CHATEAU CHAPARRAL OWNERS ASSOCIATION

Wastewater Treatment Facility

Feasibility Study

September 3, 2009

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*** Further detailed cost sheets can be seen upon request*

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1 Purpose and Scope

1.1 Purpose

In May of 2008, the Chateau Chaparral Owners Association (applicant) received an "Advisory of Requirements for General Permit Coverage and Explanation of Engineering Design Requirements" letter *(see Appendix A)* from the Water Quality Control Division of the Colorado Department of Public Health and Environment[1]. The "Compliance Advisory" letter requires that the Chateau Chaparral Owners Association act upon the following items:

1. Prove to the Division that your facility is designed to provide adequate treatment of effluent wastewater prior to discharge to ground water. More specifically, prove that your aerated lagoon is properly sized for your flow rate and does not leak.

2. If this can not be proven, you must hire a Colorado Registered Professional Engineering consultant by November 1, 2008. [Schmueser Gordon Meyer was hired.]

3. Work with your engineering consultant to prepare a proposed compliance schedule for evaluating the treatment system and developing/implementing necessary upgrades to the treatment system no later then May 1, 2009. [This item was also completed by Schmueser Gordon Meyer and submitted to the Division prior to May 1, 2009.]

4. Complete the work established in the compliance schedule within the agreed upon timeframes.

The Chateau Chaparral Owners Association is now in the phase of work in Item #4. As outlined in the approved compliance schedule, a feasibility analysis of the existing treatment system and site constraints must be completed in order to determine the most applicable and necessary upgrades to the system from an operational, treatment, and cost standpoint.

The engineering firm of Schmueser Gordon Meyer (SGM) has been retained by the applicant to perform the site assessment and Feasibility Study (FS) for various on-site wastewater treatment solutions.

[1] referred to as the "Division" or "CDPHE" in this document.

The purpose of this report is to formally state that the site can meet all requirements within section 22.4 of regulation 22 with the necessary upgrades. Additionally, this report is a Feasibility Study (FS) which evaluating different on-site wastewater treatment facility (WWTF) alternatives. The alternatives selected for analysis all have the ability to effectively treat and safely dispose of wastewater collected from the Chateau Chaparral Subdivision. The information and recommendations in this FS are to be used by the Subdivision Owners Association (OA) as guidance for selecting the preferred alternative for wastewater treatment. The selection of an appropriate WWTF is a critical step required to comply with the last step noted in the May 1, 2008 Compliance Advisory letter.

The last step of the subject letter also noted that "failure to complete the work established in the compliance advisory may result in the termination of existing permit coverage and referral to enforcement"; however, it was stated earlier in the Compliance Advisory Letter that "by completing the steps in accordance with an agreement with the Division you can avoid formal action to compel you to comply and associated monetary penalties". With this report and subsequent alternative selection, Chateau Chaparral will continue to comply with the requirements and not receive any fines or penalties.

1.2 The Problem

The existing wastewater treatment and discharge consists of an existing aerated unlined lagoon followed by a rapid sand infiltration basis (RIB) that is in violation of the Colorado Water Quality Control Act in two areas. First, the system was designed for and received site location and design approval from the Division for a flow rate of no more than 4,200gpd annual average flow. Currently the system has an annual average flow of close to 7,400gpd, making the site location and design approval from the Division void. Second, based on historic recorded flows into the aerated lagoon and out of the lagoon to the RIB (also accounting for evaporation) approximately 2/3 of the wastewater is seeping out of the bottom of the aerated lagoon before it has reached its full detention time in the lagoon and final treatment from the RIB.

To further complicate the situation, Chateau Chaparral is fully developed and only has limited available space on the property for expansions or upgrades. The greater problem is not that the OA has an out of compliance WWTF, but they are in need of a new WWTF or upgrades that are designed and constructed in accordance with acceptable industry standards, and can fit within the site constraints of the existing system. This will ensure that when construction is complete, and an appropriate new discharge permit is obtained, the WWTF has the ability to meet the required effluent limitations[2] provided with the discharge permit.

1.3 Scope

The scope of this report assesses six (6) primary alternatives with several options under each alternative for treated effluent disposal, site location, and upgrades to the existing collection system. The primary alternatives include:

1. Expand and Line Existing Aerated Lagoon
2. Advanced Integrated Pond System (AIPS)
3. AdvanTex® Treatment System (Textile-based packed bed filter)
4. Sequencing Batch Reactor (SBR)
5. Packaged Plant Systems
6. Connection to the Buena Vista Sanitation District central sanitary sewer system

Selected alternatives and alternative options for a new WWTF and/or upgrades need to meet key project goals, many of which were discussed in the June 27th owners meeting.

From the meeting, SGM identified the following project goals in addition to meeting State and County regulations:

- ✓ Selected alternative shall be the most cost effective from both an initial construction and ongoing operational and maintenance standpoint
- ✓ Selected system shall be as simple as possible to operate and maintain
- ✓ Selected system shall not be aesthetically worse than the existing system, both from a visual and olfactory standpoint

[2] Effluent limits are the limits the Division sets that treated wastewater constituents must be reduced to before it is discharged to waters of the State.

It should be noted that a number of other options were initially considered but rejected relatively quickly because they did not meet some or all of the above listed goals and site constraints. Some of the options considered early on but eliminated from further consideration were:

- A pump and haul system
- Evaporative lagoon system
- Traditional custom designed and built mechanical plant
- Traditional constructed wetland (as primary treatment)

2 Existing Conditions and Design Constraints

2.1 Existing Conditions

The Chateau Chaparral subdivision consists of approximately 40 acres divided into 307 lots. Lot sizes range from approximately 2,000 to 3,000sf with a handful of lots between 3,000 and 5,000sf. There are also a number of open space tracts spread throughout the subdivision that are owned by the OA, ranging from .1 Acres to 6.1 Acres *(See Appendix B, Chateau Chaparral Subdivision Aerial Map)*.

The 307 lots are all privately owned and are configured for mobile/modular and recreational vehicle use. Approximately half of the lots have a full time unit on them, primarily single wide mobile homes; there are a few double wide homes and a few full-time stationary recreational vehicles. The remaining lots are set up for temporary/part-time recreational vehicles to be parked and connected to utilities. No lots are rented for nightly/weekly profit “camping” use, as would be done in a recreational vehicle campground.

Drinking Water. Chateau Chaparral obtains its drinking water from two wells located on the northern side of the development more than 1000 feet away from the wastewater treatment facility site. This is a public water system with an active PWID number. Drinking water is then collected in a tank and distributed through a piped distribution system to the lots. There are a number of bath houses in the subdivision that are used primarily by the part-time residences (three bathhouses each for men and women). The subdivision also has a clubhouse/lodge that contains a full kitchen and restrooms.

Wastewater Flows. Due to the demographics of the subdivision, the wastewater flows vary significantly throughout the seasons. On average, there are about 250 residences at a time in the summer and a maximum of about 70 residences that live there full time. The current annual average flow rate is 7,400gpd, with monthly averages around 5,000gpd in the winter and 10,000gpd in the summer. The recorded extreme flow days are around 2,000gpd at low flow and 16,000gpd at peak flow. Aside from the flow rate changes, the composition of the wastewater is very typical of residential wastewater. Chateau Chaparral does not anticipate any expansion of the subdivision in the future, and so far 2009 flows have been less than 2008 *(see Appendix C, 2008 Flows and Discharge Monitoring Report Summary).*

Treatment Facility Location. Wastewater from the Chateau Chaparral subdivision flows by gravity pipes connected by manholes to the low point of the subdivision on the southern end of the subdivision (there are also two lift stations). There is a 1.9 acre tract owned by the OA that contains the existing WWTF - an aerated lagoon that discharges to a rapid sand infiltration basin which discharges to groundwater. This tract is the most suitable for a WWTF which the OA owns; any other tract would require wastewater pumping and all the existing piping flow to this point.

The Plat *(see Appendix D)* shows a portion of this southern most tract touching Chalk Creek; however, the closest Chalk Creek gets to the subdivision is about 40-50 feet south of the property line, and the adjacent property is privately owned. The Arkansas River flows north-south on the western side of the subdivision - the existing WWTF is approximately 400' west of the river. Although there are many Chateau Chaparral lots which border the Arkansas River, the WWTF tract does not touch and is blocked by a small stretch of BLM land before the river. The plat does show 16' general utility easement on all rear lot lines making it possible for the wastewater to be discharged to the Arkansas River by pumping the effluent. This is discussed more in the Discharge Options Discussion section.

The existing lagoon has an area of approximately 4,500sf with two floating mechanical aerators. It is unlined and has an unknown depth, but based on adjacent topography the lagoon is estimated to be approximately 6-8 feet deep. The lagoon is allowed to fill up and is then aerated, it then settles and is discharged to the RIB about once a month (every other month in the winter). The RIB is about 5,000sf in size and usually takes less than 24 hours to infiltrate the monthly discharge.

Voided Site Application. The existing WWTF was designed for and received site application approval in June 1989 for an annual average daily flow capacity of 4,200gpd. Since the current annual average flow is 7,400gpd, the previous site application approval is no longer valid. In addition, by subtracting the annual flow from the aerated lagoon to the RIB, and the theoretical evaporation rate for the pond surface area from the flow into the aerated lagoon, it can be calculated that approximately 2/3 of the wastewater seeps from the bottom of the aerated lagoon before it reaches its full treatment.

Aside from occasional odor complaints, the owners do not have an opposition to the type and/or location of the existing WWTF, as long as it can properly treat the wastewater.

2.2 Existing Design Constraints

It is anticipated that the flows from 2008 will be typical of flows in the future, and therefore there is no reason to believe these rates will increase. Annual average flow rate of 7,400gpd will be used for design with a peak day of 16,000gpd. With low flow days of 2,000gpd in the winter, this is also an important consideration in the design and treatment type, as not all treatment options can handle such varying flow rates.

There are no commercial or industrial wastes connected to the system and average domestic residential wastewater constituents were assumed for this FS. The 2008 discharge monitoring reports verify this assumption (DMRs).

The largest existing design constraint is the physical location of the WWTF. Primarily, the best location is where the existing facility lies; however, keeping the existing facility in operation during construction of anything new is a challenge. It is also important to note that effluent (treated wastewater) can not gravity-flow to a surface water source on the property.

3 Operational and Added Benefit Considerations Discussion

Reports and cost analysis documents are often used in analyzing the hard costs for the system under analysis. Placing costs on the operations and maintenance for a particular system is a little more difficult, but yet commonly done. In our opinion, the challenge is to be able to articulate the non-monetary advantages and disadvantages of an alternative. An example of this would be in evaluating evaporative lagoons - if one had the space and accommodating topography to fully evaporate wastewater effluent, it is effective because both ground water and surface water are protected. You can put a cost on the land consumed by the lagoons as well as the operational and maintenance savings; however, it is very difficult to place a comparable monetary value on the benefit obtained by protecting ground and surface water. Conversely, these types of lagoons can, at times, produce objectionable odors in addition to being somewhat unsightly. Again, it would be a difficult task to place a comparable monetary value on these elements.

For each alternative we will identify the non-monetary advantages and disadvantages of each option. Also, for each alternative SGM has created preliminary budgetary type cost estimates, which are to be used for comparative purposes between each alternative. The ultimate system owner will have to evaluate this information and utilize it in their decision making process.

4 Discharge Options Discussion

One common characteristic of all the WWTF alternatives is that they treat the wastewater but they do not eliminate of the treated water (effluent). Regardless of which alternative is selected, the OA will have to submit for a discharge permit through the Division. The Division has a number of discharge permits that fall into one of two categories: *Surface Water Discharge Permit* or *Ground Water Discharge Permit*.

4.1 Surface Water Discharge Permits

Although there is no flowing surface water on the existing WWTF tract, discharging the effluent from the WWTF into the dry ravine to Chalk Creek could be considered by the Division to be a discharge to surface water (this option would require an agreement with the adjacent land owner). In general, when a treated effluent is discharged to surface water, the dilution of the effluent by the surface water is taken into account when the Division sets their effluent limit requirements. For example, if the effluent were to be discharged to the Arkansas River, the effluent limits would not be as strict because the considerable flow of the Arkansas would immediately dilute the remaining wastewater constituents. Discharging into a dry ravine, however, means that there is no surface water flow to immediately dilute the effluent and therefore the effluent limits required by the District would be more restrictive. Other factors that are taken into account in assessing the effluent limits is the discharge of other treatment facilities into the same surface water source nearby, such as Buena Vista's.

An agreement with the adjacent property owner for an easement (for a gravity sewer pipe) to discharge into Chalk Creek is also an option (this would only have to be 40-50 feet long). The same approach could be taken with the BLM with an easement to the Arkansas River (although it is our experience that easements on Federal properties are very difficult to obtain). Utilizing the 16' wide utility easement at the back of the rear lots (272, 273, and 274 – *see Appendix D, Chateau Chaparral Plat)*, a pipe could be placed from the WWTF to the Arkansas River on Chateau Chaparral property. Because of the topography, this would require a small pump station (it would also open up additional wastewater treatment options), particularly if construction of a new facility/unit could take place where the existing RIB is located.

Another surface water discharge option would be to discharge into an irrigation ditch. This does not seem to be a viable option for Chateau Chaparral, so we will not discuss the requirements.

4.2 Ground Water Discharge Permits

When discharging to ground water, the treated effluent could be going directly into ground water; therefore, in general, the Division required effluent limits are stricter for ground water than surface water. The CDPHE allows for five different types of groundwater discharges in accordance with the following permits. The following information has been taken directly from the CDPHE web site[3].

