

## TECHNICAL MEMORANDUM

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**Date:** March 26, 2018

**Project No.:** **REVIEW OF JOHNSON UTILITIES SECTION 11 TREATMENT PLANT AND ASSOCIATED COLLECTION SYSTEM  
WESTLAND PROJECT NO. 2044.01**

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### INTRODUCTION

The Arizona Department of Environmental Quality (ADEQ) retained WestLand Resources, Inc. (WestLand), to assist in an evaluation for the Johnson Utilities Section 11 treatment plant and the associated collection system following a series of odor complaints. WestLand met with ADEQ on Friday, February 23, 2018, to discuss the project and conducted a site visit at the Johnson Utilities facilities on Friday, March 2, 2018.

The purpose of this memorandum is to answer specific questions regarding the facilities, and to provide a summary of WestLand's observations from the site visit. The remainder of this memorandum includes descriptions of the collection system and Section 11 treatment plant, answers to ADEQ's questions, and a summary of the field site visit.

### SYSTEM DESCRIPTION

The following is a short description of the collection system and the Section 11 treatment plant.

#### Collection System

The collection system consists of a system of gravity mains, lift stations, and force mains. Some of the lift stations in the area we evaluated pump to the Anthem treatment plant. Since the area is relatively flat, all the flows travel through at least one lift station and force main.

#### Section 11 Treatment Plant

The Section 11 treatment Plant consists of the following components in order of operation. Flows to the plant vary seasonally with higher flows in the winter. Effluent from the facility is either reused for golf course irrigation or is recharged. According to the operator, influent water quality is, on average, 5-day biochemical oxygen demand (BOD<sub>5</sub>) of 250 milligrams per liter (mg/L) and total nitrogen (TN)

of 45 mg/L. The Section 11 treatment plant is currently meeting its permitted water quality requirements. The Section 11 treatment plant includes the following components from the head of the plant to the outlet:

1. Headworks: two force mains enter the headworks, which consists of manual bar screens. The headworks structure is covered and has active odor control.
2. Aerated lagoons: four aerated basins with mechanical aerator/mixers.
3. Wetlands: 16 wetlands operated in parallel with 2 cells in series in each wetland.
4. Disinfection: chlorination with sodium hypochlorite.
5. Recharge: Eight recharge basins. Effluent is also sent off-site for recharge. Basins are cleaned and ripped in the summer when flows are lower.
6. Solids handling: solids are removed from the site for treatment and disposal.

## ADEQ QUESTIONS

**Question 1.** Are the processes Johnson Utilities have in place for odor and hydrogen sulfide control current best management practices? If not, what additional steps would be required to be so?

**Response:** Collection System

The processes and equipment Johnson Utilities have in place, and is planning to install in the collection system for odor and hydrogen sulfide control, are current best management practices.

### Treatment System

Secondary treatment at the Section 11 treatment plant is by aerated lagoons followed by wetlands for denitrification. Flow is split among several wetlands, with each wetland having two cells. The second cell of each wetland is devoid of plants, following a cleanup of the wetlands. Magnesium hydroxide and ferric chloride are added to the waste stream before it enters the wetlands. We have never seen this done before, and are concerned about the long-term effects on the wetlands, as well as about buildup of precipitate in the wetlands; however, it appears that this is working to reduce odors from the wetlands.

The operator stated that he plans to remove the ferric chloride feed as flows diminish in the summer, to see if the magnesium hydroxide can maintain the same level of odor reduction. We also recommend getting plants back into the second cell of each wetland, as this would help with the odor control and add nitrification capacity to the system.

**Question 2.** Are there operational deficiencies or issues you observed during the site visit?

**Response:** We did not note any operation deficiencies in the collection system, but we noted two operational deficiencies in the Section 11 treatment facility.

