICIPAL WELL LOCATIONS



COLEMAN ENGINEERING

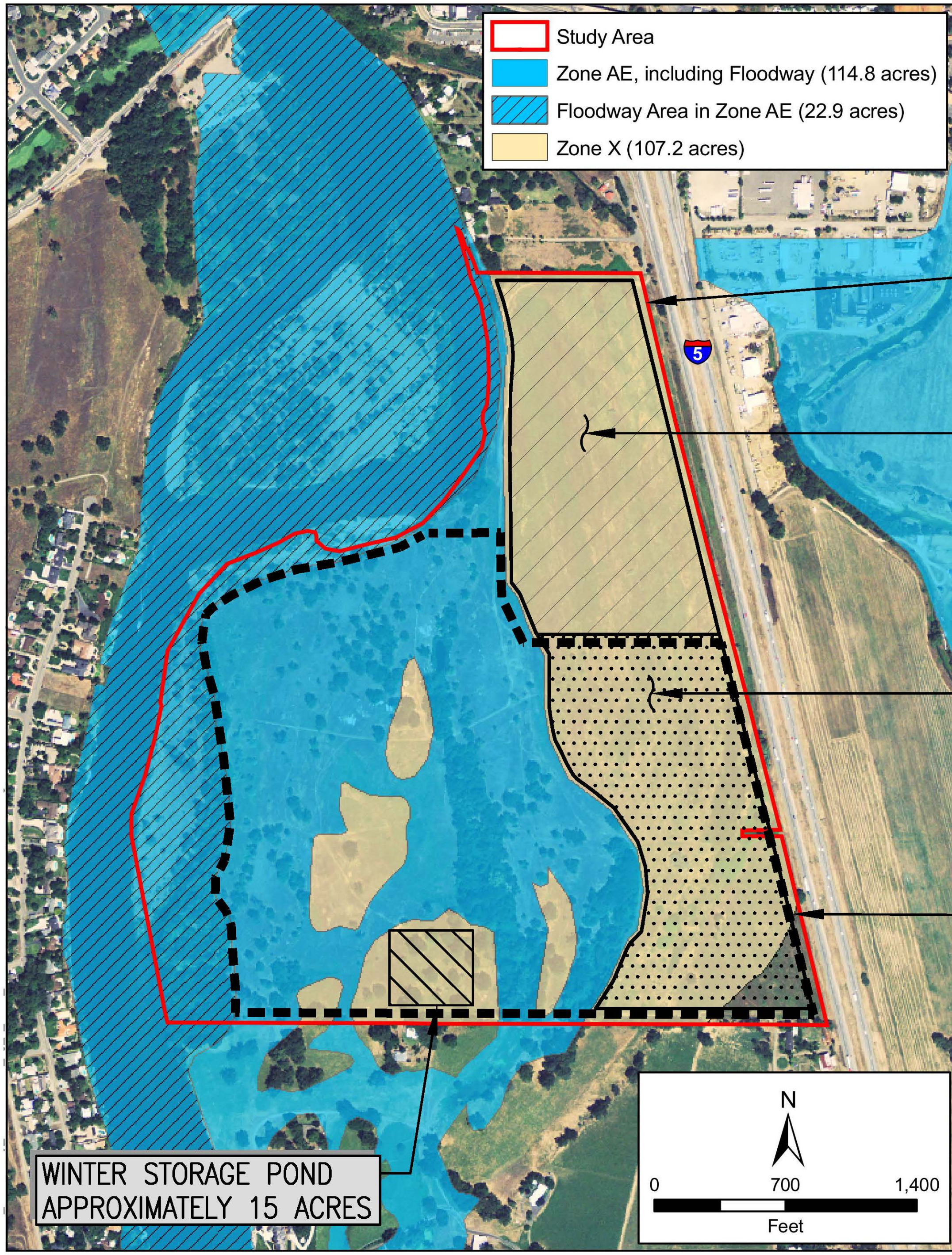
EXHIBIT 6

WASTEWATER MANAGEMENT
MBR PROCESS FLOW DIAGRAM

NOTES:

1. IF SUBSURFACE DISPOSAL IS USED, BOTH THE SUBSURFACE DISPOSAL AREA AND THE WINTER STORAGE AREA CAN BE USED FOR A TOTAL OF 61 ACRES AVAILABLE.

2. ALTERNATIVE A IS THE MOST LAND INTENSIVE DEVELOPMENT OPTION. ALTERNATIVES B-D CAN ALSO BE ACCOMMODATED ON THE REDDING SITE.



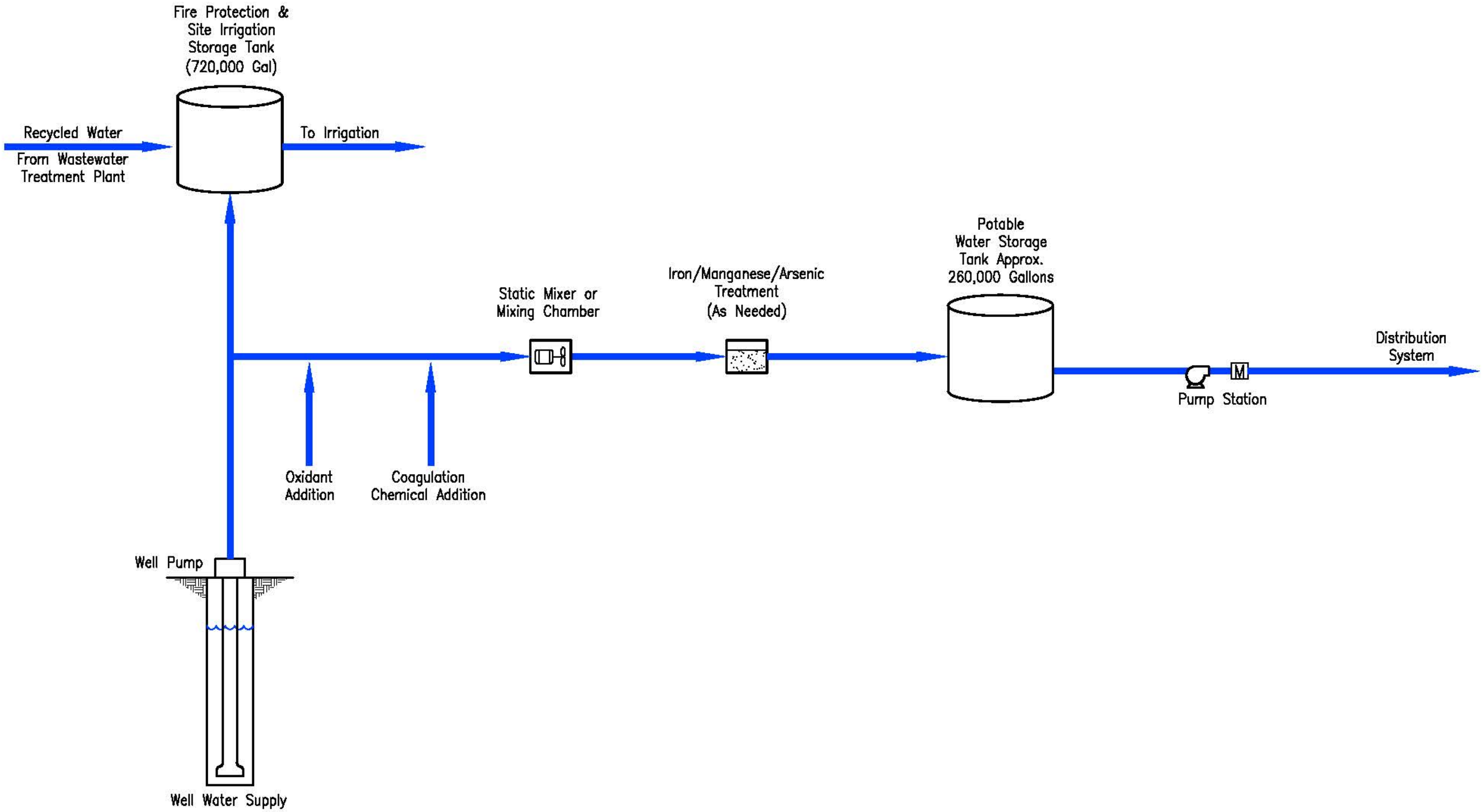
ORIGINAL FIGURE FROM THE DRAFT TECHNICAL MEMORANDUM, FIGURE 2 – OCTOBER 20, 2008 MR. PAUL KIRK

COLEMAN ENGINEERING

EXHIBIT 7

PRIMARY SITE – ALTERNATIVE A

WASTEWATER DISPOSAL OPTIONS LAND REQUIREMENT



COLEMAN ENGINEERING

EXHIBIT 8

DRINKING WATER
PROCESS FLOW DIAGRAM

Appendix C

Tables 2 and 3 Alternatives A-E Worksheets
Table 11 Alternatives A-E Worksheets
Table 12 Alternatives A-E Worksheet

Redding Rancheria Casino - Alternative A
Proposed Project Full Build-Out
Estimated Wastewater Flow Projections

