City of Biggs

Agenda Item for the
next regular City Council Meeting
February 12 , 6:30pm

To: Honorable Mayor **Date: February 6, 2013**
And Members of the City Council

From: Steve Speights, PE – City Engineer

Subject: Monthly Activity Report

6th Street Bridge

We have been in contact with adjacent property owners about granting permanent and temporary easements for the bridge replacement project. We are required by the federal funding source to offer to pay for these easements. The property owners so far have been willing to grant at no cost, but they may change their mind when they get the official offer letter, probably this week.
The utilities are planning their relocations and operations during construction. PG&E needs to provide a temporary relocation to keep a couple of customers in service. Their permanent relocation will occur during the construction period. The construction contractor needs to do some work before the permanent location is available.
PMC is working on permitting.
In the next couple of months, we will be negotiating an agreement with RD 833 for working in the slough. This agreement will need to be approved by the council and the RD 833 board. Staffs have been talking about this for some time and do not anticipate any issues.

Wastewater Treatment Plant Phase 1 Design

The Public Works Committee reviewed the Tech Memos prepared by Bennett Engineering Services. These memos provide the basis for Phase 1 design and were approved by the Committee with comments. Those comments have been addressed and the Memos are ready for city council review.

We are providing this opportunity for council review before starting plans and specifications because changes become more expensive as we move forward. We don't expect council approval of the design details, but do request concurrence with Tech Memos as recommended by the Public Works Committee.

There are seven memos each dealing with a separate design issue and containing a recommended solution for each issue summarized below.

- Headworks: A new headworks is recommended. The headworks will consist of a new pump station with three submersible pumps, an automatic bar screen, and a manual bypass bar screen. The headworks will be located at the City Corp Yard, near the existing pump station. The pump station will be designed to meet peak wet weather flow with one pump out of service. The automatic bar screen will remove plastics and other untreatable solid material from the waste stream and deposit them in a dumpster. The untreatable solids have been a considerable nuisance to the plant operators.

- Rock Filters: The rock filters are part of the treatment stream designed to remove suspended solids, predominantly algae, remaining after the biological treatment. The problem with the rock filters is that they are a breeding ground for mosquitoes. After discussions with Butte County Vector Control, we recommend covering the filters with a layer of sand on a geo-membrane fabric. The rock basins will be cleaned to remove accumulated material to provide the longest time before the next cleaning.

  A mechanical process is available as an alternate to the rock filters. The cost of this alternative is about $500,000 in construction and another mechanical device to maintain. We recommend covering the existing filters rather than the alternative.

- Chlorine Dosing System: The existing automatic system has been unused for some time after not being able to solve the problem caused by algae clogging the sensors. The dosing rate is currently set manually to match treatment flows. There are minor improvements to the chlorine treatment system that are recommended, but most of the existing system will be replaced with the Phase 2 improvements. The existing system needs to remain in operation, though, until Phase 2 is complete and we no longer discharge to Lateral K.

- Existing Building: The existing building is in need of repair and needs to be prepared for the change in operation of Phase 2. We recommend installing new control and monitoring equipment that will be capable to run the plant after Phase 2 completion.

- Electrical Power and Control Systems: We recommend upgrading and expanding the control system to allow remote monitoring and control from inside the Corp Yard office. The new system needs to monitor the new equipment and provide for Phase 2 improvements.

  The emergency generator at the existing pump station will not be large enough to power the new equipment. That generator can be mounted on a

trailer and used as a portable for other pump stations around town. The new generator will be sized to provide emergency power to all critical treatment plant functions in case of power outage.

Wastewater Treatment Plant Phase 1 Funding

We have submitted the application to the State Revolving Fund for a loan with potential for principle forgiveness for the Phase 1 project. There are several items that need to be completed before a loan agreement can be provided to the council for approval. Most of those items are financial related and some are process related. For example the state wants the financial statement for last fiscal year which is not yet complete, or a certification, with proof of publication, that we followed the Prop 218 process in rate increases. We will be working with State staff and City staff over the next few months to provide the missing information.

