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## Attachment A

August 7, 2008

Mr. Mike Yeraka, General Manager  
Diablo Water District  
P.O. Box 127  
Oakley, CA 94561-3798

*Subject: M-28 Willows Mobile Home Park  
Reverse Osmosis System - Draft CIP Budget*

Dear Mr. Yeraka:

As requested, CDM has revisited the 2006 recommended improvements to the M-28 reverse osmosis (RO) facility at the Willows Mobile Home Park, which were described in CDM's letter to the District dated June 22, 2006. The 2006 recommendations were an update of CDM's 1995 work described in a February 23, 1995 letter to the District.

For this 2008 update, CDM visited the facility and reviewed the 2006 information recommendations prior to updating the cost estimates and recommendations. In addition, CDM and the District met on June 10, 2008 to discuss the improvements and approach for updating the costs.

### **Purpose of Letter**

This letter provides an updated list of revised recommendations with higher priority items listed before lower priority ones, based on health and safety issues. A summary of all the recommended improvements and estimated costs is provided first. This is followed by more detailed discussions of each item, including descriptions and key assumptions.

### **Summary**

Table 1 summarizes the recommended improvements at the M-28 RO Facility, and their estimated planning-level costs in current dollars. Two options are shown that are dependent on the selected approach for the Item 1 Building Replacement:

- Option 1 is to replace the existing building with new pre-engineered buildings to house the existing treatment process equipment.
- Option 2 is to utilize a containerized RO treatment facility, which would replace both the existing building and the existing treatment process equipment, i.e., a new plant.

The selection of Option 1 or Option 2 for implementation in Item 1 impacts some of the other items, as indicated in the cost summary and as described for the individual items.

<b>Table 1</b> <b>Summary of Recommended Improvements</b> <b>for M-28 Reverse Osmosis Facility</b>		
<i>Items</i>	<i>Estimated Planning-Level</i> <i>Estimated Construction Costs</i> <i>(2008 \$) <sup>(1)</sup></i>	
	Option 1 - Replace Buildings, Keep Existing Treatment Equipment	Option 2 - New Containerized RO WTP Facility
No.1 - Replace Building	\$347,000	\$622,000
No.2 - Seismic Restraints/Pipe Supports	\$37,000	\$34,000
No.3 - Reservoir Stabilization	\$70,000	\$70,000
No.4 - Backup Distribution Pump	\$36,000	Included in Item 1
No.5 - Blending/Acid Elimination (RO Bypass Line)	\$15,000	Not required with new WTP
No.6 - Exterior Tank/Piping Coatings	Deleted	Deleted
No.7 - Seal Abandoned Well	\$16,000	\$16,000
No.8 - Misc. Plant Repairs/Modifications	\$78,000	\$5,000
No.9 - Instrumentation (Conductivity Meter, Chlorine Analyzer)	\$13,000	Included in Item 1
No.10 - Emergency Power	Deleted	Deleted
No.11 - Remote Monitoring (Telemetry)	\$51,000	\$51,000
No.12 - Pipe Labels	Deleted	Deleted
No.13 - Fencing Repairs	\$17,600	\$17,600
<i>Total Construction Cost including 25% contingency</i>	<i>\$680,600</i>	<i>\$815,600</i>
<i>Implementation Allowance estimated at 35% of Total Construction Costs <sup>(2)</sup></i>	<i>\$238,000</i>	<i>\$285,000</i>
<i>Total Estimated Cost (rounded)</i>	<i>\$919,000</i>	<i>\$1,101,000</i>

<sup>(1)</sup> The planning level construction cost estimates include a 25% contingency.

<sup>(2)</sup> Implementation allowance, estimated at 35% of total construction cost, includes engineering design and construction support, and District construction management and inspection.

All the items are important to ensuring the long term reliability of the facility. However, they are prioritized with regard to health and safety, with the highest priority items being at the top of the list. Items No. 6, 10 and 12 have been deleted as requested by the District/County.

The planning level cost estimates include:

- Construction costs estimated by CDM Constructors Inc (CCI), which include materials, labor, installation, overhead and profit. A 25% contingency is included at this conceptual planning stage. This Opinion of Probable Cost of Construction represents CCI judgment as a professional and is supplied for general guidance.
- Implementation allowance of 35% for engineering design and construction support of the recommended improvements, and for District construction management and inspection.

The estimated costs assume that all the improvements will be completed as part of one general improvement project, rather than individual small projects. Breaking it into several bid/construction packages would increase costs. Implementation of the selected Item 1 Building option will facilitate implementation of many other work items and help minimize the overall upgrading costs.

The cost estimates assume that either Diablo Water District or Contra Costa County will be responsible for soliciting the necessary quotations for construction work. It is assumed that the technical specifications and drawings can be attached to a set of standard terms and conditions prepared by Diablo Water District or Contra Costa County. Costs for Diablo Water District construction management and inspection are included as part of the implementation allowance. Costs for Contra Costa County staff time have not been included in the cost estimate.