Estimated Wastewater Flows for Alternative A

	Unit	Quantity	Unit flow	Base Flow	A.M		P.M		Typical WEEKDAY Flows	A.M		P.M		Typical WEEKEND Peak Flows	A.M		P.M		AVERAGE Day Flows
			(gpd/unit)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)
CASINO / ENTERTAINMENT																			
Hotel - building area = 182,288 sf	SF	182,288	0.33	60,200															
Standard rooms	Room	225	140	31,500	50%	15,750	50%	15,750	15,750	100%	31,500	100%	31,500	31,500	64%	20,250	64%	20,250	20,250
Suites (rooms)	Room	25	220	5,500	50%	2,750	50%	2,750	2,750	100%	5,500	100%	5,500	5,500	64%	3,536	64%	3,536	3,536
Hotel Lobby, Admin, Back of House	LS	1	2500	2,500	30%	750	50%	1,250	1,000	50%	1,250	100%	2,500	1,875	36%	893	64%	1,607	1,250
Spa	SF	5,000	0.75	3,750	30%	1,125	50%	1,875	1,500	50%	1,875	100%	3,750	2,813	36%	1,339	64%	2,411	1,875
Fitness Center	SF	900	0.5	450	30%	135	50%	225	180	50%	225	100%	450	338	36%	161	64%	289	225
Winter Garden	SF	15,000	0.25	3,750	30%	1,125	50%	1,875	1,500	50%	1,875	100%	3,750	2,813	36%	1,339	64%	2,411	1,875
Outdoor Pool and Facilities	LS	1	4000	4,000	30%	1,200	50%	2,000	1,600	50%	2,000	100%	4,000	3,000	36%	1,429	64%	2,571	2,000
Outdoor Amphitheatre and Facilities	Seats	1,500	5	7,500	0%	-	50%	3,750	1,875	50%	3,750	100%	7,500	5,625	14%	1,071	64%	4,821	2,946
Sub-Total				**59,000**		**22,835**		**29,475**	**26,155**		**48,000**		**59,000**	**53,500**		**30,100**		**37,900**	**34,000**
Casino - building area = 69,515 sf	SF	69,515	0.73	50,800															
Slots	Seat	1,200	20	24,000	45%	10,800	70%	16,800	13,800	70%	16,800	100%	24,000	20,400	52%	12,514	79%	18,857	15,686
Tables (30)	Seat	210	25	5,250	45%	2,363	70%	3,675	3,019	70%	3,675	100%	5,250	4,463	52%	2,738	79%	4,125	3,431
Poker Room	Seat	100	25	2,500	45%	1,125	70%	1,750	1,438	70%	1,750	100%	2,500	2,125	52%	1,304	79%	1,964	1,634
Player's Club	LS	1	2500	2,500	30%	750	50%	1,250	1,000	50%	1,250	100%	2,500	1,875	36%	893	64%	1,607	1,250
Center Bar, "Neighborhood Bars"	LS	1	4500	4,500	30%	1,350	50%	2,250	1,800	50%	2,250	100%	4,500	3,375	36%	1,607	64%	2,893	2,250
Service Bars, Self-Serving Beverage Stations	LS	1	4000	4,000	30%	1,200	50%	2,000	1,600	50%	2,000	100%	4,000	3,000	36%	1,429	64%	2,571	2,000
Back of House spaces	LS	1	8000	8,000	30%	2,400	50%	4,000	3,200	50%	4,000	100%	8,000	6,000	36%	2,857	64%	5,143	4,000
Sub-Total				**50,800**		**19,988**		**31,725**	**25,856**		**31,800**		**50,800**	**41,300**		**23,400**		**37,200**	**30,300**
Food and Beverage - building area = 31,565 sf	SF	31,565	1.9	60,000															
Specialty Restaurants	Seat	66	75	4,950	30%	1,485	65%	3,218	2,351	70%	3,465	100%	4,950	4,208	41%	2,051	75%	3,713	2,882
Café	Seat	100	60	6,000	30%	1,800	65%	3,900	2,850	70%	4,200	100%	6,000	5,100	41%	2,486	75%	4,500	3,493
24-hour Bakery/Deli Counter	Seat	15	50	750	30%	225	65%	488	356	70%	525	100%	750	638	41%	311	75%	563	437
Food Court	Seat	125	150	18,750	30%	5,625	65%	12,188	8,906	70%	13,125	100%	18,750	15,938	41%	7,768	75%	14,063	10,915
Buffet	Seat	225	95	21,375	30%	6,413	65%	13,894	10,153	70%	14,963	100%	21,375	18,169	41%	8,855	75%	16,031	12,443
Sports Bar and Grill Concept	Seat	124	65	8,060	30%	2,418	65%	5,239	3,829	70%	5,642	100%	8,060	6,851	41%	3,339	75%	6,045	4,692
Retail	SF	1,000	0.3	300	40%	120	50%	150	135	70%	210	80%	240	225	49%	146	59%	176	161
Sub-Total				**60,200**		**18,086**		**39,075**	**28,580**		**42,200**		**60,200**	**51,200**		**25,000**		**45,100**	**35,100**
Events Center - building area = 52,200 sf	SF	52,200	0.9	47,000															
Entertainment Venue	Seat	1,800	19	34,200	0%	-	50%	17,100	8,550	100%	34,200	100%	34,200	34,200	29%	9,771	64%	21,986	15,879
Pre-function area, bar, box office	LS	1	7000	7,000	0%	-	50%	3,500	1,750	100%	7,000	100%	7,000	7,000	29%	2,000	64%	4,500	3,250
Stage, Green Room, Back of House, Banquet Kitchen, Storage	LS	1	7000	7,000	0%	-	50%	3,500	1,750	100%	7,000	100%	7,000	7,000	29%	2,000	64%	4,500	3,250
Sub-Total				**48,200**		**-**		**24,100**	**12,050**		**48,200**		**48,200**	**48,200**		**13,800**		**31,000**	**22,400**
Conference Center - building area = 10,080 sf	SF	10,080	1.8	18,200															
Divisible Ballroom	SF	4,800	1	4,800	0%	-	65%	3,120	1,560	100%	4,800	100%	4,800	4,800	29%	1,371	75%	3,600	2,486
Pre-function space, Service Bar, Restrooms	LS	1	6500	6,500	0%	-	65%	4,225	2,113	100%	6,500	100%	6,500	6,500	29%	1,857	75%	4,875	3,366
Banquet Kitchen, Storage, Back of House	LS	1	6500	6,500	0%	-	65%	4,225	2,113	100%	6,500	100%	6,500	6,500	29%	1,857	75%	4,875	3,366
Sub-Total				**17,800**		**-**		**11,570**	**5,785**		**17,800**		**17,800**	**17,800**	**100**	**5,100**	**100**	**13,400**	**9,300**

Redding Rancheria Casino - Alternative A
Proposed Project Full Build-Out
Estimated Wastewater Flow Projections

	Unit	Quantity	Unit flow	Base Flow	A.M		P.M		Typical WEEKDAY Flows	A.M		P.M		Typical WEEKEND Peak Flows	A.M		P.M		AVERAGE Day Flows
			(gpd/unit)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)
Outdoor Sports Retail - building area = 130,000 sf	SF	130,000	0.3	39,000	40%	15,600	50%	19,500	17,550	70%	27,300	80%	31,200	29,250	49%	18,943	59%	22,843	20,893
Sub-Total				**39,000**		**15,600**		**19,500**	**17,550**		**27,300**		**31,200**	**29,300**		**18,943**		**22,843**	**20,900**
Central Plant/Cooling Towers @ 4.5% of gross building area	SF	21,404	3	64,300	50%	32,150	100%	64,300	48,225	50%	32,150	100%	64,300	48,225	50%	32,150	100%	64,300	48,225
Sub-Total				**64,300**		**32,150**		**64,300**	**48,225**		**32,150**		**64,300**	**48,300**		**32,150**		**64,300**	**48,300**
Parking - area = 583,500 sf		583,500																	
Garage (Cars)		1,650																	
Surface (Cars)		600																	
	TOTAL	2,250																	
GRAND TOTAL				**275,000**		**108,658**		**219,745**	**164,202**		**247,450**		**331,500**	**289,600**		**148,493**		**251,743**	**200,300**
				275,200															
Daily Flows								**Weekday Average Flow**	**164,300**				**Weekend Average Flow**	**289,600**				**Week Average Flow**	**200,300**
Calculating Peaking Factor									1.0					1.4					1.22

Average Water Demand (5% increase over this WW calculation above)		210,400
Landscape Irrigation - 5,000 gpd/acre of landscaping (see calc below)		10,919
Average Day Demand (gpd)		221,319
Max Day Demand (gpd)	315,000	
Max Day Demand (gpm)	219	
Calculated Max/Ave Peaking Factor =		1.4
Peak Hour Demand (gpm) = avg. day x 2.5		385

Total Area (SF) =	475,648			
SEWER Flows		WATER Demand		
Average WeekDay Flow (gpd/SF)	0.35	0.00	peaking factor	Peak Hour
Average WeekEnd Flow (gpd/sf)	**0.61**	**0.67**	1.5	
Average Day Flow (gpd/sf)	**0.42**	**0.45**		1.125

Landscaping Demand Calc	
Estimated area that is landscaped, % =	20%
Assumed unit landscaping water demand, gpd/acre =	5,000
Calculated landscape water demand, gpd =	10,919

NO OUTDOOR RETAIL SPACE			
Total Area (SF) =	345,648		
SEWER Flows		WATER Demand	
Average WeekDay Flow (gpd/SF)	0.42	0.45	peaking factor
Average WeekEnd Flow (gpd/sf)	**0.75**	**0.79**	1.5
Average Day Flow (gpd/sf)	**0.52**	**0.54**	
Peak Hour (use 2.5) (gpd/sf)		1.36	

Redding Rancheria Casino - Alternative B
Proposed Project with No Retail
Estimated Wastewater Flow Projections