1. *General Permit 631000 - Land Disposal of Effluent from Domestic Wastewater Treatment Works (WWTWs):* This permit covers wastewater treatment systems where effluent limitations and ground water standards are met *prior to* effluent discharge to an unlined impoundment [i.e., an infiltration basin or any lagoon or impoundment for which the Permittee has not adequately demonstrated that the seepage rate is less than 10^{-6} centimeters per second (cm/sec)] and/or a land disposal site. Compliance monitoring is required at the point of effluent discharge. Ground water monitoring wells are not required.

2. *General Permit 632000 – Land Treatment of Effluent from Domestic Wastewater Treatment Works (WWTWs):* This permit covers wastewater treatment systems where ground water standards are met *subsequent to* discharge to an unlined impoundment [i.e., an infiltration basin or any lagoon or impoundment for which the permittee has not

[3] www.cdphe.state.co.us/wq/PermitsUnit/Domestic/GW_Permitting_Overview.pdf

adequately demonstrated that the seepage rate is less than 10^{-6} centimeters per second (cm/sec)] and/or a land treatment site. Compliance monitoring is required at the point of effluent discharge and at ground water monitoring wells located hydraulically down-gradient of the treatment system. In some cases, lysimeters may be required in addition to, or in lieu of, ground water monitoring.

3. *General Permit 633000 – Land Treatment of Effluent at Agronomic Rates from Domestic Wastewater Treatment Works (WWTWs):* This permit covers wastewater treatment systems that discharge to ground water solely through land treatment at Division-approved agronomic rates and that are not covered under Regulation No. 84 – Reclaimed Water Control Regulation. To apply for this permit, you must include a copy of the facility's *Land Application Management Plan* with the permit application. Compliance monitoring is required at the point of effluent discharge. Ground water monitoring wells are not required.

4. *General Permit 621000 – Domestic Wastewater Treatment On-site Systems with Design Capacity Equal or Greater than 2,000 Gallons per Day (GPD).* This permit covers domestic wastewater treatment on-site systems, including septic and advance treatment systems that discharge to leach fields/absorption fields. Compliance monitoring is required at the point of effluent discharge and at ground water monitoring wells located hydraulically down-gradient of the WWTW.

5. *General Permit 622000 – Domestic Wastewater Treatment On-site Systems with Design Capacity Between 2,000 and 10,000 Gallons per Day (GPD with No Ground Water Monitoring Requirements.* This permit covers domestic wastewater treatment on-site systems, including septic and advance treatment systems that discharge to leach fields/absorption fields, which have adequately demonstrated to the Division, and have received Division-approval, that ground water monitoring is not required to ensure the protection of State waters. To apply for this permit, you must include a copy of the facility's site-specific risk based evaluation with the complete permit application. This permit does not require ground water monitoring, but does emphasize the use of best management practices.

Options. Discharge type #3, "*Land Treatment of Effluent at Agronomic Rates from Domestic Wastewater Treatment Works*", would require Chateau Chaparral to store their treated wastewater during the winter months.

Discharge types #1 and #2 involve discharging to groundwater through an unlined impoundment (percolation pond or unlined subsurface constructed wetland), which is currently being done at Chateau Chaparral. These two options can then be divided between two factors: whether or not the effluent limits are met prior to the effluent discharge to the unlined impoundment or if additional treatment is required by filtering the effluent through the ground as it is being discharged. If the Division required effluent limits can be met before the effluent goes to the unlined impoundment, the unlined impoundment is simply considered a disposal method and nothing more needs to be done. If the Division required effluent limits can not be met prior to going to the unlined impoundment (as is the current case), then compliance monitoring is required at the point of discharge from the WWTF and also through ground water monitoring wells located hydraulically down-gradient of the treatment system.

The last two ground water discharge permits, #4 and #5, are very similar to the previous, but instead of discharging to an unlined impoundment, they discharge to a leach field, or absorption field. Modifying the existing RIB into an absorption field with pipes that are covered can also open up additional treatment options. The #5 ground water discharge permit has an additional requirement which involves meeting Division required effluent limits prior to discharging to the leachfield/absorption field, but the WWTF design capacity must be less than 10,000gpd in order to not require ground water monitoring.

5 Effluent Limits Discussion

Depending upon the selected effluent discharge type and location, the allowable effluent quality being discharged from the WWTF could vary. Upon selection of a discharge, a request to the Division is made for Preliminary Effluent Limits (PEL's). PEL's are site and discharge option specific. The Preliminary Effluent Limits are used to proceed in the design for the WWTF. There are a number of effluent limits in which different constituents must be reduced before discharge, but the main three represent the three types of constituents found in wastewater, physical, chemical, and organic. Total Suspended Solids (TSS) represents the physical constituent. The organic constituent is represented by Biological Oxygen Demand (BOD, a measurement of how much oxygen is required to stabilize a waste biologically). The chemical constituents are a little more difficult to summarize but consist of free ammonia, organic and inorganic nitrogen, nitrites and nitrates as well as organic and inorganic phosphorus.

5.1 Nitrogen Removal

It is important to briefly discuss total nitrogen removal (organic nitrogen, inorganic nitrogen and ammonia nitrogen) because nitrogen in various forms is toxic to aquatic life. It can lead to an increase in chemical nutrients in the environment leading to algae blooms and loss of oxygen in aquatic environments. Similarly, in terrestrial environments, nitrogen-saturated soils can contribute both inorganic and organic nitrogen to the groundwater. Traditionally, WWTFs remove approximately 40% of nitrogen and discharge 60% of the incoming nitrogen. Recently the wastewater treatment industry (as well as the State of Colorado) has been trying to change this. The Division has started a process of further restricting the effluent limits of total nitrogens. Because this is the area where most new WWTFs in Colorado will struggle to meet the effluent limits, it is important to briefly discuss this process.

Nitrogen is removed from wastewater through two primary mechanisms, by assimilation and by the nitrification-denitrification process. *Assimilation*[4] is the process by which microorganisms (and plants if part of the WWTF) take up the nitrogen into their cell mass. *Nitrification-denitrification* is a very complex chemical process with a long series of chemical reactions. With the use of oxygen, ammonia is converted to nitrite, and then nitrite is converted to nitrate. In an oxygen deprived environment, denitrification uses organic carbon to remove both nitrite and nitrate with nitrogen gas as the byproduct. Nitrogen gas is then released to the atmosphere replenishing nitrogen levels (ambient air is composed of 78% nitrogen gas, 21% oxygen gas, 1% other).

6 WWTF Alternatives Discussion

There are many different ways to treat domestic wastewater. The following alternatives best match the required goals and design constraints of the project. Because of the close proximity to a residential area and the strict effluent limits that we expect to result from a groundwater discharge or surface water discharge with no dilution, it is strongly recommended to have a form of disinfection at the end of all the WWTF alternatives. It is our recommendation to utilize ultra-violet (UV) disinfection for all alternatives. Since the disinfection component is the same for all alternatives, it will be left out of the discussion for each alternative.

[4] The conversion of nutrient into the fluid or solid substance of the body, by the processes of digestion and absorption.

The primary alternatives discussed are 1) Expanding/Modifying the Existing Aerated Lagoon system, 2) the Advanced Integrated Pond System (AIPS), 3) AdvanTex® Treatment System, 4) a Sequencing Batch Reactor System, Packaged Plant Systems, and 5) connection to the Buena Vista Sanitation District central sanitary sewer system.

6.1 Expansion/Modification of the Existing Aerated Lagoon System

Wastewater treatment lagoons were very popular in the western United States and were the primary choice of treatment in the middle of the 20th century. The primary reason for so many of them being installed in rural areas was that they were a tradeoff of cost for land. They were a low cost alternative both from an installation and an operating standpoint, but they took up more land space than any other treatment option. Lagoons are primarily focused and sized for treatment of BOD and TSS and when sized and operated correctly can be effective in removing them to satisfactory levels.

Most all lagoons can fit into one of four different categories: Fully Aerobic, Fully Anaerobic, Facultative and Partial-Mix Aerated. Both Fully Aerobic and Fully Anaerobic lagoons target specific portions of the wastewater treatment process and are not used by themselves as the primary treatment of wastewater, but rather in a combination with another treatment process. Aerobic lagoons are shallow and take advantage of the treatment processes that take place in an environment rich in dissolved oxygen. Anaerobic lagoons are deep and take advantage of the treatment processes that takes place in an oxygen-free environment, breaking down the organic carbon. Facultative lagoons are some of the more common lagoons seen in Western United States; they are approximately 5-8 feet deep and take advantage of both an aerobic (oxygen rich environment) near the surface of the lagoon, and an anaerobic (oxygen deprived environment) near the bottom of the lagoon. When sized and operated correctly, they can be an effective primary treatment option.

Chateau Chaparral's existing lagoon is categorized as a Partial-Mix Aerated Lagoon, which is typically deeper and more heavily loaded organically than facultative lagoons. Mechanical aerators are used to meet the higher oxygen requirements for BOD removal and to some extent nitrification. They are deeper than the facultative lagoons (6-20 feet deep) and still maintain an anaerobic zone or sludge layer. In general they have the same advantages as a facultative lagoon but do not require quite as much land space (*see Figure 1*).

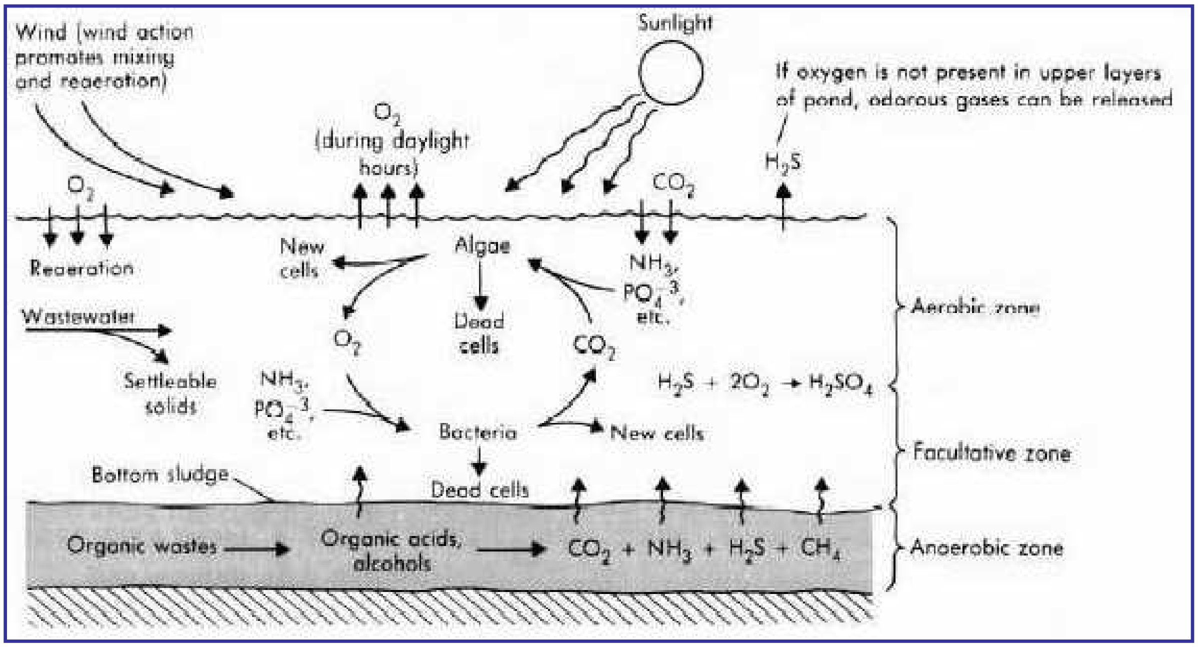


Figure 1: Typical Lagoon System Treatment Process

The actual depth on the existing partial-mix lagoon is unknown, but estimated to be about 6-8 feet deep. With the depth assumption and the surveyed size about 60'X70', the existing lagoon is probably sized about right for the 4,200gpd in the original design of the lagoon at Chateau Chaparral. Based on first-order reaction-rate kinetics and preliminary calculations, an 8' deep lagoon about 70'X160' would now be necessary for the required 45 day hydraulic detention time at 7,400gpd. At least an additional two aerators would also be required to aerate the larger surface area.

Typically, lagoons are the most cost-effective wastewater treatment alternative (even with a synthetic liner) from an initial construction cost and long-term operations and maintenance standpoint. They are not difficult to operate and do not require constant operator attention. The only energy requirements are for the aerators. Minimum maintenance and repair is required during the design life and can have a design life in excess of 20-30 years.

This does not mean significant problems can not happen to a lagoon that will undermine its ability to properly treat wastewater such as; short circuiting (solved by slug discharge and not continuous flow), significant algae blooms, and pond turn over due to rapid temperature differences and the anaerobic zone on the bottom can actually flip up (turn over) to the top creating many problems. They also do not efficiently remove nutrients.

Specifically for Chateau Chaparral, the size of pond required would fit on the existing WWTF tract, but it would have to replace the existing pond and still take up the existing RIB space. This creates two problems: first, during the construction period of the lagoon (about 2 months) all wastewater would have to be stored and hauled to an existing facility; even at low flow 2,000gpd this is approximately a $150,000 additional cost to the project; second, it removes (and/or shrinks down) the existing RIB - this is a final method of treatment to get additional removal of BOD and TSS removal in the sand filtration and some nutrient removal in plant uptake and fixed film on the sand. More importantly, without space for the RIB, there is no room to discharge to groundwater onsite, and without an additional "polishing" treatment step, it will be difficult to meet effluent limits discharging to surface water directly after the lagoon.