1. The freeboard in the aerated lagoons was down to 1 to 1.5 feet. The operator reported that flow from the aerated lagoons was reduced because of limited recharge capacity to prevent spills. The recharge basins were also full.
2. The second cell of each wetland was lacking plants. The operator reported that the plants were removed to clean up the vegetation, and the cells were expected to revegetate on their own.

**Question 3.** In the responses given to your questions, do you feel Johnson Utilities has sufficient technical and managerial capacity to operate the plant and prevent future continued odor/hydrogen sulfide issues? Did there seem to be areas of competence or expertise missing?

**Response:** Johnson Utilities staff seemed forthcoming in all their responses. They seemed knowledgeable in the operation of the treatment plant and the collection system, and understood the problems that they were facing in each system.

**Question 4.** What other observations did you have?

**Response:** In addition to the observations already noted above:

1. The operator reported a problem with ammonia in the effluent. The operator added seed from another plant, which seemed to alleviate the problem. The operator stated that the dissolved oxygen in the aerated lagoons runs between 1.0 and 1.5 mg/L. For efficient nitrification, dissolved oxygen should be 2.0 mg/L or greater. We recommended a study to determine the effect of adding additional aeration to the aerated lagoons. The operator stated that he was already planning to pilot test some aerators.
2. As stated above, recharge capacity is too low for winter months. Operator said new recharge facilities are in the planning stage. We recommended an emergency overflow pond as interim solution to prevent spills and allow proper freeboard for the aerated lagoons.

## **SUMMARY OF SITE VISIT**

### **Collection System**

As part of the site visit, we visited three lift stations: Oasis/Sunrise (also known as Mirage), Copper Basin 1, and Main Yard. Most of the flows into the Section 11 treatment plant pass through the Main Yard lift station.

The Oasis/Sunrise lift station receives flows from three upstream lift stations and pumps to the Anthem treatment plant. The lift station has a negative pressure odor control filter. There were no noticeable odors at the site.

The Copper Basin 1 lift station feeds the Oasis/Sunrise lift station. The lift station is quite large relative to the flows its currently receiving. A “wet well wizard” aeration system was installed at this lift station, and it is planned to install the same system at additional lift stations. The aerator is next to the pumps and is not connected to the pump on/off control, therefore, we have some concern about pump wear, but the operator reports no problems with operation. There is a baffle wall in the lift station which may be preventing sufficient mixing throughout the wet well.

The Main Yard lift station pumps most of the Section 11 flow. Several lift stations supply this lift station either directly or by gravity, with two lines supplying the wet well directly. The lift station is not currently aerated, but plans are to add aeration. Thioguard (magnesium hydroxide) is added at the lift station.

Most of the force mains are PVC with HDPE for newer sections. Johnson Utilities is considering adding air release valves to some force mains. There are no current odor control complaints, but we would like to reexamine during the summer when flows are lower.

## **Section 11 Treatment System**

Influent enters the treatment through two force mains with most flow coming from the Main Yard lift station. The headworks consists of manual bar screens in a covered box with a negative pressure odor control system.

Secondary treatment and nitrification is provided by four aerated lagoons with mechanical aeration. The freeboard on the aerated lagoons from 1 to 1.5 feet because of limited recharge capacity and receiving 400,000 gallons of effluent from the Anthem treatment plant. The operator reported high ammonia in the effluent, and added seed from another treatment plant, which seemed to alleviate the problem. The operator reported dissolved oxygen levels are typically between 1.0 and 1.5 mg/L.

Denitrification is provided by wetlands system; 16 wetlands operating in parallel with 2 cells per wetland. The second cell of each wetland didn't have plants. According to operator, the plants were removed to clean the wetland vegetation, but plans are for cells to revegetate. Magnesium hydroxide and ferric chloride are added before the wetlands.

All the recharge basins are full. Effluent can be transferred off-site for recharge. There was a problem this winter with an additional 400,000 gallons to recharge from the Anthem plant. There are plans for additional recharge capacity off-site.