MEMORANDUM

TO:	Project Team
FROM:	Stacey Bennett
DATE:	January 21, 2013
SUBJECT:	Executive Summary
PROJECT:	City of Biggs WWTP Phase 1 & 2 Summary

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Background:

The City of Biggs operates the City owned Wastewater Treatment Plant (WWTP) located at 2951 West Biggs Gridley Road in the City of Biggs (City), Butte County, California. The permitted design capacity of the WWTP is 0.38 million gallons per day (mgd) with a peak facility design flow of 1.05 mgd. The average dry weather influent flow over the last 3 years was approximately 0.27 mgd. The design capacity of the plant accounts for growth of approximately 300 equivalent dwelling units. The current wastewater treatment plant consists of two facultative ponds, a ballast pond, a rock filter and a chlorine contact basin. The treated wastewater discharges to Lateral K an agriculture ditch. The facility is subject to the requirements set forth by the California Regional Water Quality Control Board (RWQCB), Central Valley Region.

The City of Biggs Wastewater Treatment Plant is in violation of the National Pollutant Discharge Elimination System (NPDES) Permit (No. CA0778930).

The current National Pollutant Discharge Elimination System (NPDES) Permit (No. CA0078930) for the WWTP contains stringent ammonia nitrogen removal requirements. The existing facultative ponds process has a limited capacity for nitrogen removal. The average monthly ammonia concentration in the plant effluent over the last several years has been approximately 9 mg/L with daily maximums of about 14 mg/L. The permit specifies that interim effluent limitations for ammonia ended on December 31, 2008. The current permit limits are 2.72 mg/L average monthly and 7.44 mg/L maximum daily effluent limitation for total ammonia discharged into the receiving water. The City must be in permit compliance by January 2017.

The City of Biggs has prepared a facilities plan to upgrade the existing Wastewater Plant and change the discharge to Land Disposal. The Land Disposal solution will allow the City of Biggs to eliminate the surface discharge of wastewater effluent. This alternative will release the City of Biggs from their National Pollutant Discharge Elimination System (NPDES) permit and convert their facility to a Waste Discharge Requirement (WDR) permit facility. The result of this project will be treatment of wastewater to similar levels as currently provided by the plant (secondary level treatment followed by disinfection), seasonal storage, and summertime irrigation of fodder crops for use in animal feed.

This project will involve 2 Phases. Phase 1 will involve planning of the overall project (Phase 1 and 2), on site upgrades to the site in preparation to complete Phase 2, and the preparation of the environmental document for Phase 1. The Phase 1 improvements consist of improvements to the existing influent pump station, the addition of a new mechanical intake screen, improvements to the rock filter, improvements to the chlorine delivery system and improvements to the electrical power and controls for the treatment plant.

Phase 2 involves the purchase of 140 to 160 acres of adjacent land to accommodate land disposal. The land disposal facility will be comprised of an effluent pump station to transport treated wastewater to storage basins from the storage basins the treated wastewater will be used for land application (crop irrigation). A tailwater basin and pump system will capture unused or overflow irrigation water and return it to the storage ponds for reuse.

Below is a summary of the anticipated improvements needed for both phases.

Item	Phase 1	Phase 2
New Headworks at Corp Yard (Influent PS and Mechanical Screen)	x	
Modifications to Rock Filters	x	
Flow based Chlorine Dosing	x	
Building improvements	x	
Upgrades to Electrical and Controls	x	
SCADA	x	x
Effluent Pump Station		x
New Chlorine Injection at New Effluent Pump Station		x
Seasonal Storage		x
Land Application Site		x

MEMORANDUM

TO:	Project Team
FROM:	Stacey Bennett
DATE:	January 21, 2013
SUBJECT:	Headworks - Pump Station and Screen
PROJECT:	City of Biggs WWTP Phase 1 Upgrade

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Background and problems:

The City of Biggs Wastewater Treatment Plant (WWTP) includes a headworks facility consisting of a wet/dry pump station. The collection system flows by gravity to this pump station. The pump station pumps the flow to the treatment facility approximately 2,000 feet away through parallel 8" force mains. The electrical controls are located at the pump station site outside, but covered by a small awning. They are completely separated from the controls for the treatment plant. The electrical power is provided by the local power company (Biggs City Electric Utility) and is equipped with a 40kw backup generator for use during a power outage. There have been problems with this facility that must be resolved. In addition the station is old, out of date technically, and inefficient. This pump station will continue to be used for the future treatment plant improvement (conversion to land disposal).