Advantages:

- Low initial construction cost
- Simple design, therefore operational and maintenance friendly and cost-effective to operate
- Uses the same treatment process that existing operator is familiar
- No significant change to visual/odor impacts than existing
- Longer design life 30+ years

Disadvantages:

- Larger footprint 70' X 160'
- Not as effective at nitrogen removal, particularly without any additional "polishing" treatment
- Additional end treatment/disposal method and during construction store and haul cost, offsets low initial construction cost
- Not the best at treating effluent to the highest level and leaves little flexibility in the future to modify it to expand/meet more stringent future effluent limits
- Can have significant problems, such as algae blooms and turnover that takes the whole system out of compliance until the problem can be fixed

Table 1 – Expansion for Existing Aerated Lagoon System Costs

EXPAND EXISTING AERATED LAGOON				
*TOTAL ENGINEERING & SURVEYING COST	TOTAL CONSTRUCTION COST	ANNUAL OPERATION & MAINTENANCE COST	**TOTAL FIRST YEAR COST	***TOTAL 20 YEAR COST
$51,690	$409,750	$10,600	$472,040	$777,088

*Engineering costs for the internal workings are included in the Total Construction Cost as well as all lift station improvement related costs
**Total First Year Cost is the sum of first three columns
***4% inflation rate was used on Annual Operation and Maintenance Cost to project 20 Year Cost
****Cost are for comparative analysis between alternatives only and leave out some additional cost that are equal to all alternatives; actual construction cost could be 10-20% higher for each alternative

6.2 Advanced Integrated Pond System (AIPS)

Advanced Integrated Pond System (AIPS) is a different approach to a traditional wastewater lagoon system, which was created by Dr. William Oswald at the University of California at Berkeley, but perfected for systems in Colorado by Dr. Michael Richard. AIPS differs from the traditional lagoons in that instead of having the first cell aerated and the last cell anaerobic (oxygen deprived), the anaerobic cell is first. This increases the efficiency of the lagoon and decreases the hydraulic retention time (how long the water stays in the lagoons), and thus decreases the footprint.

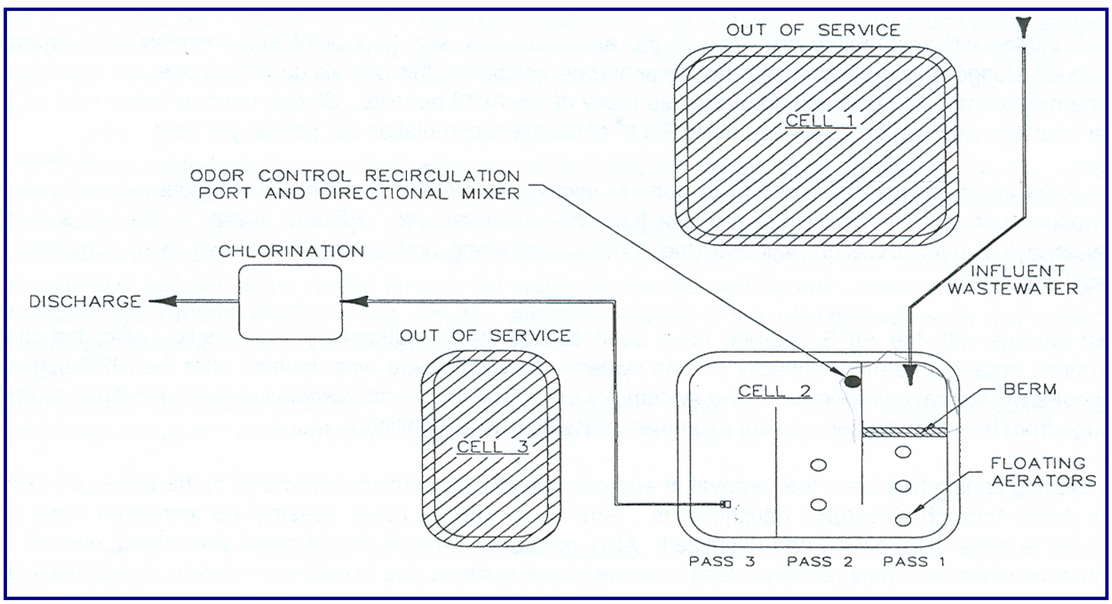


Figure 2: Mead, CO Lagoon System retro-fitted to AIPS

Since the anaerobic cell is where the sludge is digested and denitrification occurs, having it at the end lowers the water temperature and efficiency. If sludge ever builds up and over flows, it is the last step before discharge in a traditional lagoon system leaving no safety net. By moving the anaerobic cell to the front, making it deep (12' to 15') and introducing the wastewater at the bottom of the cell the treatment process is aided in a number of ways. The wastewater has to travel from the bottom of the cell up through the sludge layer (2'-9' thick) where the temperatures stay much higher all year long, increasing the microbial action for better BOD removal, and also allows denitrification to happen in a warmer carbon enriched environment. After this process, the wastewater goes through an aerated cell and a settling cell, both of which don't need to be as large in size.

Specifically for Chateau Chaparral, the entire system would take up a footprint only slightly larger then the existing lagoon (65' X75') with a similar configuration to Figure 2 above. This figure was a retrofit to the WWTF in Mead, CO that had three larger cells and after the AIPS was implemented the footprint could fit into one of the existing cells; therefore the AIPS system could fit in the same location as the existing lagoon at Chateau Chaparral and still utilize the RIB for discharge and polishing treatment. This would cause the same store and haul constructability problems as the partial mix lagoon. The other option is to construct the new AIPS system on top of the existing RIB during the two month off-season period (February/March) where there is no discharge to the RIB, and switch the flow to the AIPS and replace the existing lagoon with a new RIB. In addition, the AIPS has better treatment abilities and has a much better ability to meet surface water discharge requirements without any additional treatment.

BOD, TSS and nitrogen removal does not end up on the advantage or disadvantage list because although it is much better than a traditional lagoon system, it is not excellent and would depend on the effluent limits provided by the Division to know if an additional "polishing" treatment would be required (but not anticipated). For cost estimates in this analysis it was assumed that the new AIPS pond was located on top of the existing lagoon, a pump and haul system for two months during construction and utilizing the existing RIB in place as it is.

Advantages:

- Relatively low construction cost for AIPS itself
- Simple low-tech operations and maintenance
- Surface water or groundwater discharge

- Could remove need for construction store and haul cost
- Not the smallest footprint, but would fit on the existing tract
- Longer design life, 30+ years depending on liner condition

Disadvantages:

- Construction juggling (moving around existing facilities)
- May need one additional aerator
- Some visual impact (but not much different than existing)
- Odor (although the proponents of AIPS in Colorado brag about having no odors, we feel there will most likely be times when mild odors are produced)
- Potential need for a polishing treatment

Table 2 – Advanced Integrated Pond System Costs

ADVANCED INTEGRATED POND SYSTEM (AIPS) COST				
*TOTAL ENGINEERING & SURVEYING COST	TOTAL CONSTRUCTION COST	ANNUAL OPERATION & MAINTENANCE COST	**TOTAL FIRST YEAR COST	***TOTAL 20 YEAR COST
$48,190	$325,750	$10,900	$384,840	$698,521

*Engineering costs for the internal workings are included in the Total Construction Cost as well as all lift station improvement related costs
**Total First Year Cost is the sum of first three columns
***4% inflation rate was used on Annual Operation and Maintenance Cost to project 20 Year Cost
****Cost are for comparative analysis between alternatives only and leave out some additional cost that are equal to all alternatives; actual construction cost could be 10-20% higher for each alternative

6.3 AdvanTex® Treatment System

The AdvanTex® Treatment System operates on the same principals as a traditional packed bed filter; however, instead of a natural granular material for the filter, AdvanTex® uses their own engineered fabric to filter the wastewater. The AdvanTex® Treatment System would come as a complete package including 5 AX100 filtration units, new septic tanks (AdvanTex® requires that use of their septic tanks need fit with their STEP system pumps and filters), recirculation tank, dosing tank, pumps, tank anchors, flow meter and custom TCOM control panels. All AdvanTex® equipment could be supplied through SCG Enterprises, Inc. out of Conifer, Colorado. There is also a more local Valley Precast in Buena Vista that supplies AdvanTex® equipment but we have not yet received a quote from them.

This WWTF would still require a licensed operator because it has a larger capacity than 2,000gpd; SCG Enterprises could help locate an Operator in the area if needed. Operation and Maintenance manuals are provided, as well as start up assistance. They are also available for troubleshooting and technical assistance for the life of the system. Round-the-clock system supervision is available via Orenco's® telemetry controls. Although the system gets more complicated with pumps, recirculation, and telemetry controls, there is a lot of assistance available for a fee.

Figure 3 – Large Advantex® Treatment System, Camp Red Cloud, Lake City, CO

This system requires solids to be removed first and would require common septic tanks to be installed around the subdivision (or possibly one or two larger ones near the WWTF tract). They also have their own maintenance and pumping requirements. The AX100 units themselves could be placed on top of the existing RIB which would be modified into a buried absorption field.

Figure 4 – Advantex® AX100

After treatment, the effluent would need to be disinfected and pumped to the discharge location. Similar to the packed bed filter, the AdvanTex® system also has trouble reducing the nitrogen levels. AdvanTex® has tried to add additional components to the system (additional tanks and different circulation) to try to improve nitrogen removal but this is an additional cost that is not included and it is unsure as to how well it works. Additional treatment from the infiltration basin would be required and therefore monitoring wells used.

For Chateau Chaparral, these units could be placed directly on top of the existing RIB. The RIB would have to be modified into a piped leach field that is fully covered in granular material, and the five AX100 filtration units would be placed right on top of that field connected through piping. This would eliminate the pump and haul requirements during construction.

Advantages:

- Initial construction cost
- Good telemetry and technical assistance
- Effectively removes BOD and TSS to less the 10mg/l
- Small foot print allows for it to be placed on site and work around existing lagoon
- Comes in packages for quicker, less obtrusive construction
- Minimal visual and odor impacts

Disadvantages:

- More advanced operations and maintenance
- Annual Maintenance cost $5,000 in power consumption and part replacement
- Maintenance agreement for technical assistance and monitoring $250 per year per house - $10,000 per year for whole system.
- Not as effective at nitrogen removal effluent at 25mg/l or worse during cold temperatures
- Requires new septic tanks, about $5,000 per year to pump septic tanks
- Power outages/failures require immediate attention by technician (because of pumps)

Table 3 – Advantex System Cost

ADVANTEX SYSTEM COST				
*TOTAL ENGINEERING & SURVEYING COST	TOTAL CONSTRUCTION COST	ANNUAL OPERATION & MAINTENANCE COST	**TOTAL FIRST YEAR COST	***TOTAL 20 YEAR COST
$42,650	$401,000	$32,700	$476,350	$1,417,393

*Engineering costs for the internal workings are included in the Total Construction Cost as well as all lift station improvement related costs
**Total First Year Cost is the sum of first three columns
***4% inflation rate was used on Annual Operation and Maintenance Cost to project 20 Year Cost
****Cost are for comparative analysis between alternatives only and leave out some additional cost that are equal to all alternatives; actual construction cost could be 10-20% higher for each alternative

6.4 Sequencing Batch Reactor (SBR)

Sequencing Batch Reactors (SBRs) are an activated sludge treatment technology. The difference between an SBR and traditional activated sludge treatment is that it performs the different wastewater treatment processes in the same basin (but at different time periods) instead of using a chain of basins, tanks and treatment methods. This makes the SBR an ideal treatment option for small to medium size WWTFs, as you get the treatment of an activated sludge treatment process without the more complicated activated sludge treatment facilities. SBRs of this size only required a level C operator (the level of the current operator at Chateau Chaparral) versus any other activated sludge system requiring a higher level B operator.

Figure 5 – SBR Aire-O2 Triton ® aeration system

The current lagoon at Chateau Chaparral is operated very much in the same way as an SBR, as it does not run the aerators for a time period and then a settling period follows before discharging. On the other hand, the existing lagoon shape and aeration is not as efficient as a basin as an SBR. Aeration Industries provides a packaged system that can treat BOD, TSS and nutrients to a high level as it has all treatment phases in it: anaerobic, aerobic mix with high levels of dissolved oxygen, clarification and decant, all in the same basin but at different time intervals. Because the SBR has a more efficient basin, mixer and aerator, it would require a much smaller footprint than the existing lagoon. Because of the smaller footprint, installation could be located between Oregon Street and the existing lagoon, so as to not affect the operations of existing ponds during construction. The SBR could still utilize the existing RIB as the disposal method.

Aeration Industries outfits their SBRs with the Aire-O_2 Triton ® aeration system as seen in Figure 5. It is mounted on slide rails to react with the change in water elevation and is surface–mounted, making installation and operation simpler. The large benefit from this system is that anaerobic/anoxic mixing and aeration come from the same unit. The aeration can be controlled independent of the mixing to fully utilize the nitrification and denitrification cycles simplifying the design, installation and operations eliminating extra piping infrastructure, blower buildings and controls.