Estimated Wastewater Flows for Alternative B	Unit	Quantity	Unit flow	Base Flow	A.M		P.M		Typical WEEKDAY Flows	A.M		P.M		Typical WEEKEND Peak Flows	A.M		P.M		AVERAGE Day Flows
			(gpd/unit)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)
CASINO / ENTERTAINMENT																			
Hotel - building area = 182,288 sf	SF	182,288	0.33	60,200															
Standard rooms	Room	225	140	31,500	50%	15,750	50%	15,750	15,750	100%	31,500	100%	31,500	31,500	64%	20,250	64%	20,250	20,250.00
Suites (rooms)	Room	25	220	5,500	50%	2,750	50%	2,750	2,750	100%	5,500	100%	5,500	5,500	64%	3,536	64%	3,536	3,535.71
Hotel Lobby, Admin, Back of House	LS	1	2500	2,500	30%	750	50%	1,250	1,000	50%	1,250	100%	2,500	1,875	36%	893	64%	1,607	1,250.00
Spa	SF	5,000	0.75	3,750	30%	1,125	50%	1,875	1,500	50%	1,875	100%	3,750	2,813	36%	1,339	64%	2,411	1,875.00
Fitness Center	SF	900	0.5	450	30%	135	50%	225	180	50%	225	100%	450	338	36%	161	64%	289	225.00
Winter Garden	SF	15,000	0.25	3,750	30%	1,125	50%	1,875	1,500	50%	1,875	100%	3,750	2,813	36%	1,339	64%	2,411	1,875.00
Outdoor Pool and Facilities	LS	1	4000	4,000	30%	1,200	50%	2,000	1,600	50%	2,000	100%	4,000	3,000	36%	1,429	64%	2,571	2,000.00
Outdoor Amphitheatre and Facilities	Seats	1,500	5	7,500	0%	-	50%	3,750	1,875	50%	3,750	100%	7,500	5,625	14%	1,071	64%	4,821	2,946.43
Sub-Total				**59,000**		**22,835**		**29,475**	**26,155**		**48,000**		**59,000**	**53,500**		**30,100**		**37,900**	**34,000**
Casino - building area = 69,515 sf	SF	69,515	0.73	50,800															
Slots	Seat	1,200	20	24,000	45%	10,800	70%	16,800	13,800	70%	16,800	100%	24,000	20,400	52%	12,514	79%	18,857	15,685.71
Tables (30)	Seat	210	25	5,250	45%	2,363	70%	3,675	3,019	70%	3,675	100%	5,250	4,463	52%	2,738	79%	4,125	3,431.25
Poker Room	Seat	100	25	2,500	45%	1,125	70%	1,750	1,438	70%	1,750	100%	2,500	2,125	52%	1,304	79%	1,964	1,633.93
Player's Club	LS	1	2500	2,500	30%	750	50%	1,250	1,000	50%	1,250	100%	2,500	1,875	36%	893	64%	1,607	1,250.00
Center Bar, "Neighborhood Bars"	LS	1	4500	4,500	30%	1,350	50%	2,250	1,800	50%	2,250	100%	4,500	3,375	36%	1,607	64%	2,893	2,250.00
Service Bars, Self-Serving Beverage Stations	LS	1	4000	4,000	30%	1,200	50%	2,000	1,600	50%	2,000	100%	4,000	3,000	36%	1,429	64%	2,571	2,000.00
Back of House spaces	LS	1	8000	8,000	30%	2,400	50%	4,000	3,200	50%	4,000	100%	8,000	6,000	36%	2,857	64%	5,143	4,000.00
Sub-Total				**50,800**		**19,988**		**31,725**	**25,856**		**31,800**		**50,800**	**41,300**		**23,400**		**37,200**	**30,300**
Food and Beverage - building area = 31,565 sf	SF	31,565	1.9	60,000															
Specialty Restaurants	Seat	66	75	4,950	30%	1,485	65%	3,218	2,351	70%	3,465	100%	4,950	4,208	41%	2,051	75%	3,713	2,881.61
Café	Seat	100	60	6,000	30%	1,800	65%	3,900	2,850	70%	4,200	100%	6,000	5,100	41%	2,486	75%	4,500	3,492.86
24-hour Bakery/Deli Counter	Seat	15	50	750	30%	225	65%	488	356	70%	525	100%	750	638	41%	311	75%	563	436.61
Food Court	Seat	125	150	18,750	30%	5,625	65%	12,188	8,906	70%	13,125	100%	18,750	15,938	41%	7,768	75%	14,063	10,915.18
Buffet	Seat	225	95	21,375	30%	6,413	65%	13,894	10,153	70%	14,963	100%	21,375	18,169	41%	8,855	75%	16,031	12,443.30
Sports Bar and Grill Concept	Seat	124	65	8,060	30%	2,418	65%	5,239	3,829	70%	5,642	100%	8,060	6,851	41%	3,339	75%	6,045	4,692.07
Retail	SF	1,000	0.3	300	40%	120	50%	150	135	70%	210	80%	240	225	49%	146	59%	176	160.71
Sub-Total				**60,200**		**18,086**		**39,075**	**28,580**		**42,200**		**60,200**	**51,200**		**25,000**		**45,100**	**35,100**
Events Center - building area = 52,200 sf	SF	52,200	0.9	47,000															
Entertainment Venue	Seat	1,800	19	34,200	0%	-	50%	17,100	8,550	100%	34,200	100%	34,200	34,200	29%	9,771	64%	21,986	15,878.57
Pre-function area, bar, box office	LS	1	7000	7,000	0%	-	50%	3,500	1,750	100%	7,000	100%	7,000	7,000	29%	2,000	64%	4,500	3,250.00
Stage, Green Room, Back of House, Banquet Kitchen, Storage	LS	1	7000	7,000	0%	-	50%	3,500	1,750	100%	7,000	100%	7,000	7,000	29%	2,000	64%	4,500	3,250.00
Sub-Total				**48,200**		**-**		**24,100**	**12,050**		**48,200**		**48,200**	**48,200**		**13,800**		**31,000**	**22,400**
Conference Center - building area = 10,080 sf	SF	10,080	1.8	18,200															
Divisible Ballroom	SF	4,800	1	4,800	0%	-	65%	3,120	1,560	100%	4,800	100%	4,800	4,800	29%	1,371	75%	3,600	2,485.71
Pre-function space, Service Bar, Restrooms	LS	1	6500	6,500	0%	-	65%	4,225	2,113	100%	6,500	100%	6,500	6,500	29%	1,857	75%	4,875	3,366.07
Banquet Kitchen, Storage, Back of House	LS	1	6500	6,500	0%	-	65%	4,225	2,113	100%	6,500	100%	6,500	6,500	29%	1,857	75%	4,875	3,366.07
Sub-Total				**17,800**		**-**		**11,570**	**5,785**		**17,800**		**17,800**	**17,800**	**100**	**5,100**	**100**	**13,400**	**9,300**

Redding Rancheria Casino - Alternative B
Proposed Project with No Retail
Estimated Wastewater Flow Projections

	Unit	Quantity	Unit flow	Base Flow	A.M		P.M		Typical WEEKDAY Flows	A.M		P.M		Typical WEEKEND Peak Flows	A.M		P.M		AVERAGE Day Flows
			(gpd/unit)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)
Outdoor Sports Retail - building area = 130,000 sf	SF	-	0.3	-	40%	-	50%	-	-	70%	-	80%	-	-	49%	-	59%	-	-
Sub-Total				-		-		-	-		-		-	-		-		-	-
Central Plant/Cooling Towers @ 4.5% of gross building area	SF	15,554	3	46,700	50%	23,350	100%	46,700	35,025	50%	23,350	100%	46,700	35,025	50%	23,350	100%	46,700	35,025
Sub-Total				**46,700**		**23,350**		**46,700**	**35,025**		**23,350**		**46,700**	**35,100**		**23,350**		**46,700**	**35,100**
Parking - area = 583,500 sf		583,500																	
Garage (Cars)		1,650																	
Surface (Cars)		600																	
	TOTAL	2,250																	
GRAND TOTAL				**236,000**		**84,258**		**182,645**	**133,452**		**211,350**		**282,700**	**247,100**		**120,750**		**211,300**	**166,200**
				236,200															
Daily Flows						**Weekday Average Flow**			**133,500**		**Weekend Average Flow**			**247,100**		**Week Average Flow**			**166,200**
Calculating Peaking Factor									1					1.5					1.24

Average Water Demand (5% increase over this WW calculation above)		174,600
Landscape Irrigation - 5,000 gpd/acre of landscaping (see calc below)		7,935
Average Day Demand (gpd)		182,535
Max Day Demand (gpd)	267,400	
Max Day Demand (gpm)	186	
Calculated Max/Ave Peaking Factor =		1.5
Peak Hour Demand (gpm) = avg. day x 2.5		317

Total Area (SF) =	345,648

SEWER Flows		WATER Demand	peaking factor	Peak Hour
Average WeekDay Flow (gpd/SF)	0.39	0.00		
Average WeekEnd Flow (gpd/sf)	**0.71**	**0.78**	1.5	
Average Day Flow (gpd/sf)	**0.48**	**0.51**		1.28

Landscaping Demand Calc	
Estimated area that is landscaped, % =	20%
Assumed unit landscaping water demand, gpd/acre =	5,000
Calculated landscape water demand, gpd =	7,935

NO OUTDOOR RETAIL SPACE	
Total Area (SF) =	345,648

SEWER Flows		WATER Demand	peaking factor
Average WeekDay Flow (gpd/SF)	0.39	0.41	
Average WeekEnd Flow (gpd/sf)	**0.71**	**0.75**	1.5
Average Day Flow (gpd/sf)	**0.48**	**0.50**	
Peak Hour (use 2.5) (gpd/sf)		1.26	

Redding Rancheria Casino - Alternative C
Reduced Intensity
Estimated Wastewater Flow Projections