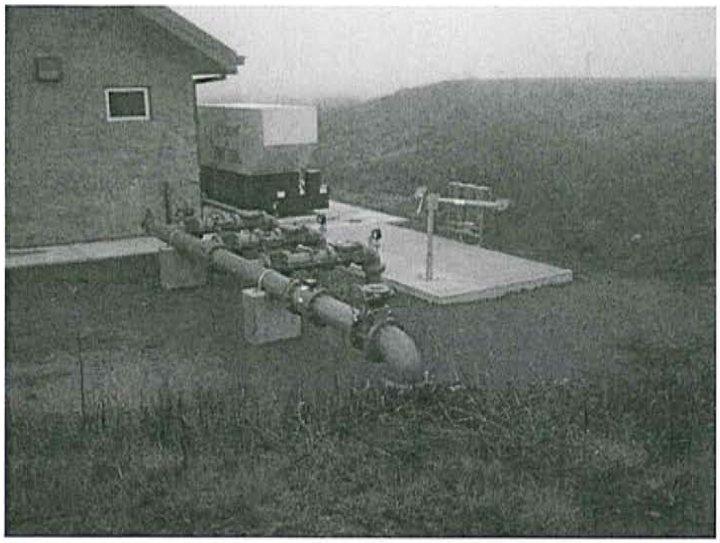
Issues to be resolved with the improvements to the headworks:

- Old pump station is difficult to maintain (required to get into dry well to remove pump, improper valve operation releases wastewater into dry well).
- Inefficient aged pumps.
- Plastics and other debris in the treatment facility must be removed at headworks to prevent damaging equipment in the treatment ponds.

Solution options:

Due to the combined problems with solids in this facility it is recommended that a new headworks (pump station and screen) be installed.

The new headworks will consist of a screen and a new pump station. The screening system will pull out a majority of the plastics that currently flow through to the treatment plant. To limit the footprint of the screening system a vertical screen as shown to the right is recommended. The pictured screen is a CleanFlo Vertical Spiral Screen Model FSV7. The outlet chute discharges screen materials into a standard refuse container that can be serviced by a refuse company. After screening is complete the waste water will flow to the proposed submersible pumping system.



It is recommended that the pump station be a wet well with submersible pumps. The waste water will enter an in ground vault approximately 15' long by 7' wide that will contain submersible pumps. The recommended pump arrangement will consist of a three pump system lead, lag, and standby. The control programming will place pump operation through a rotation, cycling through each pump to insure regular operation. On and off levels will be set based on pump sizes and run time. The three pumps will manifold together in an arrangement similar to the picture to the left. The design will consist of three pumps to replace the existing two 550 gpm capacity pumps. A flow meter will be installed at the discharge and the manifold will be plumbed to the existing parallel 8" force mains to the treatment facility.

Headworks location:

There are two feasible locations to place the headworks (new pump station and screen). Option 1 is to keep the headworks at the corporation yard where it is now. Option 2 is to put the headworks at the WWTP site. Below is a table of pros and cons of each option:

Headworks	Pros	Cons
Option 1 - Corp. Yard	Cost savings on gravity pipeline down access road is approximately $500,000	Odor at Corp.Yard
	Requires addendum to environmental document	Not all facilities in one location
Option 2 - WWTP Site	No smell from Corp. Yard	Cost of gravity pipeline down access road is approximately $500,000
	All facilities in same location	Requires new environmental document

It is recommended that the headworks remain at the corporation yard. The proposed improvements will be constructed north and parallel of the existing wet/drywell system. A new connection will be made from the existing wetwell to the screen and from the screen to the submersible pump vault. The screening and pump station facility will tie into the existing force main for discharge to the WWTP. This parallel construction will provide an easier transition to bring the facility online with shorter shut down times.

The controls for the screen and pump station (including the backup generator) will be located on the corp. yard site near the headworks. Provision for a SCADA system will also be installed to monitor and operate the system from off site. The SCADA system can either be installed as part of Phase 1 or Phase 2. Other electrical improvements for Phase 1 will provide accommodations for implementation of SCADA.

The design of the pump station will utilize existing flow data provided by the city as well as record information presented in the Psomas "Wastewater Treatment Plant Alternative Study", the CEC "City of Biggs Collection System Research and Implementation Plan" and the CEC "Sewer Master Plan".