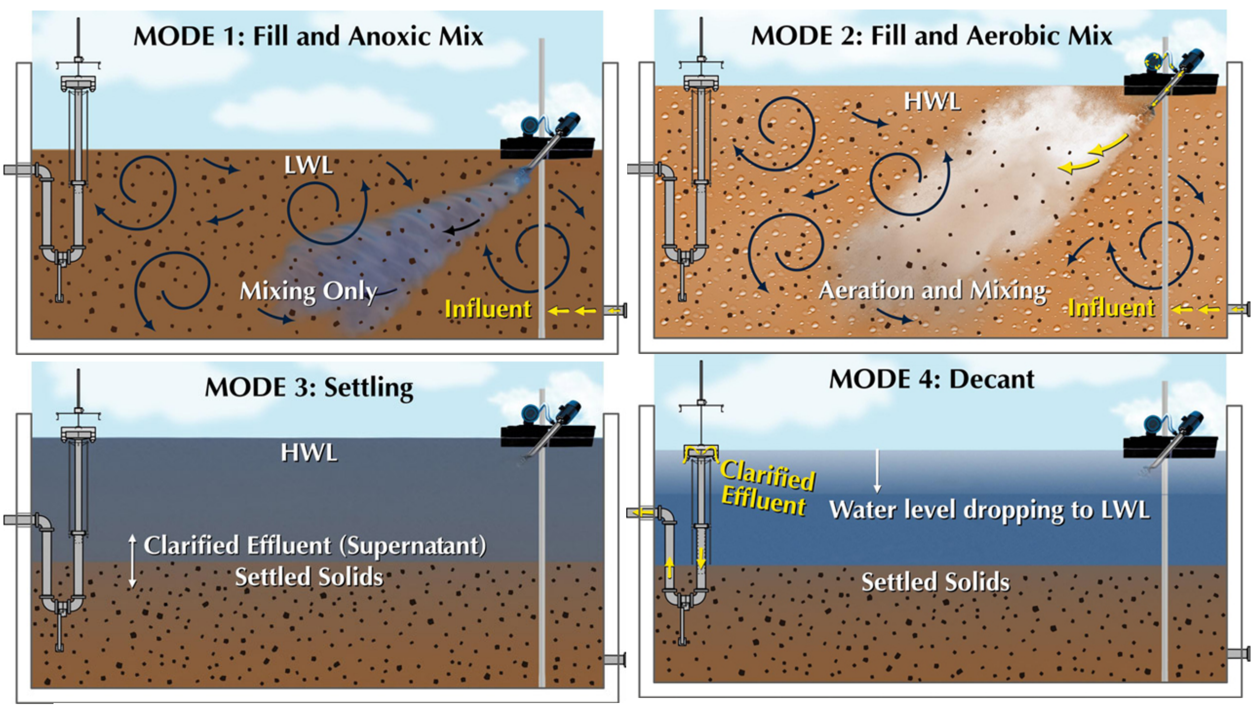


Figure 6 – SBR's Four Modes

The SBR has four "modes" or cycles, as seen above. The first is the fill and anoxic mix mode, with the mixer on (but the blower off) as the basin fills from the bottom. Once the basin is full then the second mode starts with the aeration and mixing taking place. The third mode has the aerator and mixer turned off and allows for solids to settle and the top to clarify. The last mode is when the clarified effluent is discharged through the decanter. The SBR will also have a smaller digester tank attached to it with waste activated sludge for the waste activated sludge and possibility for recycle to insure there is always the appropriate amount of organic carbon available for the denitrification process.

Specifically for Chateau Chaparral, the SBR would consist of two reactor basins and a digester basin. During low flows in the off season, only one basin would be utilized on a continuous feed reactor, and during high season both basins would be utilized in parallel with one filling as the second is in aeration and settling modes. The total footprint size would be 17' wide by 29' long, allowing for it to be placed in a number of locations on the existing WWTF site without impacting the current lagoon system during construction and still utilizing the existing RIB for discharge.

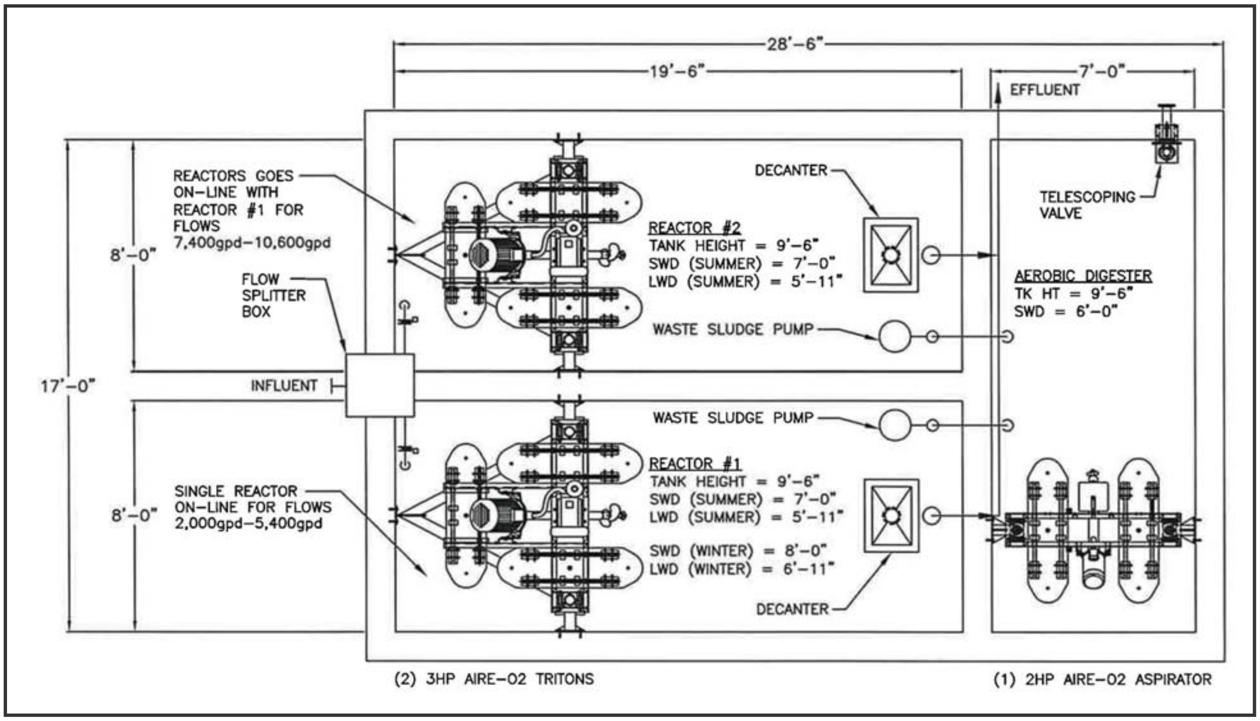


Figure 7 – Chateau Chaparral specific SBR Drawing

Advantages:

- Medium level of operations and maintenance
- Relatively low operations and maintenance cost
- Good telemetry and technical assistance
- Effectively removes BOD, TSS and nitrogen to levels less than regulatory requirements
- Small foot print allows for non obtrusive construction

- Can easily be expanded or modified in the future to meet demands of higher flows for more strict effluent limits (such as phosphorus removal)
- No changes to discharge process

Disadvantages:

- Slightly higher total initial cost then lower tech options
- Slightly more difficult operations requirements with more controls than lagoon systems
- Could have some odors when not being aerated

Table 4 – SBR Costs

SEQUENCING BATCH REACTOR (SBR)				
*TOTAL ENGINEERING & SURVEYING COST	TOTAL CONSTRUCTION COST	ANNUAL OPERATION & MAINTENANCE COST	**TOTAL FIRST YEAR COST	***TOTAL 20 YEAR COST
$49,320	$357,995	$16,100	$423,415	$886,742

*Engineering costs for the internal workings are included in the Total Construction Cost as well as all lift station improvement related costs
**Total First Year Cost is the sum of first three columns
***4% inflation rate was used on Annual Operation and Maintenance Cost to project 20 Year Cost
****Cost are for comparative analysis between alternatives only and leave out some additional cost that are equal to all alternatives; actual construction cost could be 10-20% higher for each alternative

6.5 Package Plant

There are many different types of package plants, and while simple from a design and installation perspective, many prove to be expensive and problematic. One package plant that has been proven in the state of Colorado to be relatively cost effective (compared to other package plants and mechanical plants) and effective at treating wastewater is the Ecolo Chief out of Grand Island, Nebraska.

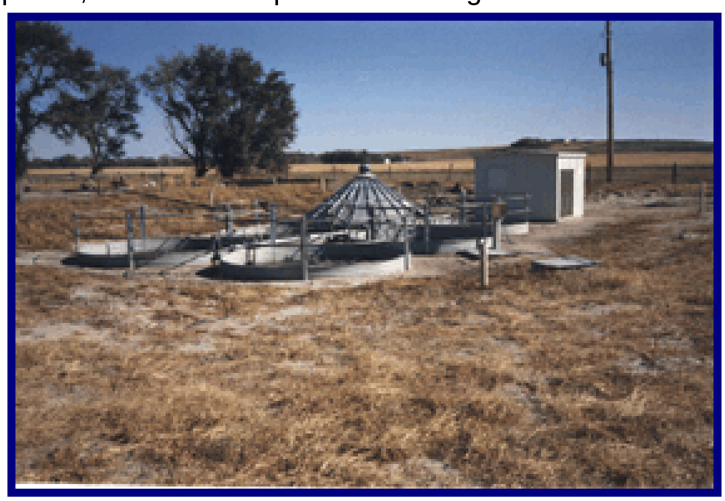


Figure 8 – Typical layout of installed Ecolo Chief

The Ecolo Chief is an Activated Sludge, Extended Aeration package plant. The principal structures include a flow equalization tank, one primary separation tank, one anoxic tank, two aeration tanks, one final settling tank (clarifier) and one aerobic digester. The treated effluent is finally treated through disinfection and piped to a disposal option (ground or surface). The Ecolo Chief historically has been able to meet the Division's effluent limits at other locations in Colorado, which should be able to discharge directly to ground water, surface water or both at different times of year.

All tanks are eleven feet tall and will be equipped with guardrails and installed in the ground with 12-18 inches above finish grade. The tanks are buried to retain as much heat as possible during the winter months, therefore keeping the process working efficiently. Cathodic protection using magnesium anodes will be installed to prohibit corrosion. The footprint is also relatively small (60' X 30') and could be located at the same locations as the previous alternative.

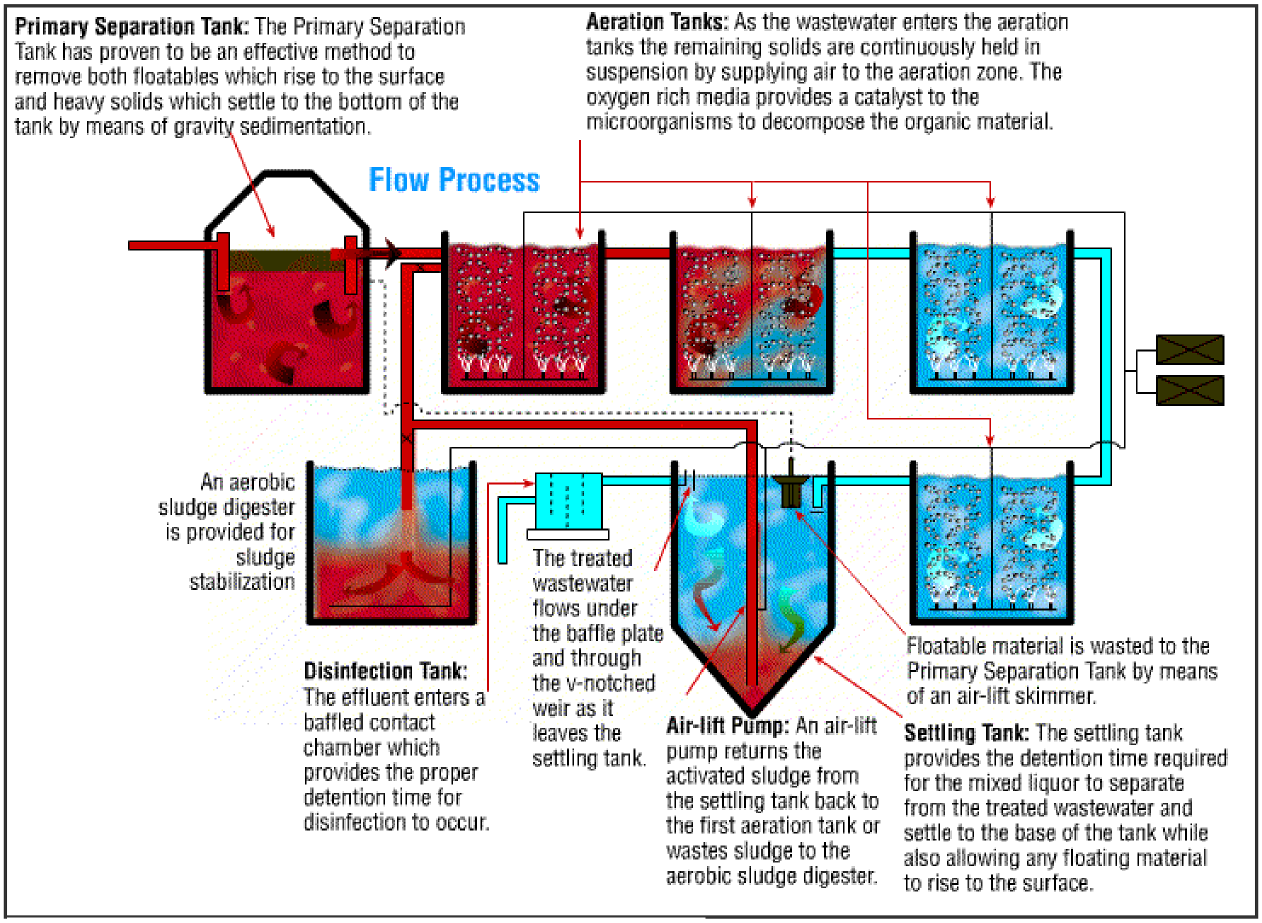


Figure 9 – Typical Flow Diagram of Ecolo Chief

Advantages:

- Small foot print allows for less obtrusive quick construction due to the packaged system
- No changes to discharge process
- Effectively removes BOD, TSS and nitrogen

Disadvantages:

- Higher total initial cost than lower tech options
- Requires periodic grit removal from separation tank and sludge removal from Aerobic Digester
- Higher operational and maintenance cost
- Much higher-tech Operational requirements; need level B operator. When things go wrong they can go wrong very fast

Table 5 – Ecolo Chief Cost

ECOLO CHIEF PACKAGED PLANT COST				
*TOTAL ENGINEERING & SURVEYING COST	TOTAL CONSTRUCTION COST	ANNUAL OPERATION & MAINTENANCE COST	**TOTAL FIRST YEAR COST	***TOTAL 20 YEAR COST
$42,250	$369,500	$22,000	$433,750	$1,066,868

*Engineering costs for the internal workings are included in the Total Construction Cost as well as all lift station improvement related costs
**Total First Year Cost is the sum of first three columns
***4% inflation rate was used on Annual Operation and Maintenance Cost to project 20 Year Cost
****Cost are for comparative analysis between alternatives only and leave out some additional cost that are equal to all alternatives; actual construction cost could be 10-20% higher for each alternative

6.6 Connection to Buena Vista Sanitation District Central Sewer

One of the requirements of this FS is to evaluate the possibility of connecting Chateau Chaparral subdivision onto central sewer system. It is widely accepted that connecting to central sewer provides the greatest ground water protection. This would eliminate the WWTF at Chateau Chaparral all together and eliminate such responsibility from the Owners Association.