Estimated Wastewater Flows for Alternative C	Unit	Quantity	Unit flow	Base Flow	A.M		P.M		Typical WEEKDAY Flows	A.M		P.M		Typical WEEKEND Peak Flows	A.M		P.M		AVERAGE Day Flows
			(gpd/unit)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)
CASINO / ENTERTAINMENT																			
Hotel - building area = 182,288 sf	SF	182,288	0.33	60,200.00															
Standard rooms	Room	225	140	31,500.00	50%	15,750.00	50%	15,750.00	15,750.00	100%	31,500.00	100%	31,500.00	31,500.00	64%	20,250.00	64%	20,250.00	20,250.00
Suites (rooms)	Room	25	220	5,500.00	50%	2,750.00	50%	2,750.00	2,750.00	100%	5,500.00	100%	5,500.00	5,500.00	64%	3,535.71	64%	3,535.71	3,535.71
Hotel Lobby, Admin, Back of House	LS	1	2500	2,500.00	30%	750.00	50%	1,250.00	1,000.00	50%	1,250.00	100%	2,500.00	1,875.00	36%	892.86	64%	1,607.14	1,250.00
Spa	SF	5,000	0.75	3,750.00	30%	1,125.00	50%	1,875.00	1,500.00	50%	1,875.00	100%	3,750.00	2,812.50	36%	1,339.29	64%	2,410.71	1,875.00
Fitness Center	SF	900	0.5	450.00	30%	135.00	50%	225.00	180.00	50%	225.00	100%	450.00	337.50	36%	160.71	64%	289.29	225.00
Winter Garden	SF	15,000	0.25	3,750.00	30%	1,125.00	50%	1,875.00	1,500.00	50%	1,875.00	100%	3,750.00	2,812.50	36%	1,339.29	64%	2,410.71	1,875.00
Outdoor Pool and Facilities	LS	1	4000	4,000.00	30%	1,200.00	50%	2,000.00	1,600.00	50%	2,000.00	100%	4,000.00	3,000.00	36%	1,428.57	64%	2,571.43	2,000.00
Outdoor Amphitheatre and Facilities	Seats	1,500	5	7,500.00	0%	-	50%	3,750.00	1,875.00	50%	3,750.00	100%	7,500.00	5,625.00	14%	1,071.43	64%	4,821.43	2,946.43
Sub-Total				59,000		22,835		29,475	26,155		48,000		59,000	53,500		30,100		37,900	34,000
Casino - building area = 54,412 sf	SF	54,412	0.73	39,800.00															
Slots	Seat	825	20	16,500.00	45%	7,425.00	70%	11,550.00	9,487.50	70%	11,550.00	100%	16,500.00	14,025.00	52%	8,603.57	79%	12,964.29	10,783.93
Tables (25)	Seat	175	25	4,375.00	45%	1,968.75	70%	3,062.50	2,515.63	70%	3,062.50	100%	4,375.00	3,718.75	52%	2,281.25	79%	3,437.50	2,859.38
Poker Room	Seat	40	25	1,000.00	45%	450.00	70%	700.00	575.00	70%	700.00	100%	1,000.00	850.00	52%	521.43	79%	785.71	653.57
Player's Club	LS	1	2500	2,500.00	30%	750.00	50%	1,250.00	1,000.00	50%	1,250.00	100%	2,500.00	1,875.00	36%	892.86	64%	1,607.14	1,250.00
Center Bar, "Neighborhood Bars"	LS	1	4500	4,500.00	30%	1,350.00	50%	2,250.00	1,800.00	50%	2,250.00	100%	4,500.00	3,375.00	36%	1,607.14	64%	2,892.86	2,250.00
Service Bars, Self-Serving Beverage Stations	LS	1	4000	4,000.00	30%	1,200.00	50%	2,000.00	1,600.00	50%	2,000.00	100%	4,000.00	3,000.00	36%	1,428.57	64%	2,571.43	2,000.00
Back of House spaces	LS	1	8000	8,000.00	30%	2,400.00	50%	4,000.00	3,200.00	50%	4,000.00	100%	8,000.00	6,000.00	36%	2,857.14	64%	5,142.86	4,000.00
Sub-Total				40,900		15,544		24,813	20,178		24,900		40,900	32,900		18,200		29,500	23,800
Food and Beverage - building area = 30,390 sf	SF	30,390	1.9	57,800.00															
Specialty Restaurants	Seat	66	75	4,950.00	30%	1,485.00	65%	3,217.50	2,351.25	70%	3,465.00	100%	4,950.00	4,207.50	41%	2,050.71	75%	3,712.50	2,881.61
Café	Seat	100	60	6,000.00	30%	1,800.00	65%	3,900.00	2,850.00	70%	4,200.00	100%	6,000.00	5,100.00	41%	2,485.71	75%	4,500.00	3,492.86
24-hour Bakery/Deli Counter	Seat	15	50	750.00	30%	225.00	65%	487.50	356.25	70%	525.00	100%	750.00	637.50	41%	310.71	75%	562.50	436.61
Food Court	Seat	125	150	18,750.00	30%	5,625.00	65%	12,187.50	8,906.25	70%	13,125.00	100%	18,750.00	15,937.50	41%	7,767.86	75%	14,062.50	10,915.18
Buffet	Seat	200	95	19,000.00	30%	5,700.00	65%	12,350.00	9,025.00	70%	13,300.00	100%	19,000.00	16,150.00	41%	7,871.43	75%	14,250.00	11,060.71
Sports Bar and Grill Concept	Seat	124	65	8,060.00	30%	2,418.00	65%	5,239.00	3,828.50	70%	5,642.00	100%	8,060.00	6,851.00	41%	3,339.14	75%	6,045.00	4,692.07
Retail	SF	1,000	0.3	300.00	40%	120.00	50%	150.00	135.00	70%	210.00	80%	240.00	225.00	49%	145.71	59%	175.71	160.71
Sub-Total				57,900		17,373		37,532	27,452		40,500		57,800	49,200		24,000		43,400	33,700
Events Center - building area = 52,200 sf	SF	52,200	0.9	47,000.00															
Entertainment Venue	Seat	1,800	19	34,200.00	0%	-	50%	17,100.00	8,550.00	100%	34,200.00	100%	34,200.00	34,200.00	29%	9,771.43	64%	21,985.71	15,878.57
Pre-function area, bar, box office	LS	1	7000	7,000.00	0%	-	50%	3,500.00	1,750.00	100%	7,000.00	100%	7,000.00	7,000.00	29%	2,000.00	64%	4,500.00	3,250.00
Stage, Green Room, Back of House, Banquet Kitchen, Storage	LS	1	7000	7,000.00	0%	-	50%	3,500.00	1,750.00	100%	7,000.00	100%	7,000.00	7,000.00	29%	2,000.00	64%	4,500.00	3,250.00
Sub-Total				48,200		-		24,100	12,050		48,200		48,200	48,200		13,800		31,000	22,400
Conference Center - building area = 10,080 sf	SF	10,080	1.8	18,200.00															
Divisible Ballroom	SF	4,800	1	4,800.00	0%	-	65%	3,120.00	1,560.00	100%	4,800.00	100%	4,800.00	4,800.00	29%	1,371.43	75%	3,600.00	2,485.71
Pre-function space, Service Bar, Restrooms	LS	1	6500	6,500.00	0%	-	65%	4,225.00	2,112.50	100%	6,500.00	100%	6,500.00	6,500.00	29%	1,857.14	75%	4,875.00	3,366.07
Banquet Kitchen, Storage, Back of House	LS	1	6500	6,500.00	0%	-	65%	4,225.00	2,112.50	100%	6,500.00	100%	6,500.00	6,500.00	29%	1,857.14	75%	4,875.00	3,366.07
Sub-Total				17,800		-		11,570	5,785		17,800		17,800	17,800	100	5,100	100	13,400	9,300

Redding Rancheria Casino - Alternative C
Reduced Intensity
Estimated Wastewater Flow Projections

	Unit	Quantity	Unit flow	Base Flow	A.M		P.M		Typical WEEKDAY Flows	A.M		P.M		Typical WEEKEND Peak Flows	A.M		P.M		AVERAGE Day Flows
			(gpd/unit)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)
Outdoor Sports Retail - building area = 130,000 sf	SF	130,000	0.3	39,000	40%	15,600.00	50%	19,500	17,550	70%	27,300	80%	31,200	29,250	49%	18,943	59%	22,843	20,893
Sub-Total				**39,000**		**15,600**		**19,500**	**17,550**		**27,300**		**31,200**	**29,250**		**18,943**		**22,843**	**20,893**
Central Plant/Cooling Towers @ 4.5% of gross building area	SF	20,672	3	62,100	50%	31,050	100%	62,100	46,575	50%	31,050	100%	62,100	46,575	50%	31,050	100%	62,100	46,575
Sub-Total				**62,100**		**31,050**		**62,100**	**46,575**		**31,050**		**62,100**	**46,600**		**31,050**		**62,100**	**46,600**
Parking - area = 583,500 sf		583,500																	
Garage (Cars)		1,650																	
Surface (Cars)		600																	
GRAND TOTAL				**262,800**		**102,402**		**209,089**	**155,745**		**237,750**		**317,000**	**277,450**		**141,193**		**240,143**	**190,693**
				262,000															
Daily Flows								**Weekday Average Flow**	**155,800**				**Weekend Average Flow**	**277,500**				**Week Average Flow**	**190,700**
Calculating Peaking Factor									1.0					1.5					1.22

Average Water Demand (5% increase over this WW calculation above)		200,300
Landscape Irrigation - 5,000 gpd/acre of landscaping (see calc below)		10,546
Average Day Demand (gpd)		210,846
Max Day Demand (gpd)	301,900	
Max Day Demand (gpm)	210	
Calculated Max/Ave Peaking Factor =		1.4
Peak Hour Demand (gpm) = avg. day x 2.5		367

Total Area (SF) = 459,370

SEWER Flows		WATER Demand		
Average WeekDay Flow (gpd/SF)	0.34	0.00	peaking factor	Peak Hour
Average WeekEnd Flow (gpd/sf)	**0.60**	**0.66**	1.5	
Average Day Flow (gpd/sf)	**0.42**	**0.44**		1.10

Landscaping Demand Calc	
Estimated area that is landscaped, % =	20%
Assumed unit landscaping water demand, gpd/acre =	5,000
Calculated landscape water demand, gpd =	10,546

NO OUTDOOR RETAIL SPACE

Total Area (SF) = 329,370

SEWER Flows		WATER Demand	
Average WeekDay Flow (gpd/SF)	0.42	0.44	peaking factor
Average WeekEnd Flow (gpd/sf)	**0.75**	**0.79**	1.5
Average Day Flow (gpd/sf)	**0.52**	**0.54**	
Peak Hour (use 2.5) (gpd/sf)		1.35	

Redding Rancheria Casino - Alternaive D
Non-Gaming
Estimated Wastewater Flow Projections