MEMORANDUM

TO:	Project Team
FROM:	Steve Lamb
DATE:	January 21, 2013
SUBJECT:	Rock Filters
PROJECT:	City of Biggs WWTP Phase 1 Upgrade

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Background:

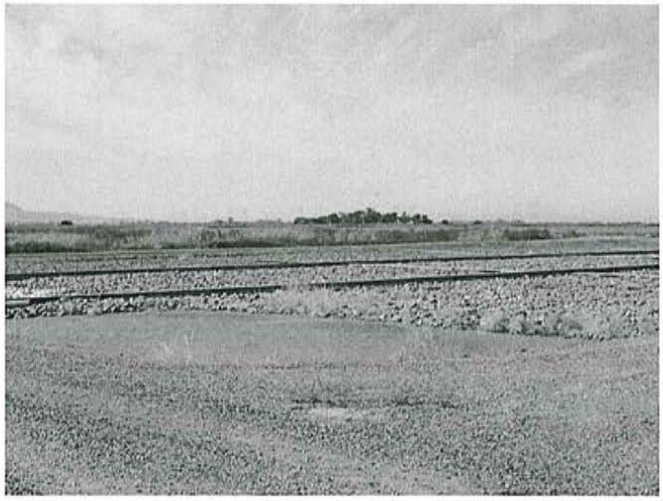
The City of Biggs Wastewater Treatment Plant (WWTP) includes two facultative ponds followed by rock filters, disinfection with chlorine dechlorination, and discharge to an agricultural drain. The rock filters are designed to filter suspended solids from the pond effluent so that the discharge meets NPDES discharging requirements of 30 mg/L BOD and 30 mg/L TSS (30/30). High populations of algae, especially during warmer months, can degrade pond effluent quality above 30/30. The filters consist of 3-inch diameter river run rocks which act as a passive strainer as the water slowly moves through the bed.

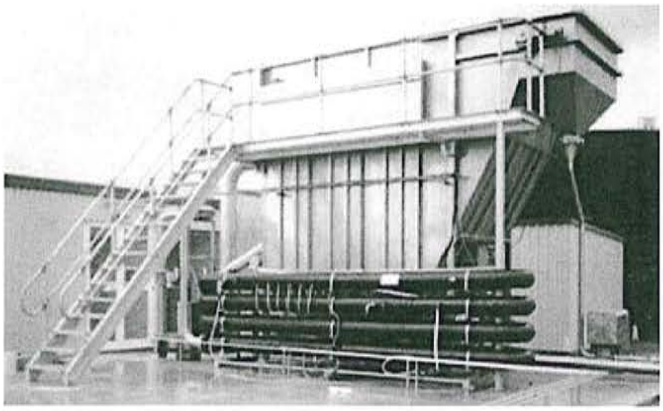
The system has been in place for over 12 years and the effluent has been consistently below 30/30. There are two major issues with the rock filters:

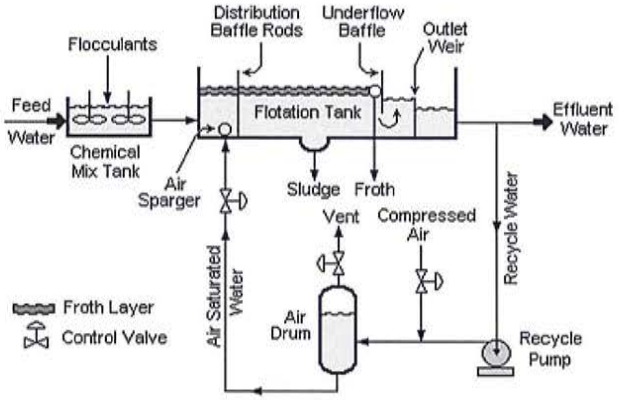
1) Performance of rock filters has been inconsistent at other WWTPs and engineers have developed other means to control algae. Many rock filter installations in the Central Valley have been abandoned due to excessive algae plugging the filters. City of Biggs Operations Staff has observed that the rock filters may not do much to reduce effluent BOD and TSS.
2) The large rocks combined with the presence of slow moving, nutrient rich water creates an ideal mosquito breeding habitat. Butte County vector control must actively control (fog) around the rock filters to minimize nuisance conditions. In recent years, the spread of West Nile Virus by mosquitoes has elevated concerns to actively control mosquito populations.

Solution / Evaluation:

1) It has been determined that the existing filters are necessary to consistently meet 30/30 limits, which will require the rock filters to remain in place. To control mosquitoes the recommendation is the following:
    a. Place a geotextile fabric over the existing rocks.
    b. Add 3/8" pea gravel with a depth of 2".
    c. Cost of the cover is small relative to the plant improvements cost.
    d. Ben|En has consulted with vector control and they view this as a viable alternative.







2) Other options for vector control include:

a. Removal of the rock filters and installing a dissolved air flotation process, where coagulants (ferric chloride or aluminum sulfate) are added and compressed air bubbles "float" the suspended solids to the surface where it is then removed.

b. This option would require significant improvements to the plant, including the construction of a basin / tank of adequate size, air entrainment vessel, coagulant storage and a skimming system. The cost of this may range from 300,000 – 500,000.