It would require tap fees at BVSD rates and user rates at about $100 a quarter, but no operating cost and/or responsibilities. SGM looked at one possible route for a force main line along the railroad easement (*see Appendix E, Chateau Chaparral Area Map*). This route is 4.7 miles long and the cost for just the pipe installation would be at least $750,000.

Advantages:

- A WWTF located within the Chateau Chaparral would be eliminated and no longer a potential pollution source, and no longer the responsibility of the HOA
- Adjacent neighbors could tie into this line to further protect groundwater

Disadvantages:

- Logistical and easement challenges
- Cost about ($750,000 for the 4.7 miles of pipe alone without easements cost, tap fees, lift station, etc.)

Table 6 – Connection to BVSD Central Sewer Cost

CONNECTION TO BV SANITATION DISTRICT CENTRAL SEWER COST				
*TOTAL ENGINEERING & SURVEYING COST	TOTAL CONSTRUCTION COST	ANNUAL OPERATION & MAINTENANCE COST	**TOTAL FIRST YEAR COST	***TOTAL 20 YEAR COST
$68,680	$874,648	$35,000	$978,328	$1,985,561

*Engineering costs for the internal workings are included in the Total Construction Cost as well as all lift station improvement related costs
**Total First Year Cost is the sum of first three columns
***4% inflation rate was used on Annual Operation and Maintenance Cost to project 20 Year Cost
****Cost are for comparative analysis between alternatives only and leave out some additional cost that are equal to all alternatives; actual construction cost could be 10-20% higher for each alternative

7 Funding Options

SGM understands that the most daunting component of a WWTF project to an owner's association, such as Chateau Chaparral, is how it will be paid for. This is always one of the most difficult hurdles in most projects that we deal with, and typically there are two funding sources outside of the HOA itself.

Revolving Loan Fund. The first funding source is the revolving loan fund through CDPHE; however, the first requirement to be eligible for such funds is to be a governmental entity such as a town, county or sanitation district. This appears to eliminate many WWTF projects similar to Chateau Chaparral, but there are many cases where a governmental entity will team up with its voters to take on the project so the funding is available. This is the case in a very similar project SGM is involved with for a small HOA just north of Gunnison, where they are connecting their subdivision into the County central sewer system and getting funding through the County (paid back by the HOA). Unfortunately, for Chateau Chaparral, this does not seem to be possible because Chaffee County does not have a central sewer system. As outlined above, it would be extremely difficult to connect onto Buena Vista Sanitation District's system.

USDA Rural Development Fund. Since Chateau Chaparral is an owner's association (a non-for profit entity), they would be eligible for USDA Rural Development funds. The USDA Rural Development was created specifically to aid in improving the lives of people in rural communities. SGM has had an initial conversation with Bill Burns out of the Alamosa office (Chaffee County's region, 719-589-5661 ext.132), who thought that WWTF upgrades at Chateau Chaparral could potentially qualify for this type of funding.

The USDA Rural Development has a number of different categories for their projects. One category is for projects which have received a directive or mandate from CDPHE that they must improve their system (this is very rare - most associations do not fit into this category). It is in this category that the highest percentage of grant versus loan is possible. It is a possibility that Chateau Chaparral fits into this category because the subdivision has received a compliance advisory letter from the CDPHE. All others fall into the second category, which is then divided up into divisions based on the communities mean household income. Depending on where the community compares to the state average, the percentage of grant versus loan and different interest rates for the loan portion will vary. It is our understanding that unincorporated Chaffee County has a mean annual household income of less than the state wide average, which means it would be eligible for a possible 45% grant at a lower than 4% interest rate; however, this all must be verified through the USDA.

The first step to verify this is to have Bill Burns from USDA plan a site visit, and explain exactly what Chateau Chaparral would be eligible for. There is a significant amount of paper work which needs to be done, including a preliminary engineering report for the selected alternative, but there is potential for funding if the OA is willing to go through the process.

8 Conclusions and Recommendations

8.1 Conclusions

In review of Chateau Chaparral's existing WWTF, it is fairly evident that the existing aerated lagoon is undersized for the current measured flow rate and leaking, requiring a more significant upgrade than simply lining the pond. SGM has evaluated six alternatives, all of which have the ability to meet current State design standards. It is widely accepted that centralized collection and treatment of wastewater protects public health and the environment, however this does not seem to be a feasible solution for Chateau Chaparral without significant County involvement.

Of the options considered, SGM feels there are two viable, feasible options: the Advanced Integrated Pond System (AIPS) and the Sequencing Batch Reactor (SBR). Both options, when designed and operated correctly, have the ability to treat wastewater effectively, but also have different monetary and non-monetary advantages and disadvantages.

Sequence Batch Reactor. Our preferred solution for Chateau Chaparral is the SBR, and though it has a slightly higher cost than the AIPS, here are a few advantages:

1. It has the ability, and operator flexibility, to treat the wastewater more consistently (even with large seasonal variation) to a higher degree, without requiring a higher level of operator certification/licensing

2. It provides the flexibility, and physical space (it would leave the entire area of the existing lagoon available) to be modified in the future to treat more flows and remove different constituents. It allows for chemical additives to be used, flexibility of adding an additional basin for increased flows to be added in a series, and/or allows for more space on the WWTF tract for an additional treatment option into the line of treatment chain between the SBR and RIB.

3. The SBR has a smaller construction impact; even though the AIPS has a low installation cost, it uses a temporary pump and haul system during construction which keeps it slightly less expensive than the SBR. The SBR takes up a smaller footprint (with less earthwork) creating a smaller construction disturbance to nearby residences and a smoother construction process.

4. Construction of the SBR could occur at any time of the year (not just February and March, during low flow times) and would not have to be rushed in a two month time period. It is very unlikely the State and USDA process could be completed in time to have a new facility under construction by February 2010; therefore, the AIPS could not be constructed until 2011, but the SBR could still take place later in the year in 2010.

Advanced Integrated Pond System. SGM does feel the AIPS is a viable option, primarily due to low first year costs and long term simplicity/operational costs. SGM would make this our second highest recommendation and we feel it should not be left out of OA option discussions at this time. In addition to simplicity and cost as an advantage, especially with the RIB used at the end of the process, the AIPS system treats the wastewater to a high degree. Also reusing the existing two aerators also gives the system a unique advantage for Chateau Chaparral. One of the existing aerators is in need of a $4,000 new skirt in order to be effective during the coming winter; using the AIPS system this would not be a one year cost but could be used in the future system.

In section 4, SGM discussed the possibility (with easement work and or effluent lift station with piping) of Chateau Chaparral utilizing surface water discharge instead of the current groundwater discharge. This possibility opened up more options to be analyzed; however, the two best solutions that came out of the feasibility study can still simply utilize the existing RIB to discharge to groundwater. SGM recommends when submitting for preliminary effluent limits (PELs) from the State that the OA submit for both groundwater discharge and surface water discharge PELs; then a decision can be made at the time of design which option is best. Currently we believe the groundwater discharge is best because the existing RIB can be utilized for both options, and whether it is needed or not for treatment it provides a final polishing step in the treatment process for both options.

8.2 Recommendations

Based upon the above conclusions, SGM recommends the OA take the following steps in deciding which option is best for Chateau Chaparral:

1. Hold OA discussions to decide which options best suit the subdivision, based on the association's values. Involve the operator in these discussions. SGM can be available to participate if needed.

2. Set up a meeting with Bill Burns with UDSA (719-589-5661) to discuss available funding options for Chateau Chaparral, as well as the requirements. This may help significantly in choosing which alternative with which to move forward.

3. Continue to follow the steps outlined in the approved Compliance Schedule *(see Appendix F, Chateau Chaparral Compliance Schedule)*: submit for PELs, create and submit the preliminary engineering report for selected alternative, complete final design, obtain site application approval, bid and construct the project, and apply for new discharge permit.

SGM appreciates this opportunity to perform this feasibility study, and we look forward to the opportunity to continue to assist you through this process (including assistance with the funding process). As briefly mentioned previously, a preliminary engineering report is required for both the CDPHE process and USDA's funding application, and though they do have different requirements and formats, SGM can modify the report to meet both needs.

Table 7: Cost Analysis of all Alternatives

CHATEAU CHAPARRAL OWNERS ASSOCIATION
WASTEWATER SYSTEM ANALYSIS AND RECOMMENDATIONS
ALTERNATIVE COST ESTIMATE
SCHMUESER GORDON MEYER, INC.

	ALTERNATIVES	*TOTAL ENGINEERING & SURVEYING COST	TOTAL CONSTRUCTION COST	ANNUAL OPERATION & MAINTENANCE COST	**TOTAL FIRST YEAR COST	***TOTAL 20 YEAR COST
1	EXPAND EXISTING AERATED LAGOON	$51,690	$409,750	$10,600	$472,040	$777,088
2	ADVANCED INTEGRATED POND SYSTEM (AIPS)	$48,190	$325,750	$10,900	$384,840	$698,521
3	ADVANTEX SYSTEM	$42,650	$401,000	$32,700	$476,350	$1,417,393
4	SEQUENCING BATCH REACTOR (SBR)	$49,320	$357,995	$16,100	$423,415	$886,742
5	ECOLO CHIEF PACKAGED PLANT	$42,250	$369,500	$22,000	$433,750	$1,066,868
6	CONNECTION TO BUENA VISTA SD CENTRAL SEWER	$68,680	$874,648	$35,000	$978,328	$1,985,561

*Alternatives 3,4 and 5 are packaged type systems and the engineering costs for the internal workings are included in the Total Construction Cost
**Total First year cost is the sum of the three first columns
***A 4% inflation rate was used on the Annual Operation and Maintenance Cost to project the 20 year cost
****Cost are for comparative analysis between alternatives only and leave out some additional cost that are equal to all alternatives; actual construction cost could be 10-20% higher for each alternative

APPENDICES

Appendix A

CDPHE Requirements for CDPS Letter

STATE OF COLORADO

Bill Ritter, Jr., Governor
James B. Martin, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80246-1530
Phone (303) 692-2000
TDD Line (303) 691-7700
Located in Glendale, Colorado

Laboratory Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

http://www.cdphe.state.co.us

Colorado Department of Public Health and Environment

May 1, 2008

CERTIFIED MAIL No: 7007 0220 0001 0158 8159

Milo K. Marquardt, President
Chateau Chaparral Owners Association
10795 County Road 197A
Nathrop, CO 81236

RE: Advisory of Requirements for General Permit Coverage and Explanation of Engineering Design Requirements (Reference Permit No. CO-0042498)

Cottys Campground Resort Permit No. CO-0045292

Dear Mr. Marquardt,

Thank you for applying for coverage under a Colorado Discharge Permit System (CDPS) general permit for discharge to ground water. Based on a review of your treatment system design, the Water Quality Control Division (Division) has determined that discharge from your wastewater treatment plant (WWTP) does not qualify for coverage under a general permit because the discharge is not in compliance with the conditions of a general permit as your application does not demonstrate that the discharge will meet the numeric water quality requirements before it mixes with ground water. Unfortunately, in order to obtain coverage for the discharge to ground water from your WWTP under the general permit, additional treatment or demonstration of the seepage rate of the impoundment liner(s) is required.

In accordance with state regulations (Regulation No. 62 – Regulations for Effluent Limits), wastewater must be treated to remove biological oxygen demand (BOD_5) and total suspended solids (TSS) to acceptable levels (e.g., 30-day average concentrations of 30 mg/l) prior to mixing with state waters, which includes ground water. Based on our review of your application, your facility may not be designed to provide adequate treatment of effluent prior to discharge to ground water. Our records indicate that your WWTP may have clay-lined and/or bentonite-lined impoundments and that a seepage rate study has not been performed to demonstrate that seepage occurs at a rate less than the allowable rate of 1×10^{-6} cm/sec (1/32 inch per day). In order for the Division to determine that effluent has been properly treated prior to mixing with ground water, you must demonstrate that treatment meeting the limits in Regulation No. 62 occurs prior to discharge to any such impoundment that does not meet the allowable seepage requirement.