Estimated Wastewater Flows for Alternative D																			
	Unit	**Quantity**	**Unit flow**	**Base Flow**	**A.M**		**P.M**		**Typical WEEKDAY Flows**	**A.M**		**P.M**		**Typical WEEKEND Peak Flows**	**A.M**		**P.M**		**AVERAGE Day Flows**
			(gpd/unit)	**(gpd)**	**(%)**	**(gpd)**	**(%)**	**(gpd)**	**(gpd)**	**(%)**	**(gpd)**	**(%)**	**(gpd)**	**(gpd)**	**(%)**	**(gpd)**	**(%)**	**(gpd)**	**(gpd)**
CASINO / ENTERTAINMENT																			
Hotel - building area = 89,717 sf	SF	89,717	0.33	29,700.00															
Standard rooms	Room	121	140	16,940.00	50%	8,470.00	50%	8,470.00	8,470.00	100%	16,940.00	100%	16,940.00	16,940.00	64%	10,890.00	64%	10,890.00	10,890.00
Suites (rooms)	Room	7	220	1,540.00	50%	770.00	50%	770.00	770.00	100%	1,540.00	100%	1,540.00	1,540.00	64%	990.00	64%	990.00	990.00
Hotel Lobby, Admin, Back of House	LS	1	2500	2,500.00	30%	750.00	50%	1,250.00	1,000.00	50%	1,250.00	100%	2,500.00	1,875.00	36%	892.86	64%	1,607.14	1,250.00
Spa	SF	5,000	0.75	3,750.00	30%	1,125.00	50%	1,875.00	1,500.00	50%	1,875.00	100%	3,750.00	2,812.50	36%	1,339.29	64%	2,410.71	1,875.00
Fitness Center	SF	900	0.5	450.00	30%	135.00	50%	225.00	180.00	50%	225.00	100%	450.00	337.50	36%	160.71	64%	289.29	225.00
Winter Garden	SF		0.25	-	30%	-	50%	-	-	50%	-	100%	-	-	36%	-	64%	-	-
Outdoor Pool and Facilities	LS	1	4000	4,000.00	30%	1,200.00	50%	2,000.00	1,600.00	50%	2,000.00	100%	4,000.00	3,000.00	36%	1,428.57	64%	2,571.43	2,000.00
Outdoor Amphitheatre and Facilities	Seats		5	-	0%	-	50%	-	-	50%	-	100%	-	-	14%	-	64%	-	-
Sub-Total				**29,200**		**12,450**		**14,590**	**13,520**		**23,900**		**29,200**	**26,600**		**15,800**		**18,800**	**17,300**
Casino - building area = 0 sf	SF	-	0.73	-															
Slots	Seat		20	-	45%	-	70%	-	-	70%	-	100%	-	-	52%	-	79%	-	-
Tables	Seat		25	-	45%	-	70%	-	-	70%	-	100%	-	-	52%	-	79%	-	-
Poker Room	Seat		25	-	45%	-	70%	-	-	70%	-	100%	-	-	52%	-	79%	-	-
Player's Club	LS		2500	-	30%	-	50%	-	-	50%	-	100%	-	-	36%	-	64%	-	-
Center Bar, "Neighborhood Bars"	LS		4500	-	30%	-	50%	-	-	50%	-	100%	-	-	36%	-	64%	-	-
Service Bars, Self-Serving Beverage Stations	LS		4000	-	30%	-	50%	-	-	50%	-	100%	-	-	36%	-	64%	-	-
Back of House spaces	LS		8000	-	30%	-	50%	-	-	50%	-	100%	-	-	36%	-	64%	-	-
Sub-Total				-		-		-	-		-		-	-		-		-	-
Food and Beverage - building area = 12,178 sf	SF	12,178	1.9	23,200.00															
Specialty Restaurants	Seat	66	75	4,950.00	30%	1,485.00	65%	3,217.50	2,351.25	70%	3,465.00	100%	4,950.00	4,207.50	41%	2,050.71	75%	3,712.50	2,881.61
Café	Seat	85	60	5,100.00	30%	1,530.00	65%	3,315.00	2,422.50	70%	3,570.00	100%	5,100.00	4,335.00	41%	2,112.86	75%	3,825.00	2,968.93
24-hour Bakery/Deli Counter	Seat	15	50	750.00	30%	225.00	65%	487.50	356.25	70%	525.00	100%	750.00	637.50	41%	310.71	75%	562.50	436.61
Food Court	Seat		150	-	30%	-	65%	-	-	70%	-	100%	-	-	41%	-	75%	-	-
Buffet	Seat		95	-	30%	-	65%	-	-	70%	-	100%	-	-	41%	-	75%	-	-
Sports Bar and Grill Concept	Seat	99	65	6,435.00	30%	1,930.50	65%	4,182.75	3,056.63	70%	4,504.50	100%	6,435.00	5,469.75	41%	2,665.93	75%	4,826.25	3,746.09
Retail	SF	1,000	0.3	300.00	40%	120.00	50%	150.00	135.00	70%	210.00	80%	240.00	225.00	49%	145.71	59%	175.71	160.71
Sub-Total				**17,600**		**5,291**		**11,353**	**8,322**		**12,300**		**17,500**	**14,900**		**7,300**		**13,200**	**10,200**
Events Center - building area = 0 sf	SF	-	0.9	-															
Entertainment Venue	Seat		19	-	0%	-	50%	-	-	100%	-	100%	-	-	29%	-	64%	-	-
Pre-function area, bar, box office	LS		7000	-	0%	-	50%	-	-	100%	-	100%	-	-	29%	-	64%	-	-
Stage, Green Room, Back of House, Banquet Kitchen, Storage	LS		7000	-	0%	-	50%	-	-	100%	-	100%	-	-	29%	-	64%	-	-
Sub-Total				-		-		-	-		-		-	-		-		-	-
Conference Center - building area = 0 sf	SF	-	1.8	-															
Divisible Ballroom	SF		1	-	0%	-	65%	-	-	100%	-	100%	-	-	29%	-	75%	-	-
Pre-function space, Service Bar, Restrooms	LS		6500	-	0%	-	65%	-	-	100%	-	100%	-	-	29%	-	75%	-	-
Banquet Kitchen, Storage, Back of House	LS		6500	-	0%	-	65%	-	-	100%	-	100%	-	-	29%	-	75%	-	-
Sub-Total				-		-		-	-		-		-	-		-		-	-

Redding Rancheria Casino - Alternaive D
Non-Gaming
Estimated Wastewater Flow Projections

	Unit	Quantity	Unit flow	Base Flow	A.M		P.M		Typical WEEKDAY Flows	A.M		P.M		Typical WEEKEND Peak Flows	A.M		P.M		AVERAGE Day Flows
			(gpd/unit)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)
Outdoor Sports Retail - building area = 120,000 sf	SF	120,000	0.3	36,000	40%	14,400.00	50%	18,000	16,200	70%	25,200	80%	28,800	27,000	49%	17,486	59%	21,086	19,286
Sub-Total				**36,000**		**14,400**		**18,000**	**16,200**		**25,200**		**28,800**	**27,000**		**17,486**		**21,086**	**19,286**
Central Plant/Cooling Towers @ 4.5% of gross building area	SF	9,985	3	30,000	50%	15,000	100%	30,000	22,500	50%	15,000	100%	30,000	22,500	50%	15,000	100%	30,000	22,500
Sub-Total				**30,000**		**15,000**		**30,000**	**22,500**		**15,000**		**30,000**	**22,500**		**15,000**		**30,000**	**22,500**
Parking - area = ?? sf		-																	
Garage (Cars)																			
Surface (Cars)		200																	
GRAND TOTAL				**82,800**		**47,141**		**73,943**	**60,542**		**76,400**		**105,500**	**91,000**		**55,586**		**83,086**	**69,286**
				88,900															
Daily Flows								**Weekday Average Flow**	**60,600**				**Weekend Average Flow**	**91,000**				**Week Average Flow**	**69,300**
Calculating Peaking Factor									1.0					1.3					1.14

Average Water Demand (5% increase over this WW calculation above)		72,800
Landscape Irrigation - 5,000 gpd/acre of landscaping (see calc below)		5,094
Average Day Demand (gpd)		77,894
Max Day Demand (gpd)	100,700	
Max Day Demand (gpm)	70	
Calculated Max/Ave Peaking Factor =		1.3
Peak Hour Demand (gpm) = avg. day x 2.5		135

Total Area (SF) =	221,895			
SEWER Flows		WATER Demand		
Average WeekDay Flow (gpd/SF)	0.27	0.00	peaking factor	Peak Hour
Average WeekEnd Flow (gpd/sf)	**0.41**	**0.46**	1.4	
Average Day Flow (gpd/sf)	**0.31**	**0.33**		0.83

Landscaping Demand Calc	
Estimated area that is landscaped, % =	20%
Assumed unit landscaping water demand, gpd/acre =	5,000
Calculated landscape water demand, gpd =	5,094

NO OUTDOOR RETAIL SPACE			
Total Area (SF) =	101,895		
SEWER Flows		WATER Demand	
Average WeekDay Flow (gpd/SF)	0.44	0.46	peaking factor
Average WeekEnd Flow (gpd/sf)	**0.63**	**0.66**	1.3
Average Day Flow (gpd/sf)	**0.49**	**0.52**	
Peak Hour (use 2.5) (gpd/sf)		1.29	

Redding Rancheria Casino - Alternaive E
Alternative Site
Estimated Wastewater Flow Projections