3) Additionally the plant could be reconfigure the ponds to a series of basins with baffle walls so the residence time of any single basin is below 2-3 days more intense aeration, to discourage algae growth.

a. This would require draining and de-sludging the existing basins, constructing baffle walls, weirs to control flow rates, addition of aerators and potentially upsizing the electrical system to support the increased load. The cost of this alternative would range from 400,000 – 600,000.

MEMORANDUM

TO:	Project Team
FROM:	Steve Lamb
DATE:	January 21, 2013
SUBJECT:	Chlorine Delivery
PROJECT:	City of Biggs WWTP Phase 1 Upgrade

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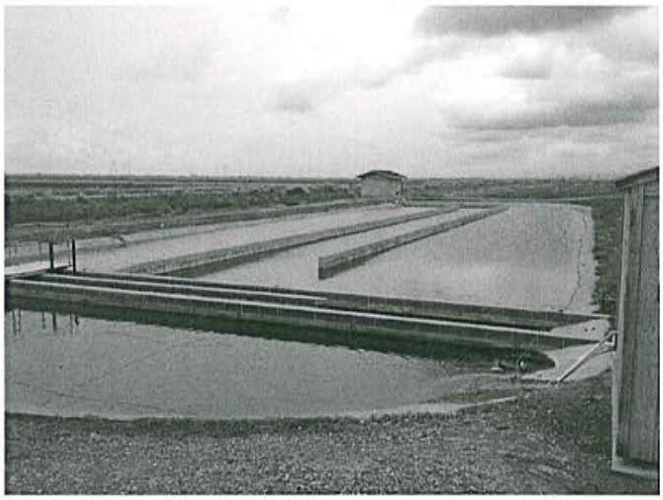
Background:

The City of Biggs Wastewater Treatment Plant (WWTP) includes a chlorine contact basin that was reconstructed approximately in 2001. The designed chlorine delivery system was ineffective in delivering proper doses of chlorine due to sensor malfunction caused by algae blocking the sensors. After numerous attempts utilizing different sensors, the sensor controlled automated chlorine delivery was discontinued and is now being delivered via manual adjustments supported by effluent testing. The current delivery method is meeting the requirements as set forth by the NPDES permit.

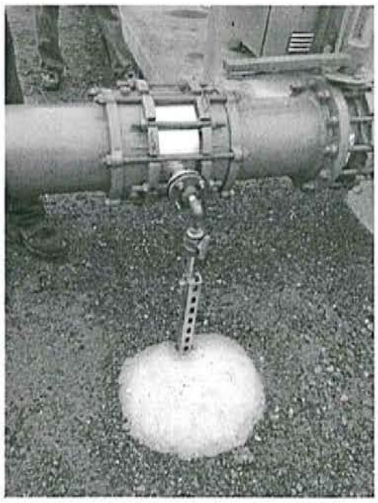
Improvements required to the Chlorine Contact Basin include: clean and perform maintenance on the existing contact basin, and stage delivery system for land disposal in pipe dosing.



Solution:

The existing chlorine contact basin has cracks in the concrete lining where vegetation has begun to grow. The cracks in the lining must be repaired.

The Chlorine dosing method must be automated to inject Chlorine into the wastewater based on flow. The existing dosing pump may require replacement to be compatible with an automated system. The chlorine storage and distribution pump will remain in the existing building. The chlorine contact basin will be upgraded and placed in service.



For phase 2, piping will be installed from the existing chlorine distribution system to the proposed land disposal effluent discharge location. Chlorine delivery will be similar to the photo at the left. The existing chlorine contact basin will be abandoned.

MEMORANDUM

TO:	Project Team
FROM:	Steve Lamb
DATE:	January 21, 2013
SUBJECT:	Existing Building
PROJECT:	City of Biggs WWTP Phase 1 Upgrade

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Background:

The City of Biggs Wastewater Treatment Plant (WWTP) includes an existing block building that houses a laboratory, electrical and operations equipment, a restroom, chlorine delivery equipment, and storage area.

The existing building must be improved:

- To update existing equipment for the future land disposal process, and to update existing saftey equipment.
- The existing building exterior must be repaired and painted.
- The existing Storage Shed by the chlorine contact basin will be repaired and painted.

To streamline future processes a separate control system may be required thereby eliminating portions of the existing equipment. Additional conduits may be installed for SCADA telemetry and communcations.