It is your responsibility to retain a Colorado licensed engineering consultant to develop and submit to the Division a proposed compliance schedule for further evaluation of and/or improvements to your treatment system and to develop and implement any necessary upgrades. By completing these steps in accordance with an agreement with the Division you can avoid formal action to compel you to comply and associated monetary penalties.

If you feel that our position regarding your wastewater treatment system is in error and your impoundment(s) meets the required seepage rate and the limits in Regulation No. 62 prior to discharge to groundwater, please contact the Division to discuss this matter by June 1, 2008. The Division will review and evaluate any additional information regarding your treatment system you may provide.

The remainder of this letter outlines necessary next steps for improving your treatment system and obtaining permit coverage.

❖ The Site and Design Approval Process

In Colorado, all domestic wastewater treatment facilities must obtain site and design approval in accordance with Regulation No. 22 – Site Location and Design Approval Regulations for Domestic Wastewater Treatment Works. These rules are intended to ensure that WWTPs are designed to a level that ensures that they will be able to meet permit requirements and adequately protect the quality of state waters. Because it appears that your facility is currently unable to meet permit requirements and we have no record of prior site/design approval for your facility, you must complete the following next steps to initiate the site/design approval process:

- Step One: Retain a Colorado licensed engineering consultant and secure funding for project planning aspects as soon as possible and **no later than November 1, 2008**. Submit to the Division the name and contact information for your Colorado licensed engineering consultant, or notification that a licensed engineer has not been retained with written justification and a proposed schedule for retaining a licensed engineering consultant **no later than November 10, 2008.**

- Step Two: Work with your engineering consultant to prepare a proposed compliance schedule for evaluating the treatment system and developing/implementing necessary upgrades to the treatment system. Submit the proposed compliance schedule to the Division in writing **no later than May 1, 2009**, or by an alternate agreed-upon date. Complete any seepage study by this date.

  An example compliance schedule for construction of new or substantially expanded facilities is provided in Attachment A. As shown, the Division recommends developing a compliance schedule with four or five major milestones. Please note that the example schedule in Attachment A is intended solely as a guide in meeting the expectations of the Division for this type of project. There may be several options for upgrading your facility to meet engineering requirements, some of which may take more or less time than that identified in the schedule. For example, you may be able to line your impoundment(s) to achieve proper treatment, or you may be able to purchase and install a package treatment plant that provides the level of treatment necessary for you to meet the requirements for subsequent disposal which may include discharge to a stream or land application of the treated wastewater.

  The Division will review and comment upon your proposed compliance schedule and may discuss the terms and conditions of this schedule with you. Once an agreed-upon compliance schedule is developed, this schedule will become part of a compliance advisory for your facility.

- Step Three: Complete the work established in the compliance schedule within the agreed upon timeframes. Failure to complete the work established in the compliance advisory may result in the termination of existing permit coverage and referral to enforcement.

❖ Available Funding Opportunities:

The Division is aware of the potential costs for WWTPs to comply with the technology-based and water quality-based discharge limits. Facilities may need to invest in new treatment technologies requiring significant planning, design, and construction for infrastructure and other capital improvements.

Private and not-for-profit wastewater treatment facilities in rural areas may pursue possible funding opportunities through the U.S. Department of Agriculture Rural Development (USDA-RD) [Contact: Dolores Sanchez (720) 544-2931, **www.rurdev.usda.gov**] In addition, private and not-for-profit entities may seek assistance from a County or City in forming a Special Improvement District, Local Improvement District, or Public Improvement District in order to obtain funding for the project.

Colorado's site design, construction, and permitting requirements for WWTPs are implemented as part of the Division's mission to maintain, restore, and improve the quality of Colorado's water resources and assure that safe drinking water is provided from public water systems for the people of the state. By fulfilling the steps provided herein, you can obtain or maintain permit coverage for your WWTP and avoid potential penalties for unauthorized discharges to ground water. This letter does not limit or preclude the Division from pursuing future enforcement options.

If you have any questions concerning your ground water discharge application or permitting requirements, please contact **Margo Griffin, Domestic Permits Unit,** by phone at 303-692-3588 or by email at margo.griffin@state.co.us.

Sincerely,

Margo Griffin for

Janet Kieler, Permits Section Manager
Water Quality Control Division
Colorado Department of Public Health and Environment

cc: Tim Vrudny, WQCD, District Engineer

Attachment A
Example Compliance Schedule for Meeting Permit Limits

Note: The proposed compliance schedule for your WWTP must be submitted to the Division no later than May 1, 2009 and must include specific dates for accomplishing your proposed milestones for securing funding, and developing and implementing any necessary upgrades to your treatment system. An example compliance schedule is provided below:

MILESTONE NUMBER	TASK DESCRIPTION[1]	PROPOSED DUE DATE
MILESTONE 1: RETAIN ENGINEERING CONSULTANT & SECURE FUNDING[1]		
1a	Submit a letter of notification that a Colorado licensed engineering consultant has been obtained and funding has been secured for planning aspects[2]	6 months
MILESTONE 2: INITIATE PLANNING AND DESIGN & SECURE FUNDING		
2a	Submit a letter of notification that Preliminary Effluent Limits (PELs) have been received and report progress in obtaining funding for design and construction aspects[2]	1 year and 6 months
2b	Submit a letter of notification that funding has been obtained for design and construction aspects, and final plans specifications have been submitted to the Division[3]	2 years and 6 months
MILESTONE 3: COMPETE DESIGN AND COMMENCE CONSTRUCTION, AND REAPPLY FOR DISCHARGE PERMIT		
3a	Submit a letter of notification that Final Design Approval has been received from the Division and construction has commenced.	3 years and 6 months
3b	Submit a report of progress of construction	3 years and 6 months
3c	Apply for a new discharge permit	3 years and 6 months
MILESTONE 4: COMPLETE CONSTRUCTION		
4a	Submit a letter of notification that construction is complete, facility start-up is complete, and the facility is fully operational	4 years and 6 months

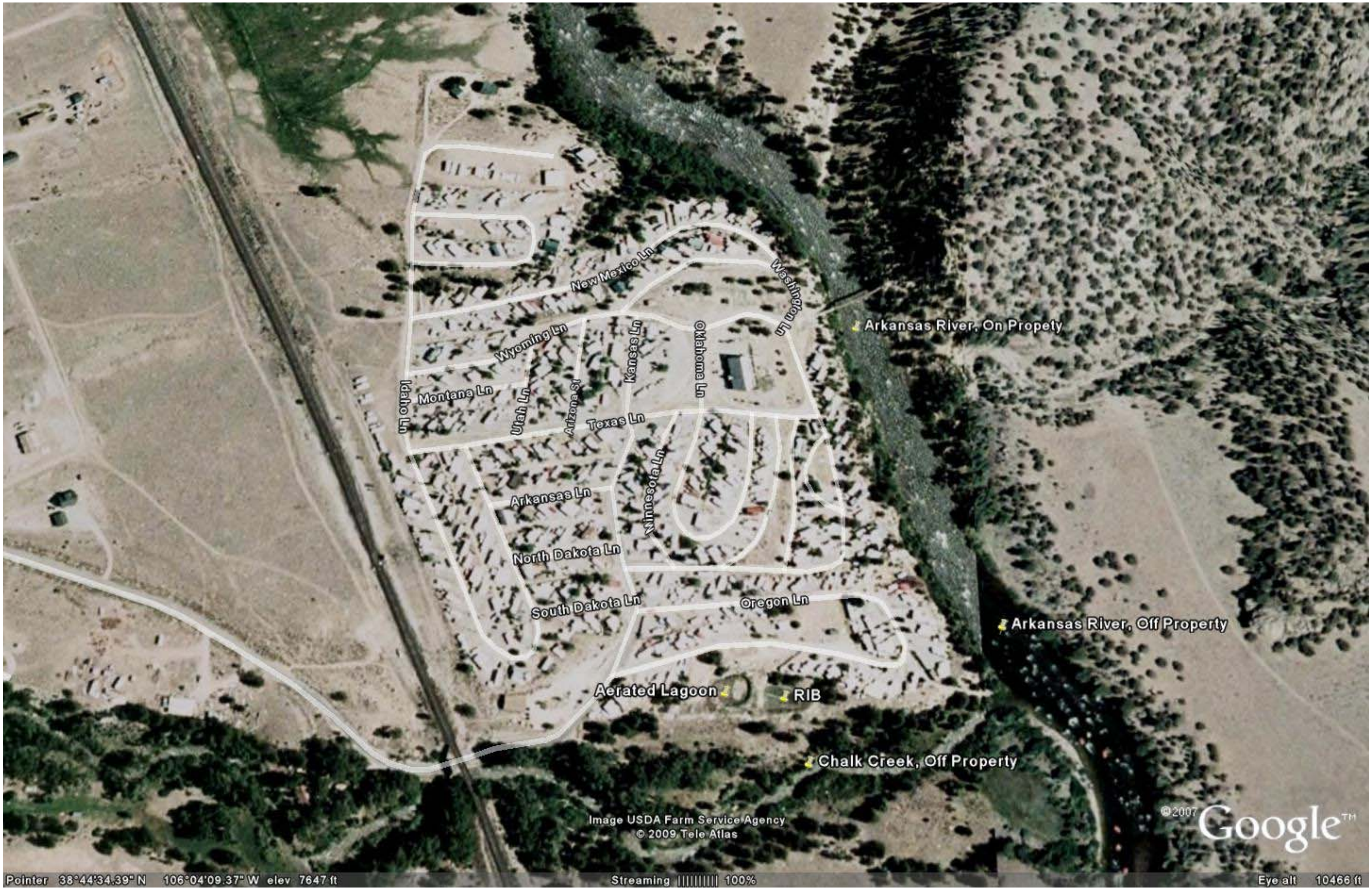
[1] Milestone #1 must be accomplished within 6 months of letter receipt date. In this example, Milestones #2 through #4 are accomplished with the support of a Colorado licensed engineering consultant.

[2] In order to receive federal or state loans or grants through the Division, a *Preliminary Engineering Report* (PER) must be submitted and approved by the Division and a NEPA finding must be made. Contact Carolyn Schacterle at (303) 692-3551 for additional information.

[3] A *Site Application for Site Location Approval* must be submitted and approved by the Division and a *Preliminary Design* must be submitted and approved by the Division, prior to submitting final plans and specifications. For more information visit http://www.cdphe.state.co.us/wq/engineering/techhom.html.

Appendix B

Chateau Chaparral Subdivision Aerial Map


New Mexico Ln
Washington Ln
Arkansas River, On Propety
Wyoming Ln
Kansas Ln
Oklahoma Ln
Idaho Ln
Montana Ln
Utah Ln
Arizona St
Texas Ln
Minnesota Ln
Arkansas Ln
North Dakota Ln
South Dakota Ln
Oregon Ln
Arkansas River, Off Property
Aerated Lagoon
RIB
Chalk Creek, Off Property
Image USDA Farm Service Agency
© 2009 Tele Atlas
©2007 Google™
Pointer 38°44'34.39" N 106°04'09.37" W elev 7647 ft
Streaming |||||||||| 100%
Eye alt 10466 ft

Appendix C

2008 Flows and Discharge Monitoring Report Summary

Chateau Chaparral WWTF Existing Flows From DMRs

Flows

Raw Influent Into Aerated Pond

	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09
Total (gallons)	224,358	192,082	151,744	117,319	236,194	318,926	316,516	316,524	259,371	222,217	177,932	169,247	156,299	137,675	149,097
Avg GPD	7,237	6,624	4,895	3,910	7,619	10,630	10,210	10,210	8,646	7,168	5,931	5,460	5,042	4,917	4,809
Peak Day (gallons)	8,878	8,385	7,975	5,585	13,309	12,338	15,728	14,100	13,484	8,586	6,689	6,976	6,671	6,490	5,350
Low Day (gallons)	5,127	4,210	2,013	2,004	5,880	8,584	8,071	7,937	7,113	5,401	5,236	4,476	4,180	4,273	4,179

From Aerated Pond To Rapid Infiltration Pond (dischard once a month about, not sure how flows are calculated)

	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09
Avg GPD	NO Disch	8,400	5,300	?	4,000	5,500	6,700	6,000	6,300	5,300	7,500	No Disch			
Daily Max (gallons)	NO Disch	2,900	83,500	?	125,200	83,400	83,500	103,400	103,400	104,000	125,200	No Disch			

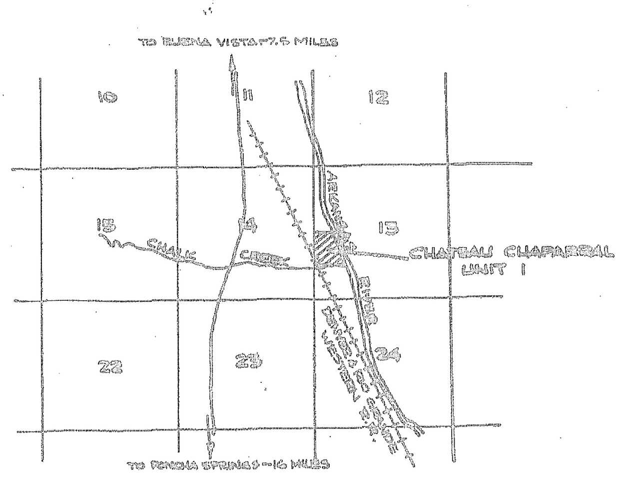
DMR Reports (Permit #C00042498)

Monitoring wells #1 and #2 down gradient from Rapid Infiltration Pond, about 80' apart, approximately 30' deep, water level at about 10' deep