Estimated Wastewater Flows for Alternative E - City of Anderson Alternate Site																			
	Unit	**Quantity**	**Unit flow**	**Base Flow**	**A.M**		**P.M**		**Typical WEEKDAY Flows**	**A.M**		**P.M**		**Typical WEEKEND Peak Flows**	**A.M**		**P.M**		**AVERAGE Day Flows**
			(gpd/unit)	**(gpd)**	**(%)**	**(gpd)**	**(%)**	**(gpd)**	**(gpd)**	**(%)**	**(gpd)**	**(%)**	**(gpd)**	**(gpd)**	**(%)**	**(gpd)**	**(%)**	**(gpd)**	**(gpd)**
CASINO / ENTERTAINMENT																			
Hotel - building area = 165,788 sf	SF	165,788	0.33	54,800															
Standard rooms	Room	225	140	31,500	50%	15,750.00	50%	15,750	15,750	100%	31,500	100%	31,500	31,500	64%	20,250	64%	20,250	20,250
Suites (rooms)	Room	25	220	5,500	50%	2,750.00	50%	2,750	2,750	100%	5,500	100%	5,500	5,500	64%	3,536	64%	3,536	3,536
Hotel Lobby, Admin, Back of House	LS	1	2500	2,500	30%	750.00	50%	1,250	1,000	50%	1,250	100%	2,500	1,875	36%	893	64%	1,607	1,250
Spa	SF	5,000	0.75	3,750	30%	1,125.00	50%	1,875	1,500	50%	1,875	100%	3,750	2,813	36%	1,339	64%	2,411	1,875
Fitness Center	SF	900	0.5	450	30%	135.00	50%	225	180	50%	225	100%	450	338	36%	161	64%	289	225
Winter Garden	SF			-	30%	-	50%	-	-	50%	-	100%	-	-	36%	-	64%	-	-
Outdoor Pool and Facilities	LS	1	4000	4,000	30%	1,200.00	50%	2,000	1,600	50%	2,000	100%	4,000	3,000	36%	1,429	64%	2,571	2,000
Outdoor Amphitheatre and Facilities	Seats	1,500	5	7,500	0%	-	50%	3,750	1,875	50%	3,750	100%	7,500	5,625	14%	1,071	64%	4,821	2,946
Sub-Total				**55,200**		**21,710**		**27,600**	**24,655**		**46,100**		**55,200**	**50,700**		**28,700**		**35,500**	**32,100**
Casino - building area = 69,515 sf	SF	69,515	0.73	50,800															
Slots	Seat	1,200	20	24,000	45%	10,800.00	70%	16,800	13,800	70%	16,800	100%	24,000	20,400	52%	12,514	79%	18,857	15,686
Tables (30)	Seat	210	25	5,250	45%	2,362.50	70%	3,675	3,019	70%	3,675	100%	5,250	4,463	52%	2,738	79%	4,125	3,431
Poker Room	Seat	100	25	2,500	45%	1,125.00	70%	1,750	1,438	70%	1,750	100%	2,500	2,125	52%	1,304	79%	1,964	1,634
Player's Club	LS	1	2500	2,500	30%	750.00	50%	1,250	1,000	50%	1,250	100%	2,500	1,875	36%	893	64%	1,607	1,250
Center Bar, "Neighborhood Bars"	LS	1	4500	4,500	30%	1,350.00	50%	2,250	1,800	50%	2,250	100%	4,500	3,375	36%	1,607	64%	2,893	2,250
Service Bars, Self-Serving Beverage Stations	LS	1	4000	4,000	30%	1,200.00	50%	2,000	1,600	50%	2,000	100%	4,000	3,000	36%	1,429	64%	2,571	2,000
Back of House spaces	LS	1	8000	8,000	30%	2,400.00	50%	4,000	3,200	50%	4,000	100%	8,000	6,000	36%	2,857	64%	5,143	4,000
Sub-Total				**50,800**		**19,988**		**31,725**	**25,856**		**31,800**		**50,800**	**41,300**		**23,400**		**37,200**	**30,300**
Food and Beverage - building area = 31,565 sf	SF	31,565	1.9	60,000															
Specialty Restaurants	Seat	66	75	4,950	30%	1,485.00	65%	3,218	2,351	70%	3,465	100%	4,950	4,208	41%	2,051	75%	3,713	2,882
Café	Seat	100	60	6,000	30%	1,800.00	65%	3,900	2,850	70%	4,200	100%	6,000	5,100	41%	2,486	75%	4,500	3,493
24-hour Bakery/Deli Counter	Seat	15	50	750	30%	225.00	65%	488	356	70%	525	100%	750	638	41%	311	75%	563	437
Food Court	Seat	125	150	18,750	30%	5,625.00	65%	12,188	8,906	70%	13,125	100%	18,750	15,938	41%	7,768	75%	14,063	10,915
Buffet	Seat	225	95	21,375	30%	6,412.50	65%	13,894	10,153	70%	14,963	100%	21,375	18,169	41%	8,855	75%	16,031	12,443
Sports Bar and Grill Concept	Seat	124	65	8,060	30%	2,418.00	65%	5,239	3,829	70%	5,642	100%	8,060	6,851	41%	3,339	75%	6,045	4,692
Retail	SF	1,000	0.3	300	40%	120.00	50%	150	135	70%	210	80%	240	225	49%	146	59%	176	161
Sub-Total				**60,200**		**18,086**		**39,075**	**28,580**		**42,200**		**60,200**	**51,200**		**25,000**		**45,100**	**35,100**
Events Center - building area = 52,200 sf	SF	52,200	0.9	47,000															
Entertainment Venue	Seat	1,800	19	34,200	0%	-	50%	17,100	8,550	100%	34,200	100%	34,200	34,200	29%	9,771	64%	21,986	15,879
Pre-function area, bar, box office	LS	1	7000	7,000	0%	-	50%	3,500	1,750	100%	7,000	100%	7,000	7,000	29%	2,000	64%	4,500	3,250
Stage, Green Room, Back of House, Banquet Kitchen, Storage	LS	1	7000	7,000	0%	-	50%	3,500	1,750	100%	7,000	100%	7,000	7,000	29%	2,000	64%	4,500	3,250
Sub-Total				**48,200**		**-**		**24,100**	**12,050**		**48,200**		**48,200**	**48,200**		**13,800**		**31,000**	**22,400**
Conference Center - building area = 10,080 sf	SF	10,080	1.8	18,200															
Divisible Ballroom	SF	4,800	1	4,800	0%	-	65%	3,120	1,560	100%	4,800	100%	4,800	4,800	29%	1,371	75%	3,600	2,486
Pre-function space, Service Bar, Restrooms	LS	1	6500	6,500	0%	-	65%	4,225	2,113	100%	6,500	100%	6,500	6,500	29%	1,857	75%	4,875	3,366
Banquet Kitchen, Storage, Back of House	LS	1	6500	6,500	0%	-	65%	4,225	2,113	100%	6,500	100%	6,500	6,500	29%	1,857	75%	4,875	3,366
Sub-Total				**17,800**		**-**		**11,570**	**5,785**		**17,800**		**17,800**	**17,800**	**100**	**5,100**	**100**	**13,400**	**9,300**

Redding Rancheria Casino - Alternaive E
Alternative Site
Estimated Wastewater Flow Projections

	Unit	Quantity	Unit flow	Base Flow	A.M		P.M		Typical WEEKDAY Flows	A.M		P.M		Typical WEEKEND Peak Flows	A.M		P.M		AVERAGE Day Flows
			(gpd/unit)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)	(%)	(gpd)	(%)	(gpd)	(gpd)
Outdoor Sports Retail - building area = 120,000 sf	SF	120,000	0.3	36,000	40%	14,400.00	50%	18,000	16,200	70%	25,200	80%	28,800	27,000	49%	17,486	59%	21,086	19,286
Sub-Total				**36,000**		**14,400**		**18,000**	**16,200**		**25,200**		**28,800**	**27,000**		**17,486**		**21,086**	**19,286**
Central Plant/Cooling Towers @ 4.5% of gross building area	SF	20,212	3	60,700	50%	30,350	100%	60,700	45,525	50%	30,350	100%	60,700	45,525	50%	30,350	100%	60,700	45,525
Sub-Total				**60,700**		**30,350**		**60,700**	**45,525**		**30,350**		**60,700**	**45,600**		**30,350**		**60,700**	**45,600**
Parking - area = 583,500 sf		583,500																	
Garage (Cars)		1,650																	
Surface (Cars)		600																	
GRAND TOTAL				**268,200**		**104,533**		**212,770**	**158,652**		**241,650**		**321,700**	**281,800**		**143,836**		**243,986**	**194,086**
				266,800															
Daily Flows								**Weekday Average Flow**	**158,700**				**Weekend Average Flow**	**281,800**				**Week Average Flow**	**194,100**
Calculating Peaking Factor									1.0					1.5					1.2

Average Water Demand (5% increase over this WW calculation above)		######
Landscape Irrigation - 5,000 gpd/acre of landscaping (see calc below)		10,311
Average Day Demand (gpd)		######
Max Day Demand (gpd)	306,300	
Max Day Demand (gpm)	213	
Calculated Max/Ave Peaking Factor =		1.4
Peak Hour Demand (gpm) = avg. day x 2.5		372

Total Area (SF) =	449,148			
SEWER Flows		WATER Demand		
Average WeekDay Flow (gpd/SF)	0.35	0.00	peaking factor	Peak Hour
Average WeekEnd Flow (gpd/sf)	**0.63**	**0.69**	1.5	
Average Day Flow (gpd/sf)	**0.43**	**0.46**		1.15

Landscaping Demand Calc	
Estimated area that is landscaped, % =	20%
Assumed unit landscaping water demand, gpd/acre =	5,000
Calculated landscape water demand, gpd =	10,311

NO OUTDOOR RETAIL SPACE			
Total Area (SF) =	329,148		
SEWER Flows		WATER Demand	
Average WeekDay Flow (gpd/SF)	0.43	0.45	peaking factor
Average WeekEnd Flow (gpd/sf)	**0.77**	**0.81**	1.5
Average Day Flow (gpd/sf)	**0.53**	**0.56**	
Peak Hour (use 2.5) (gpd/sf)		1.39	

Redding Rancheria Casino
Alternative A - Water Balance

100-YEAR RAINFALL

										Conversion from (in) to (MG)			Agronomic Rate			
MONTH	DAY	RAINFALL* (in)	PAN EVAP. (in)	POND EVAP. (in)	POND INFILTRATION (in)	CROP EVAPOTRANSPIRATION** (in/month)	CROP COEFFICIENT*** (alfalfa)	CROP ET (in)	NET RAIN / EVAPO / CROP (in)	NET RAIN / EVAPO / CROP (MG)	POND INFILTRATION (MG)	INFLOW (MG)	DISPOSAL TO SPRAY FIELD (GPD)	DISPOSAL TO SPRAY FIELD (MG)	NET FLOW TO/FROM POND (MG)	ACCUM. IN POND (MG)
NOV	30	9.48	2.72	-1.74	-0.10	2.1	0.9	0	7.74	2.52	-0.03	6.01			8.50	8.50
DEC	31	9.68	1.77	-1.13	-0.10	1.55	0.9	0	8.55	2.78	-0.03	6.21			8.96	17.46
JAN	31	15.08	2.05	-1.31	-0.10	1.55	0.9	0	13.77	4.49	-0.03	6.21			10.66	28.12
FEB	28	12.08	2.80	-1.79	-0.10	2.24	0.9	0	10.29	3.35	-0.03	5.61			8.93	37.05
MARCH	31	13.20	4.96	-3.17	-0.10	3.72	0.9	0	10.03	3.27	-0.03	6.21			9.44	46.50
APRIL	30	5.80	7.01	-4.49	-0.10	5.1	0.9	-4.59	-3.28	-1.07	-0.03	6.01	179,903	-5.40	-0.49	46.01
MAY	31	2.58	9.25	-7.03	-0.10	6.82	0.9	-6.138	-10.59	-3.45	-0.03	6.21	359,806	-11.15	-8.43	37.58
JUNE	30	1.54	11.46	-8.71	-0.10	7.8	0.9	-7.02	-14.19	-4.62	-0.03	6.01	359,806	-10.79	-9.44	28.14
JULY	31	1.26	14.21	-10.80	-0.10	8.68	0.9	-7.812	-17.35	-5.65	-0.03	6.21	359,806	-11.15	-10.63	17.51
AUG	31	1.74	13.50	-10.26	-0.10	7.75	0.9	-6.975	-15.50	-5.05	-0.03	6.21	359,806	-11.15	-10.03	7.48
SEPT	30	4.00	11.54	-8.77	-0.10	5.7	0.9	-5.13	-9.90	-3.22	-0.03	6.01	359,806	-10.79	-8.04	-0.56
OCT	31	4.40	6.34	-4.82	-0.10	4.03	0.9	-3.627	-4.04	-1.32	-0.03	6.21	179,903	-5.58	-0.72	-1.28
TOTAL	**365**	**80.84**	**87.60**	**-64.02**	**-1.20**	**57.04**		**-41.29**	**-24.47**	**-7.97**	**-0.39**	**73.11**	**2,158,834**	**-66.02**	**-1.28**	