The existing building will be painted and repairs to exterior trim will be made. It is intended that the existing color will be maintained.

MEMORANDUM

TO:	Project Team
FROM:	Stacey Bennett / Jeremy Pollet
DATE:	January 21, 2013
SUBJECT:	Electrical Power and Controls
PROJECT:	City of Biggs WWTP Phase 1 Upgrade

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Background:

Power to the City of Biggs Wastewater Treatment Plant (WWTP) facilities is provided through two separate 12.47 kV / 480V overhead electrical services. These services provide power to two locations – the Influent Pump Station and the WWTP. The Influent Pump Station (IPS) is located approximately 2000 feet from the WWTP. Automated controls at each of these services are separate and there is no Supervisory Control and Data Acquisition (SCADA) system.

Influent Pump Station (IPS):

A 480VAC, 3-phase, 3-wire, 100 amp (A) service provides power to the influent pumps, a drywell sump pump, and station instrumentation and controls. A 40 kilowatt (kW) emergency generator located at the influent pump station provides backup power to the influent pumps. The influent flow meter signal at the pump station is transmitted to the operations building via overhead messenger cable. The electrical and controls infrastructure at the Influent Pump Station is approximately 15 years old and functioning properly.

Wastewater Treatment Plant (WWTP):

A 480VAC, 3-phase, 4-wire, 200A service provides power to the aerators, recycle pumps, effluent pumps, transfer pump, mixing pump, operations building, dechlorination building, and plant instrumentation and controls equipment. A messenger cable from the influent pump station to the WWTP provides emergency power to select WWTP loads. The existing electrical and controls infrastructure at the WWTP is functioning adequately but is not up to date. Space constraints and system interoperability concerns do not allow for increasing or updating the electrical service and controls equipment at the WWTP for future changes (Phase 2).

Design Considerations for Phase 1:

- The existing electrical service at the Influent Pump Station is sufficient for Phase 1 loads of one additional Influent Pump and a Headworks Screening Unit.
- The existing 40kW generator at the Influent Pump Station is not adequate for the Buildout of the Influent Pumps Station and the Headworks Screening Unit. Calculations approximate that a 50kW generator will be required.
- The existing electrical controller for the Influent Pumps must be replaced with a non-proprietary, SCADA-ready Programmable Logic Controller (PLC-1). This new PLC would provide control and monitoring of the (3) Influent Pumps, including Influent Flow and Wetwell Level, and the headworks screening unit.
- A new SCADA node/computer (hardware and software) would be provided and placed in the Corp Yard Building. The SCADA node would provide local and remote monitoring and control of the new Influent equipment, existing WWTP equipment, and future Phase 2 equipment.
- A single underground conduit for a network/Ethernet connection would be installed from the Corp Yard Building to the new Influent PLC.

- A new non-proprietary, SCADA-ready Programmable Logic Controller (PLC-2) would be installed at the WWTP in the existing Operations Building to provide control and monitoring of the Aerators and the Chlorine Injection system.
- Network connectivity from the Corp Yard to the WWTP Operations Building would be accomplished by:
    - Underground conduit with fiber optics cable. (~ $10/ft for trenching @ 2,000 ft = $20K)
    - Overhead fiber cable across existing City of Biggs Power poles, if allowed. ($5-10K)
    - Radio, antenna, and antenna poles located at the Corp Yard and the Ops Building ($20K)
- The existing influent flow meter chart recorder located at the WWTP would be replaced.
- Electrical equipment such as motor starters, hand controls, and indicators at the WWTP would remain, they are working properly.
- The current backup power for the WWTP is the standby generator at the influent pump station. That system is not adequate. A dedicated backup power system (diesel generator) at the WWTP sized for the existing equipment and future Phase 2 equipment would be installed.

Design Considerations for Phase 2:

- A new electrical service will be required for the Effluent Pump Station.
- A new SCADA-ready PLC (PLC-3) would be installed at the Effluent Pump Station for Effluent control and monitoring.
- An underground conduit for a network connection would be installed from the new WWTP Effluent Pump Station to the existing Operations Building.
- Effluent Pump Station controls, graphics, and alarming will be added to the SCADA node.

SCADA System Summary:

- Upon Buildout (end of Phase 2), the City of Biggs wastewater system would be equipped with the following control system equipment, each networked together with a combination of Fiber and Ethernet cabling:
    - SCADA Node (Corp Yard), with Remote Access
    - PLC-1 (Influent / Headworks)
    - PLC-2 (WWTP)
    - PLC-3 (Effluent Pump Station)