Parameter	Units	Type	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Annual Ave.
BOD-5 (30d avg) raw influent	lbs/day	Grab	20.7	23.3	2.9	?	8.56	18.7	24.5	11.91	16.35	8.71	3.69	11.05	13.74
BOD-5 (7d avg Max) raw influent	lbs/day	Grab	20.7	24.8	3.9	?	9.3	19.9	30.8	12.38	17.68	9.47	3.94	11.86	30.8
BOD-5 (30d avg) raw influent	mg/L	Grab	345	424	72	445	135	204	288	140	228	145	75	241	
BOD-5 (7d avg Max) raw influent	mg/L	Grab	345	424	72	445	135	204	288	140	228	145	75	241	
BOD-5 (30d avg) well #1	lbs/day	Grab	No Disch	0.05	0.221	?	0.033	0.138	0.224	0.05	0.1051	0.133	0.063	No Disch	
BOD-5 (7d avg Max) well #1	lbs/day	Grab	No Disch	0.2	0.496	?	0.149	0.298	0.597	0.0123	0.2463	0.373	0.149	No Disch	
BOD-5 (30d avg) well #1	mg/L	Grab	No Disch	2	5	1	1	3	4	1	2	3	1	No Disch	
BOD-5 (7d avg Max) well #1	mg/L	Grab	No Disch	2	5	1.2	1	3	4	1	2	3	1	No Disch	
pH well #1		Grab	No Disch	7.47	6.49	7.51	6.79	7.02	7.1	6.97	6.93	7.15	6.98	No Disch	
Oil & Grease well #1	mg/L	Grab	No Disch	na	na	na	na	na	na	na	na	na	na	No Disch	
Total Nitrogen (as N) (30d ave) well #1	mg/L	Grab	No Disch	1.52	9.3	?	8.7	8.5	13	5.8	1.93	3.7	4.37	No Disch	
TDS (30d avg) well #1	mg/L	Grab	No Disch	154	201	?	220	278	298	229	148	213	224	No Disch	
TDS (daily max) well #1	mg/L	Grab	No Disch	154	201	?	220	278	298	229	148	213	224	No Disch	
Fecal Coliform (30day avg) well #1	#/100ml	Grab	No Disch	4	2	?	2	2	2	2	2	2	2	No Disch	
Fecal Coliform (7d avg Max) well #1	#/100ml	Grab	No Disch	4	2	?	2	2	2	2	2	2	2	No Disch	
Visual Oil & Grease well #1		Visual	No Disch	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	No Disch	
BOD-5 (30d avg) well #2	lbs/day	Grab	No Disch	0.05	0.133	?	0.033	0.138	0.167	0.2	0.0525	0.177	0.063	No Disch	
BOD-5 (7d avg Max) well #2	lbs/day	Grab	No Disch	0.2	0.298	?	0.149	0.298	0.448	0.492	0.1231	0.496	0.149	No Disch	
BOD-5 (30d avg) well #2	mg/L	Grab	No Disch	2	3	?	1	3	3	4	1	4	1	No Disch	
BOD-5 (7d avg Max) well #2	mg/L	Grab	No Disch	2	3	?	1	3	3	4	1	4	1	No Disch	
pH well #2		Grab	No Disch	7.29	6.64	?	6.91	7.54	7.25	6.96	7.08	7.82	7.39	No Disch	
Oil & Grease well #2	mg/L	Grab	No Disch	na	na	na	na	na	na	na	na	na	na	No Disch	
Total Nitrogen (as N) (30d ave) well #2	mg/L	Grab	No Disch	7.8	7.3	?	6.4	6.8	5.4	6.3	6.44	2.8	1.26	No Disch	
TDS (30d avg) well #2	mg/L	Grab	No Disch	166	182	?	242	249	219	229	185	183	154	No Disch	
TDS (daily max) well #2	mg/L	Grab	No Disch	166	182	?	242	249	219	229	185	183	154	No Disch	
Fecal Coliform (30day avg) well #2	#/100ml	Grab	No Disch	2	2	?	2	2	2	2	2	2	2	No Disch	
Fecal Coliform (7d avg Max) well #2	#/100ml	Grab	No Disch	2	2	?	2	2	2	2	2	2	2	No Disch	
Visual Oil & Grease well #2		Visual	No Disch	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	No Disch	

Appendix D

Chateau Chaparral Plat



LOCATION MAP

CHATEAU CHAPARRAL UNIT 1

FOR RECREATIONAL VEHICLE USE

NW 1/4, SW 1/4, SEC. 13, and PART OF NE 1/4, SE 1/4, SEC. 14,
T. 15 S., R. 78 W., CHAFFEE COUNTY,
COLORADO.

NOTES:

1. ALL STREETS ARE PRIVATE, TO BE MAINTAINED BY THE OWNERS' ASSOCIATION
2. STORAGE BUILDINGS MAY BE CONSTRUCTED WITHIN REAR LOT LINE EASEMENTS.
3. BEARINGS BASED ON ROBERT F. HARRISON & ASSOCIATES, INC. DRAWING DATED 10/21/68 AND WERE DETERMINED BY SOLAR OBSERVATION

CENTERLINE CURVE DATA

	DELTA	RADIUS	LENGTH	TANGENT
1.	90°12'39"	54.80'	86.29'	55.00'
2.	30°57'08"	36.12'	19.51'	10.00'
3.	18°32'50"	244.97'	79.30'	40.00'
4.	21°35'57"	104.85'	39.53'	20.00'
5.	57°11'01"	128.43'	128.19'	70.00'
6.	07°14'23"	316.14'	39.95'	20.00'
7.	25°22'32"	359.54'	159.24'	80.96'
8.	27°29'24"	40.89'	19.61'	10.00'
9.	56°08'29"	112.51'	110.24'	60.00'
10.	57°20'19"	107.23'	107.31'	58.61'
11.	65°49'05"	58.22'	66.88'	37.69'
12.	54°56'39"	96.16'	92.22'	50.00'
13.	18°31'12"	92.00'	29.74'	15.00'
14.	38°16'34"	100.86'	67.38'	35.00'
15.	07°47'43"	587.10'	79.88'	40.00'
16.	47°58'07"	134.86'	112.91'	60.00'
17.	09°50'40"	580.59'	99.75'	50.00'
18.	16°25'43"	346.36'	99.31'	50.00'
19.	84°12'35"	105.12'	154.50'	95.00'
20.	122°29'43"	35.66'	76.25'	65.00'
21.	03°40'24"	311.85'	19.99'	10.00'
22.	23°32'20"	239.98'	98.59'	50.00'
23.	00°11'27"	3002.40'	10.00'	5.00'
24.	180°00'00"	66.09'	188.70'	
25.	85°20'26"	27.12'	40.40'	25.00'
26.	12°21'07"	369.65'	79.69'	40.00'
27.	20°22'17"	222.63'	79.16'	40.00'
28.	13°17'37"	171.64'	39.82'	20.00'
29.	07°48'53"	317.56'	43.31'	21.69'
30.	16°31'59"	227.14'	65.54'	33.00'
31.	14°24'12"	261.16'	65.65'	33.00'
32.	10°09'42"	449.81'	79.79'	40.00'
33.	35°35'12"	73.80'	45.79'	23.66'
34.	32°58'49"	84.45'	48.61'	25.00'
35.	51°17'41"	83.31'	74.58'	40.00'
36.	07°06'35"	241.45'	29.96'	15.00'
37.	32°15'47"	138.30'	77.87'	40.00'
38.	11°01'02"	414.76'	79.75'	40.00'
39.	42°39'59"	76.81'	57.20'	30.00'
40.	43°55'46"	113.44'	86.97'	45.75'
41.	03°26'47"	360.01'	19.99'	10.00'
42.	27°35'19"	122.19'	58.84'	30.00'
43.	52°16'46"	101.89'	92.96'	50.00'
44.	24°31'02"	184.10'	78.78'	40.00'
45.	23°36'37"	176.50'	72.73'	36.89'
46.	63°01'34"	57.09'	62.79'	35.00'
47.	37°30'05"	117.83'	77.12'	40.00'
48.	34°51'24"	141.85'	86.30'	44.53'
49.	31°11'14"	143.33'	78.01'	40.00'
50.	180°00'00"	64.99'	188.46'	
51.	39°19'03"	55.98'	38.42'	20.00'
52.	40°24'04"	70.93'	50.02'	26.10'

SURVEYOR'S CERTIFICATE

I, JOE R. ZYLSTRA, A REGISTERED LAND SURVEYOR, LICENSED TO PRACTICE IN THE STATE OF COLORADO, DO HEREBY CERTIFY THAT THE SURVEY OF THE PROPERTY SHOWN AND DESCRIBED HEREON WAS PREPARED UNDER MY SUPERVISION AND THAT THE PLAT IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE.

DATED THIS 6th DAY OF August, A.D., 1973.

Joe R. Zylstra
JOE R. ZYLSTRA COLO. L.S. NO. 4934

CERTIFICATE OF TITLE INSURANCE COMPANY

I, JAMES L. TREAT, A LICENSED TITLE INSURANCE AGENT, LICENSED TO REPRESENT TRANSAMERICA TITLE INSURANCE COMPANY IN THE STATE OF COLORADO, CERTIFY THAT I EXAMINED TITLE TO ALL THE PROPERTY INCLUDED IN THIS PLAT ON AUGUST 6, A.D., 1973 AND FOUND TITLE VESTED IN ALLIANCE CORPORATION, FREE OF ANY RECORDED MORTGAGES, JUDGEMENTS, LIENS, EASEMENTS, CONTRACTS AND AGREEMENTS, EXCEPT AS NOTED. DEED OF TRUST RECORDED IN BOOK 385 AT PAGE 633.

DATED THIS 6th DAY OF AUGUST, A.D., 1973.

James L. Treat
TITLE INSURANCE AGENT

PLAT INSPECTOR'S APPROVAL

PLAT APPROVED AS COMPLYING WITH CHAFFEE COUNTY SUBDIVISION REGULATIONS.

DATED THIS 21ST DAY OF AUGUST, A.D., 1973.

Roy Waugh
CHAFFEE COUNTY PLAT INSPECTOR

PLANNING COMMISSION APPROVAL

APPROVED BY THE CHAFFEE COUNTY PLANNING COMMISSION, THIS 20TH DAY OF AUGUST, A.D., 1973.

BY: Stanley R. Ogilvie
CHAIRMAN

BOARD OF COUNTY COMMISSIONERS APPROVAL

APPROVED BY THE CHAFFEE COUNTY BOARD OF COMMISSIONERS THIS 21ST DAY OF AUGUST A.D., 1973.

BY: George Dominick III
CHAIRMAN

CLERK AND RECORDER'S CERTIFICATE

THIS PLAT WAS FILED FOR RECORD IN THE OFFICE OF THE COUNTY CLERK AND RECORDER OF CHAFFEE COUNTY COLORADO AT 2:38 P.M. ON THE 22nd DAY OF August, A.D., 1973. RECEPTION NO. 153337.

JASPER J. CORTESE Jasper J. Cortese by M.M.
CHAFFEE COUNTY CLERK AND RECORDER

CERTIFICATE OF DEDICATION AND OWNERSHIP

KNOW ALL MEN BY THESE PRESENTS THAT ALLIANCE CORPORATION, A COLORADO CORPORATION, BEING THE OWNERS OF THE PROPERTY DESCRIBED BELOW: THE NORTHWEST ONE-QUARTER OF THE SOUTHWEST ONE QUARTER OF SECTION 13, TOWNSHIP 15 SOUTH, RANGE 78 WEST OF THE SIXTH PRINCIPAL MERIDIAN, COUNTY OF CHAFFEE, STATE OF COLORADO MORE PARTICULARLY DESCRIBED AS FOLLOWS:
COMMENCING AT THE WEST ONE-QUARTER CORNER OF SAID SECTION 13, SAID POINT BEING THE TRUE POINT OF BEGINNING; THENCE SOUTH 88°32'40" EAST A DISTANCE OF 1332.31 FEET TO THE NORTHEAST CORNER OF THE NORTHWEST ONE-QUARTER OF THE SOUTHWEST ONE-QUARTER OF SAID SECTION 13; THENCE SOUTH 00°22'52" WEST A DISTANCE OF 1310.95 FEET TO THE SOUTHEAST CORNER OF THE NORTHWEST ONE-QUARTER OF THE SOUTHWEST ONE-QUARTER OF SAID SECTION 13; THENCE NORTH 88°53'46" WEST A DISTANCE OF 1327.30 FEET TO THE SOUTHWEST CORNER OF THE NORTHWEST ONE-QUARTER OF THE SOUTHWEST ONE-QUARTER OF SAID SECTION 13; THENCE NORTH 00°10'10" EAST ALONG THE WEST LINE OF THE SOUTHWEST ONE-QUARTER OF SAID SECTION 13 A DISTANCE OF 1319.20 FEET TO THE TRUE POINT OF BEGINNING, CONTAINING 40.140 ACRES. SUBJECT TO A 200.00 FOOT RIGHT-OF-WAY FOR THE DENVER AND RIO GRANDE WESTERN RAILROAD.

THAT SAID OWNERS HAVE BY THESE PRESENTS LAID, PLATTED AND SUBDIVIDED THE SAME INTO THREE HUNDRED AND SEVEN (307) LOTS NUMBERED 1 THROUGH 307 INCLUSIVE, AS SHOWN ON THIS PLAT, UNDER THE NAME AND STYLE OF:

CHATEAU CHAPARRAL UNIT 1

ALL LOTS ARE SUBJECT TO THE RESTRICTIVE AND PROTECTIVE COVENANTS AS RECORDED IN BOOK NO. 385 AND PAGE(S) 779 IN THE RECORDS OF CHAFFEE COUNTY, STATE OF COLORADO.