INFLOW (WASTEAWATER) (gpd) =	200,300
AREA OF WINTER STORAGE POND (acres) (interation) =	12
LAND APPLICATION AREA (acres) (iteration) =	**59**
SOIL APPLICATION (HYDRAULIC LOADING) RATE for PERCOLATION (gpd/sf) =	0.14
DAYS OF IRRIGATION (days) - Half months of October and April =	183

Pond Size (acres) =	**12**	@ 12' deep
20% Pond Size Increase =	**15**	
20% LAA Increase =	**71**	
Reuse (LAA reduction by 30%) =	**50**	

*Rainfall data from Western Regional Climate Center (1971-2000); assume 100-year rainfall is 2x the average year rainfall
**California Irrigation Management Information System (CIMIS) Reference EvapoTranspiration (Eto) Zones, Department of Water Resources
***Alfalfa crop coefficient range of 0.57 to 1.15 during growing season. Use 0.90 for Zone 14.

Redding Rancheria Casino
Alternative B - Water Balance

100-YEAR RAINFALL

MONTH	DAY	RAINFALL* (in)	PAN EVAP. (in)	POND EVAP. (in)	POND INFILTRATION (in)	CROP EVAPOTRANSPIRATION** (in/month)	CROP COEFFICIENT*** (alfalfa)	CROP ET (in)	NET RAIN / EVAPO / CROP (in)	Conversion from (in) to (MG): NET RAIN / EVAPO / CROP (MG)	Conversion from (in) to (MG): POND INFILTRATION (MG)	Conversion from (in) to (MG): INFLOW (MG)	Agronomic Rate: DISPOSAL TO SPRAY FIELD (GPD)	Agronomic Rate: DISPOSAL TO SPRAY FIELD (MG)	NET FLOW TO/FROM POND (MG)	ACCUM. IN POND (MG)
NOV	30	9.48	2.72	-1.74	-0.10	2.1	0.9	0	7.74	2.31	-0.03	4.99			7.27	7.27
DEC	31	9.68	1.77	-1.13	-0.10	1.55	0.9	0	8.55	2.55	-0.03	5.15			7.67	14.94
JAN	31	15.08	2.05	-1.31	-0.10	1.55	0.9	0	13.77	4.11	-0.03	5.15			9.24	24.18
FEB	28	12.08	2.80	-1.79	-0.10	2.24	0.9	0	10.29	3.07	-0.03	4.65			7.70	31.88
MARCH	31	13.20	4.96	-3.17	-0.10	3.72	0.9	0	10.03	2.99	-0.03	5.15			8.12	39.99
APRIL	30	5.80	7.01	-4.49	-0.10	5.1	0.9	-4.59	-3.28	-0.98	-0.03	4.99	155,509	-4.67	-0.69	39.30
MAY	31	2.58	9.25	-7.03	-0.10	6.82	0.9	-6.138	-10.59	-3.16	-0.03	5.15	311,018	-9.64	-7.68	31.62
JUNE	30	1.54	11.46	-8.71	-0.10	7.8	0.9	-7.02	-14.19	-4.24	-0.03	4.99	311,018	-9.33	-8.61	23.01
JULY	31	1.26	14.21	-10.80	-0.10	8.68	0.9	-7.812	-17.35	-5.18	-0.03	5.15	311,018	-9.64	-9.70	13.31
AUG	31	1.74	13.50	-10.26	-0.10	7.75	0.9	-6.975	-15.50	-4.63	-0.03	5.15	311,018	-9.64	-9.15	4.16
SEPT	30	4.00	11.54	-8.77	-0.10	5.7	0.9	-5.13	-9.90	-2.96	-0.03	4.99	311,018	-9.33	-7.33	-3.17
OCT	31	4.40	6.34	-4.82	-0.10	4.03	0.9	-3.627	-4.04	-1.21	-0.03	5.15	155,509	-4.82	-0.91	-4.08
TOTAL	**365**	**80.84**	**87.60**	**-64.02**	**-1.20**	**57.04**		**-41.29**	**-24.47**	**-7.31**	**-0.36**	**60.66**	**1,866,110**	**-57.07**	**-4.08**	

INFLOW (WASTEAWATER) (gpd) =	166,200
AREA OF WINTER STORAGE POND (acres) (interation) =	11
LAND APPLICATION AREA (acres) (iteration) =	**51**
SOIL APPLICATION (HYDRAULIC LOADING) RATE for PERCOLATION (gpd/sf) =	0.14
DAYS OF IRRIGATION (days) - Half months of October and April =	183

Pond Size (acres) =	**10** @ 12' deep
20% Pond Size Increase =	**13**
20% LAA Increase =	**62**
Reuse (LAA reduction by 30%) =	**44**

*Rainfall data from Western Regional Climate Center (1971-2000); assume 100-year rainfall is 2x the average year rainfall
**California Irrigation Management Information System (CIMIS) Reference EvapoTranspiration (Eto) Zones, Department of Water Resources
***Alfalfa crop coefficient range of 0.57 to 1.15 during growing season. Use 0.90 for Zone 14.

Redding Rancheria Casino
Alternative C - Water Balance

100-YEAR RAINFALL

										Conversion from (in) to (MG)			Agronomic Rate			
MONTH	DAY	RAINFALL* (in)	PAN EVAP. (in)	POND EVAP. (in)	POND INFILTRATION (in)	CROP EVAPOTRANSPIRATION** (in/month)	CROP COEFFICIENT*** (alfalfa)	CROP ET (in)	NET RAIN / EVAPO / CROP (in)	NET RAIN / EVAPO / CROP (MG)	POND INFILTRATION (MG)	INFLOW (MG)	DISPOSAL TO SPRAY FIELD (GPD)	DISPOSAL TO SPRAY FIELD (MG)	NET FLOW TO/FROM POND (MG)	ACCUM. IN POND (MG)
NOV	30	9.48	2.72	-1.74	-0.10	2.1	0.9	0	7.74	2.31	-0.03	5.72			8.00	8.00
DEC	31	9.68	1.77	-1.13	-0.10	1.55	0.9	0	8.55	2.55	-0.03	5.91			8.43	16.44
JAN	31	15.08	2.05	-1.31	-0.10	1.55	0.9	0	13.77	4.11	-0.03	5.91			9.99	26.43
FEB	28	12.08	2.80	-1.79	-0.10	2.24	0.9	0	10.29	3.07	-0.03	5.34			8.38	34.82
MARCH	31	13.20	4.96	-3.17	-0.10	3.72	0.9	0	10.03	2.99	-0.03	5.91			8.88	43.69
APRIL	30	5.80	7.01	-4.49	-0.10	5.1	0.9	-4.59	-3.28	-0.98	-0.03	5.72	124,146	-3.72	0.99	44.68
MAY	31	2.58	9.25	-7.03	-0.10	6.82	0.9	-6.138	-10.59	-3.16	-0.03	5.91	248,292	-7.70	-4.98	39.70
JUNE	30	1.54	11.46	-8.71	-0.10	7.8	0.9	-7.02	-14.19	-4.24	-0.03	5.72	248,292	-7.45	-5.99	33.71
JULY	31	1.26	14.21	-10.80	-0.10	8.68	0.9	-7.812	-17.35	-5.18	-0.03	5.91	248,292	-7.70	-7.00	26.71
AUG	31	1.74	13.50	-10.26	-0.10	7.75	0.9	-6.975	-15.50	-4.63	-0.03	5.91	248,292	-7.70	-6.44	20.26
SEPT	30	4.00	11.54	-8.77	-0.10	5.7	0.9	-5.13	-9.90	-2.96	-0.03	5.72	248,292	-7.45	-4.71	15.55
OCT	31	4.40	6.34	-4.82	-0.10	4.03	0.9	-3.627	-4.04	-1.21	-0.03	5.91	124,146	-3.85	0.83	16.38
TOTAL	**365**	**80.84**	**87.60**	**-64.02**	**-1.20**	**57.04**		**-41.29**	**-24.47**	**-7.31**	**-0.36**	**69.61**	**1,489,752**	**-45.56**	**16.38**	

INFLOW (WASTEAWATER) (gpd) =	190,700
AREA OF WINTER STORAGE POND (acres) (interation) =	11
LAND APPLICATION AREA (acres) (iteration) =	**57**
SOIL APPLICATION (HYDRAULIC LOADING) RATE for PERCOLATION (gpd/sf) =	0.1
DAYS OF IRRIGATION (days) - Half months of October and April =	183

Pond Size (acres) =	**11**	@ 12' deep
20% Pond Size Increase =	**14**	
20% LAA Increase =	**69**	
Reuse (LAA reduction by 30%) =	**49**	

*Rainfall data from Western Regional Climate Center (1971-2000); assume 100-year rainfall is 2x the average year rainfall
**California Irrigation Management Information System (CIMIS) Reference EvapoTranspiration (Eto) Zones, Department of Water Resources
***Alfalfa crop coefficient range of 0.57 to 1.15 during growing season. Use 0.90 for Zone 14.

Redding Rancheria Casino
Alternative D - Water Balance

100-YEAR RAINFALL

										Conversion from (in) to (MG)			Agronomic Rate			
MONTH	DAY	RAINFALL* (in)	PAN EVAP. (in)	POND EVAP. (in)	POND INFILTRATION (in)	CROP EVAPOTRANSPIRATION** (in/month)	CROP COEFFICIENT*** (alfalfa)	CROP ET (in)	NET RAIN / EVAPO / CROP (in)	NET RAIN / EVAPO / CROP (MG)	POND INFILTRATION (MG)	INFLOW (MG)	DISPOSAL TO SPRAY FIELD (GPD)	DISPOSAL TO SPRAY FIELD (MG)	NET FLOW TO/FROM POND (MG)	ACCUM. IN POND (MG)
NOV	30	9.48	2.72	-1.74	-0.10	2.1	0.9	0	7.74	0.84	-0.01	2.08			2.91	2.91
DEC	31	9.68	1.77	-1.13	-0.10	1.55	0.9	0	8.55	0.93	-0.01	2.15			3.07	5.97
JAN	31	15.08	2.05	-1.31	-0.10	1.55	0.9	0	13.77	1.50	-0.01	2.15			3.63	9.61
FEB	28	12.08	2.80	-1.79	-0.10	2.24	0.9	0	10.29	1.12	-0.01	1.94			3.05	12.65
MARCH	31	13.20	4.96	-3.17	-0.10	3.72	0.9	0	10.03	1.09	-0.01	2.15			3.23	15.88
APRIL	30	5.80	7.01	-4.49	-0.10	5.1	0.9	-4.59	-3.28	-0.36	-0.01	2.08	39,204	-1.18	0.54	16.42
MAY	31	2.58	9.25	-7.03	-0.10	6.82	0.9	-6.138	-10.59	-1.15	-0.01	2.15	78,408	-2.43	-1.44	14.97
JUNE	30	1.54	11.46	-8.71	-0.10	7.8	0.9	-7.02	-14.19	-1.54	-0.01	2.08	78,408	-2.35	-1.82	13.15
JULY	31	1.26	14.21	-10.80	-0.10	8.68	0.9	-7.812	-17.35	-1.88	-0.01	2.15	78,408	-2.43	-2.18	10.97
AUG	31	1.74	13.50	-10.26	-0.10	7.75	0.9	-6.975	-15.50	-1.68	-0.01	2.15	78,408	-2.43	-1.98	8.99
SEPT	30	4.00	11.54	-8.77	-0.10	5.7	0.9	-5.13	-9.90	-1.07	-0.01	2.08	78,408	-2.35	-1.36	7.64
OCT	31	4.40	6.34	-4.82	-0.10	4.03	0.9	-3.627	-4.04	-0.44	-0.01	2.15	39,204	-1.22	0.48	8.12
TOTAL	**365**	**80.84**	**87.60**	**-64.02**	**-1.20**	**57.04**		**-41.29**	**-24.47**	**-2.66**	**-0.13**	**25.29**	**470,448**	**-14.39**	**8.12**	

INFLOW (WASTEAWATER) (gpd) =	69,300
AREA OF WINTER STORAGE POND (acres) (interation) =	4
LAND APPLICATION AREA (acres) (iteration) =	**18**
SOIL APPLICATION (HYDRAULIC LOADING) RATE for PERCOLATION (gpd/sf) =	0.1
DAYS OF IRRIGATION (days) - Half months of October and April =	183

Pond Size (acres) =	**4**	@ 12' deep
20% Pond Size Increase =	**5**	
20% LAA Increase =	**22**	
Reuse (LAA reduction by 30%) =	**16**	

*Rainfall data from Western Regional Climate Center (1971-2000); assume 100-year rainfall is 2x the average year rainfall
**California Irrigation Management Information System (CIMIS) Reference EvapoTranspiration (Eto) Zones, Department of Water Resources
***Alfalfa crop coefficient range of 0.57 to 1.15 during growing season. Use 0.90 for Zone 14.

Redding Rancheria Casino
Alternative E - Water Balance

100-YEAR RAINFALL

MONTH	DAY	RAINFALL* (in)	PAN EVAP. (in)	POND EVAP. (in)	POND INFILTRATION (in)	CROP EVAPOTRANSPIRATION** (in/month)	CROP COEFFICIENT*** (alfalfa)	CROP ET (in)	NET RAIN / EVAPO / CROP (in)	Conversion from (in) to (MG): NET RAIN / EVAPO / CROP (MG)	POND INFILTRATION (MG)	INFLOW (MG)	Agronomic Rate: DISPOSAL TO SPRAY FIELD (GPD)	DISPOSAL TO SPRAY FIELD (MG)	NET FLOW TO/FROM POND (MG)	ACCUM. IN POND (MG)
NOV	30	9.48	2.72	-1.74	-0.10	2.1	0.9	0	7.74	2.31	-0.03	5.82			8.11	8.11
DEC	31	9.68	1.77	-1.13	-0.10	1.55	0.9	0	8.55	2.55	-0.03	6.02			8.54	16.65
JAN	31	15.08	2.05	-1.31	-0.10	1.55	0.9	0	13.77	4.11	-0.03	6.02			10.10	26.75
FEB	28	12.08	2.80	-1.79	-0.10	2.24	0.9	0	10.29	3.07	-0.03	5.43			8.48	35.22
MARCH	31	13.20	4.96	-3.17	-0.10	3.72	0.9	0	10.03	2.99	-0.03	6.02			8.98	44.21
APRIL	30	5.80	7.01	-4.49	-0.10	5.1	0.9	-4.59	-3.28	-0.98	-0.03	5.82	128,502	-3.86	0.96	45.17
MAY	31	2.58	9.25	-7.03	-0.10	6.82	0.9	-6.138	-10.59	-3.16	-0.03	6.02	257,004	-7.97	-5.14	40.02
JUNE	30	1.54	11.46	-8.71	-0.10	7.8	0.9	-7.02	-14.19	-4.24	-0.03	5.82	257,004	-7.71	-6.15	33.87
JULY	31	1.26	14.21	-10.80	-0.10	8.68	0.9	-7.812	-17.35	-5.18	-0.03	6.02	257,004	-7.97	-7.16	26.70
AUG	31	1.74	13.50	-10.26	-0.10	7.75	0.9	-6.975	-15.50	-4.63	-0.03	6.02	257,004	-7.97	-6.61	20.10
SEPT	30	4.00	11.54	-8.77	-0.10	5.7	0.9	-5.13	-9.90	-2.96	-0.03	5.82	257,004	-7.71	-4.87	15.22
OCT	31	4.40	6.34	-4.82	-0.10	4.03	0.9	-3.627	-4.04	-1.21	-0.03	6.02	128,502	-3.98	0.80	16.02
TOTAL	**365**	**80.84**	**87.60**	**-64.02**	**-1.20**	**57.04**		**-41.29**	**-24.47**	**-7.31**	**-0.36**	**70.85**	**1,542,024**	**-47.16**	**16.02**	

INFLOW (WASTEAWATER) (gpd) =	194,100
AREA OF WINTER STORAGE POND (acres) (interation) =	11
LAND APPLICATION AREA (acres) (iteration) =	**59**
SOIL APPLICATION (HYDRAULIC LOADING) RATE for PERCOLATION (gpd/sf) =	0.1
DAYS OF IRRIGATION (days) - Half months of October and April =	183

Pond Size (acres) =	**11**	@ 12' deep
20% Pond Size Increase =	**14**	
20% LAA Increase =	**71**	
Reuse (LAA reduction by 30%) =	**50**	

*Rainfall data from Western Regional Climate Center (1971-2000); assume 100-year rainfall is 2x the average year rainfall
**California Irrigation Management Information System (CIMIS) Reference EvapoTranspiration (Eto) Zones, Department of Water Resources
***Alfalfa crop coefficient range of 0.57 to 1.15 during growing season. Use 0.90 for Zone 14.

Redding Rancheria Casino
Leach Field Disposal Land Requirement

YEAR-ROUND LEACH FIELD DISPOSAL - Subsurface Land Area Calculations

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Week Average Sewer flows (gpd)	200,300	166,200	190,700	69,300	194,100
Percolation rate =		0.45	gallons/day/ft2		
Absorption Area Needed (ft2)	445,111	369,333	423,778	154,000	431,333
Trench is 3' wide x 100' long =		300	ft2		
Side wall estimation 1' x 2 sides x 100' =		200	ft2		
TOTAL absorption area =		500	ft2 per 100' trench		
# of 100' trenches	890	739	848	308	863
11-foot separation between pipes (8-foot separation from trench edge to edge)					
Land area (ft^2) =	979,244	812,533	932,311	338,800	948,933
100% Replacement	979,244	812,533	932,311	338,800	948,933
Total Area required (ft^2)	**1,958,489**	**1,625,067**	**1,864,622**	**677,600**	**1,897,867**
Total Area (acres) w/ 100% Replacement	45	38	43	16	44
20% Efficiency Add. (acres)	**54**	**46**	**52**	**20**	**53**

WASTEWATER RECYCLE - Subsurface Land Area Calculations

Leach Field to be designed for maximum possible use. Winter months represent the maximum flows possible.

20% — Winter Months: Percentage of wastewater reused during winter months. Total number of bathrooms and other such facilities will need to be quantified and will affect this percentage.

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Reduced Sewer Flow	160,240	132,960	152,560	55,440	155,280
Absorption Area Needed (ft^2)	356,089	295,467	339,022	123,200	345,067
# of 100' trenches	713	591	679	247	691
Land area (ft^2) =	784,300	650,100	746,900	271,700	760,100
100% Replacement	784,300	650,100	746,900	271,700	760,100
Total Area required (ft^2)	**1,568,600**	**1,300,200**	**1,493,800**	**543,400**	**1,520,200**
Total Area (acres) w/ 100% Replacement	37	30	35	13	35
20% Efficiency Add. (acres)	**45**	**36**	**42**	**16**	**42**