THERE IS HEREBY RESERVED FOR THE CONSTRUCTION, OPERATION AND MAINTENANCE OF EACH PUBLIC UTILITIES, UTILITY EASEMENTS BEING TEN (10) FEET WIDE ON ALL LOT LINES.

ALL TRACTS, STREETS AND OPEN SPACES ARE HEREBY DEDICATED TO THE CHATEAU CHAPARRAL OWNERS ASSOCIATION EXCEPT TRACTS "C" & "D".

IN WITNESS HEREOF, LEON DU CHARME, VICE PRESIDENT AND S.J. JOSEPH, SECRETARY OF ALLIANCE CORPORATION, A COLORADO CORPORATION, HAVE CAUSED THEIR NAMES TO BE HEREUNDER SUBSCRIBED THIS 6TH DAY OF AUGUST, A.D., 1973.

OWNERS:
ALLIANCE CORPORATION

Leon Du Charme
LEON DU CHARME, VICE PRESIDENT

S. J. Joseph
S.J. JOSEPH, SECRETARY

HOLDER OF A FIRST DEED OF TRUST: Ted Jackson
TED JACKSON

NOTARIAL
STATE OF COLORADO) S.S.
COUNTY OF CHAFFEE)

THE FOREGOING INSTRUMENT WAS ACKNOWLEDGED BEFORE ME THIS 6TH DAY OF AUGUST, A.D. 1973, BY LEON DU CHARME, VICE PRESIDENT AND S.J. JOSEPH, SECRETARY OF ALLIANCE CORPORATION, WHO ARE PERSONALLY KNOWN TO ME TO BE THE SAME PERSONS WHOSE NAMES ARE SUBSCRIBED TO THE FOREGOING INSTRUMENT.
MY COMMISSION EXPIRES JANUARY 10, A.D. 1974.

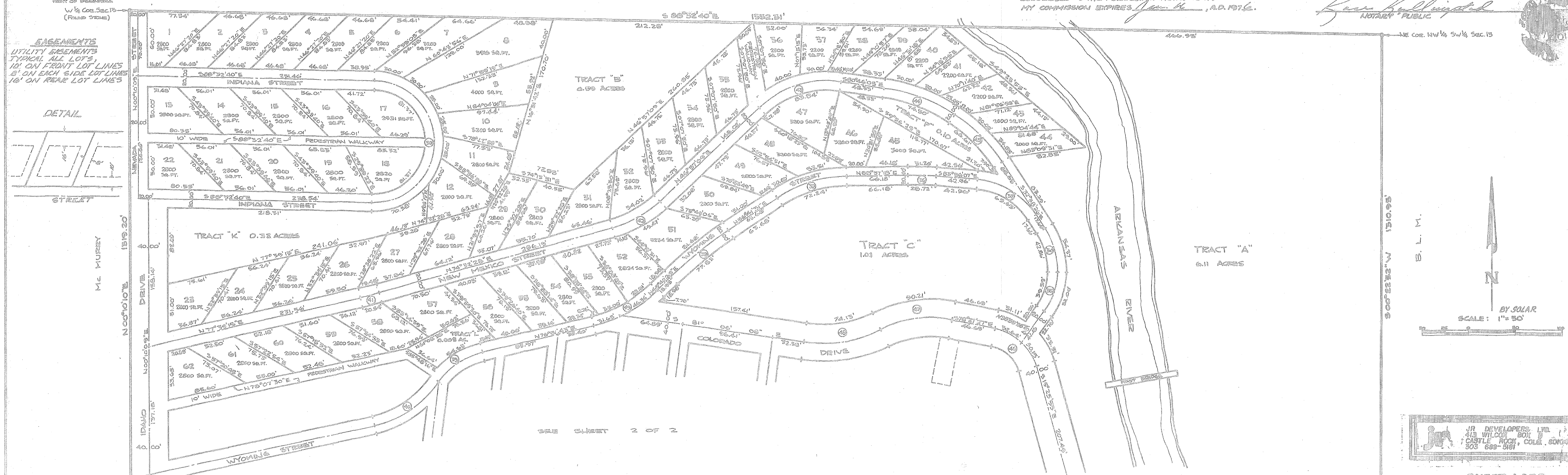
Edie W. Thrane
NOTARY PUBLIC

NOTARIAL
STATE OF COLORADO) S.S.
COUNTY OF CHAFFEE)

THE FOREGOING INSTRUMENT WAS ACKNOWLEDGED BEFORE ME THIS 6 DAY OF Aug, A.D. 1973, BY TED JACKSON AS HOLDER OF A FIRST DEED OF TRUST ON THE ABOVE DESCRIBED LANDS, WHO IS PERSONALLY KNOWN TO ME TO BE THE SAME PERSON WHOSE NAME IS SUBSCRIBED TO THE FOREGOING INSTRUMENT.
MY COMMISSION EXPIRES Jan 16, A.D. 1976.

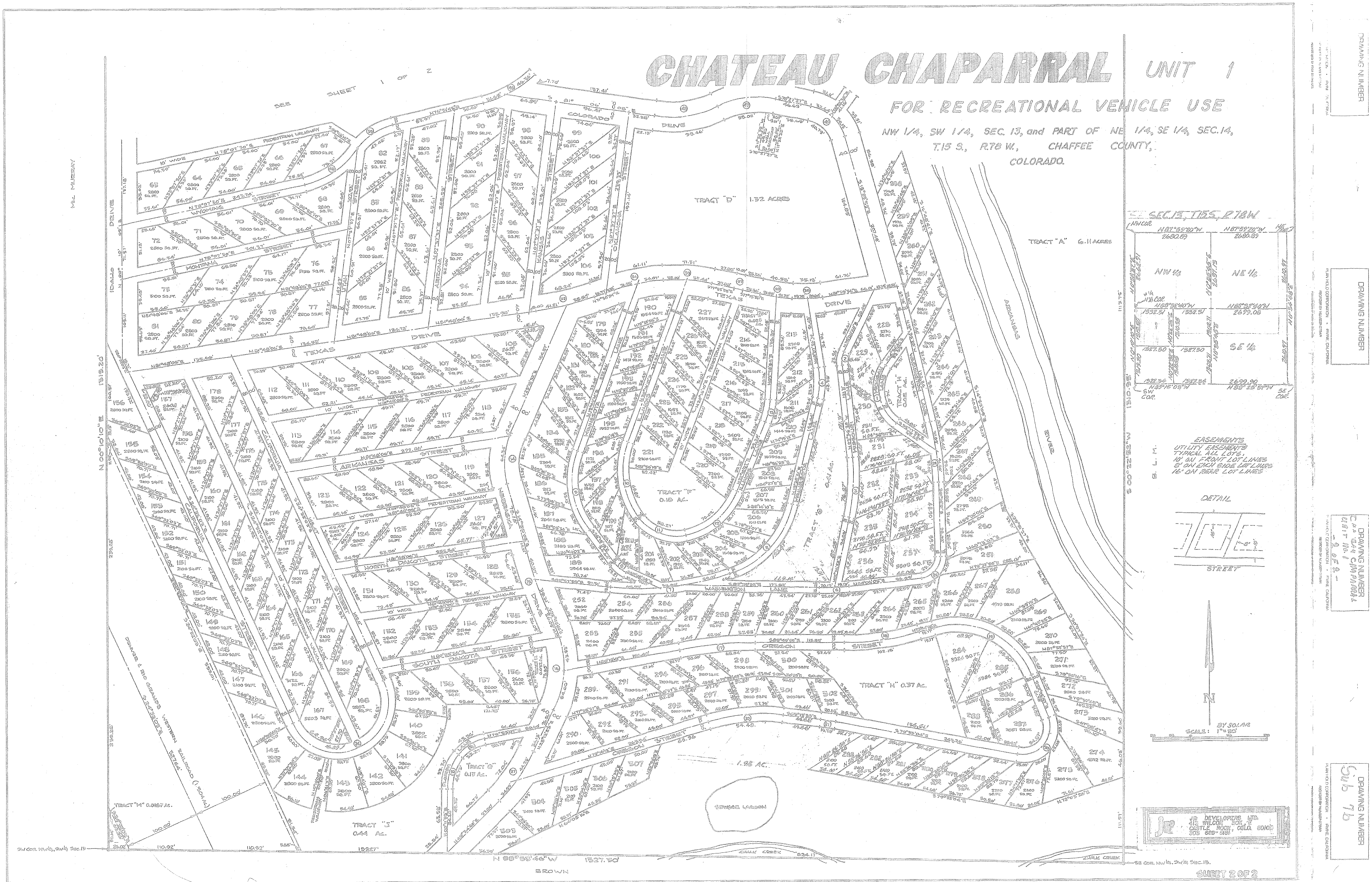
NOTARY PUBLIC

Mc MURRY



SHEET 1 OF 2

2-25



CHATEAU CHAPARRAL UNIT 1
FOR RECREATIONAL VEHICLE USE
NW 1/4, SW 1/4, SEC. 13, and PART OF NE 1/4, SE 1/4, SEC. 14, T.15 S., R.78 W., CHAFFEE COUNTY, COLORADO.
SEE SHEET 1 OF 2
TRACT "D" 1.32 ACRES
TRACT "A" 6.11 ACRES
TRACT "F" 0.19 Ac.
TRACT "H" 0.37 Ac.
TRACT "G" 0.13 Ac.
TRACT "J" 0.44 Ac.
TRACT "M" 0.0167 Ac.
1.96 AC.
SEWAGE LAGOON
ARKANSAS RIVER
CHALK CREEK
B. L. M.
COLORADO DRIVE
WYOMING STREET
MONTANA STREET
TEXAS DRIVE
ARKANSAS STREET
NORTH DAKOTA STREET
SOUTH DAKOTA STREET
WASHINGTON LANE
OREGON STREET
CALIFORNIA STREET
IDAHO DRIVE
ARIZONA STREET
KANSAS STREET
OKLAHOMA STREET
PEDESTRIAN WALKWAY
10' WIDE
DENVER & RIO GRANDE WESTERN RAILROAD
N 00°10'10" E 1315.20'
N 89°55'46" W 1327.30'
BROWN
SW COR. NW1/4, SW1/4 Sec. 13
SE COR. NW1/4, SW1/4 Sec. 13
SEC. 13, T15S, R78W
NW 1/4
NE 1/4
SE 1/4
EASEMENTS
UTILITY EASEMENTS TYPICAL ALL LOTS.
10' ON FRONT LOT LINES
5' ON EACH SIDE LOT LINES
16' ON REAR LOT LINES
DETAIL
STREET
N
SCALE: 1"=80'
JR DEVELOPERS LTD.
CASTLE ROCK, COLO.
SHEET 2 OF 2
DRAWING NUMBER
Sub 7b
2-26

Appendix E

Chateau Chaparral Area Map


Buena Vista SD WWTF
Chateau Chaparral
Image USDA Farm Service Agency
© 2009 Tele Atlas
AREA MAP
©2007 Google
285
Pointer 38°46'15.94" N 106°05'01.49" W elev 7750 ft
Streaming |||||||||| 100%
Eye alt 46082 ft

Appendix F

Chateau Chaparral Compliance Schedule

CHATEAU CHAPARRAL RESORT
WASTEWATER FACILITY
COMPLIANCE SCHEDULE
SCHMUESER GORDON MEYER, INC.
4/28/2009

MILESTONE #	TASK AND DESCRIPTION	PROPOSED DUE DATE																																				
		Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11
1	**RETAIN ENGINEERING CONSULTANT**																																					
1a	Meet with engineering consultant on site, site visit of facility	■																																				
1b	Sign letter agreement with engineering consultant to develop compliance schedule and perform an analysis/assessment of the current system, including site survey, and produce a feasibility study of alternative solutions	■																																				
1c	Submit a letter of notification to CDPHE that a Colorado licensed engineering consultant has been obtained and letter agreement signed	■																																				
2	**COMPLIANCE SCHEDULE**																																					
2a	Preliminary existing system analysis at a level of detail to produce compliance schedule		■	■	■	■	■																															
2b	Create, agree on, and submit compliance schedule to CDPHE		■	■	■	■	■																															
3	**SYSTEM ANALYSIS AND ALTERNATIVE SOLUTIONS**																																					
3a	Complete existing system analysis, including site survey,						■	■																														
3b	complete alternative solutions analysis and report, including potential funding sources and funding sources requirements							■																														
3c	present results from analysis and report with owners/property owners and determin the preferred alternative							■	■																													
4	**SOLUTION DESIGN AND FUNDING**																																					
4a	Preliminary design and submit for Preliminary Effluent Limits (PELs)								■	■	■	■	■																									
4b	Submit letter of notification to CDPHE that PELs have been received and progress on design and funding													■																								
4c	Submit Preliminary Engineering Report (PER) and Preliminary Design to CDPHE for approval													■	■																							
4d	Use PER to submit for funding/loans															■	■	■	■	■																		
5	**FINALIZE DESIGN AND BEGIN CONSTRUCTION PROCESS**																																					
5a	Revise design per CDPHE comments and submit for Site Application																			■	■	■	■	■	■	■												
5b	Finalize funding source/loans																				■	■	■	■	■	■	■	■	■	■	■							
5c	Produce construction documents and go through bid process to select a contractor																									■	■	■	■	■	■							
5d	Submit a letter of notification to CDPHE that Final Design Approval has been received and construction has commenced																															■						
5e	Apply for a new discharge permit																																■					
6	**COMPLETE CONSTRUCTION**																																					
2a	Complete construction, punch list items, facility start-up																															■	■	■	■	■	■	■
2b	Submit a letter of notification to CDPHE that construction is complete, facility start-up is completer, and the facility is fully operational																																					■