## **Description of Items**

### **1. Replace Building**

The existing RO equipment location and plywood shed does not meet Occupational Safety & Health Administration (OSHA) standards and the National Fire Protection Association (NFPA) Life Safety Code. It also does not allow reasonable access to the equipment for maintenance and protect the equipment from vandalism and environmental elements. It is recommended that the existing plywood shed around the RO system and the old RO frame building be demolished and one of the following two options be implemented.

#### **Option 1 - Two New Pre-engineered Metal Buildings (25 ft x 8 ft and 25 ft x 20 ft)**

With Option 1, two new pre-engineered metal buildings will be constructed to replace the existing buildings. Some of the existing treatment equipment will be re-located as necessary. This option is similar to that described in the 1995 and 2006 letters; except that two buildings are now recommended instead of one, in order to stay within the existing site boundary.

The anticipated sequence of construction is described below:

1. Demolish all of the existing unsafe buildings.
2. Pour additional concrete slab around the existing RO skid area to expand the width of the concrete slab for the new location of the chemical tanks.
3. Install a new 25-foot x 20-foot concrete slab for the new location of the re-located RO skid and ancillary equipment at existing plywood shed area.
4. Relocate the existing RO skid and ancillary equipment to existing plywood shed area; relocate existing chemical tanks to existing RO skid area.
5. Erect the new buildings. The new buildings will include: insulation for noise and temperature control, double wide access doors or coiling overhead door at new RO skid area and new chemical tanks area, lighting, ventilation, skylight, electric unit heater, counter, sample sink, toilet, wash sink and relocation of existing emergency eyewash/shower unit.

All the existing equipment would be protected in place during the construction period. This option will require coordination with Pacific Gas & Electric (PG&E) and a plant shut down for a few days while relocating equipment.

The engineering tasks for Option 1 are anticipated to include:

- Site plan;
- New construction site plan and mechanical equipment/piping layout details;
- Building sections and foundation/slab details;
- Specifications describing sequence of work, piping, electrical, and pre-engineered building requirements;
- General notes and details;
- Geotechnical samples will need to be taken and analyzed (2-20 ft bore holes and sample analysis).

The estimated cost of Option 1 for replacing the existing structure with new buildings includes new concrete slab, pre-engineered buildings, HVAC, electrical power distribution equipment, lighting, plumbing, and equipment relocation.

## **Option 2 - New Containerized RO Water Treatment Plant**

With Option 2, a new containerized RO Water Treatment Plant (WTP) will be constructed to replace the existing building and treatment facilities. This will essentially provide a new plant, although will continue to use the existing filters.

The anticipated sequence of constructing the Containerized RO WTP is described below:

1. Set the new pre-fabricated and pre-assembled Containerized RO WTP unit at a temporary location with temporary piping system from existing raw water system through existing filters and new RO Containerized WTP unit to existing Hydropneumatic tank and existing reservoir to continue to provide the water to users during the construction period. This operation will require coordination with PG & E and a shut down for couple days to make tie-ins.
2. Demolish all the existing unsafe buildings, RO skid, and chemical systems.
3. Relocate the existing filters.
4. Pour additional concrete slab around the existing RO area for the new containerized RO WTP unit.
5. Re-arrange and re-use, where possible, the ductile iron fittings with new PVC piping system in the yard.
6. Relocate the new Containerized RO WTP to the permanent location and connect it to the existing system. This operation will require coordination with PG & E and a shut down for couple days to make the tie-in.

The recommended new containerized RO WTP unit features include: insulation for noise and temperature control, double wide access doors or coiling overhead door at RO skid area, electrical power distribution equipment, lighting, ventilation, skylight, electric unit heater, counter, sample sink, toilet, wash sink and relocate of existing emergency eyewash/shower.

The engineering tasks for a new Containerized RO WTP are anticipated to include:

- Site plan and temporary equipment locations;
- New construction site plan and mechanical equipment/piping layout details;
- Building sections and foundation/slab details;
- Specifications describing sequence of work, piping, electrical, and Containerized RO WTP requirements; and
- General notes and details.
- Geotechnical samples will need to be taken and analyzed (2-20 ft bore holes and sample analysis).

The estimated cost of Option 2 for the new Containerized RO WTP includes new RO skid system, backup distribution pumps, chemical systems, concrete slab, building, HVAC, electrical power distribution equipment, lighting, plumbing, and equipment relocation.

## **2. Seismic Restraints/Pipe Supports**

The RO skid is not seismically restrained and some plant piping is not adequately supported and seismically restrained. In the event of an earthquake, significant damage may occur, resulting in an extended plant outage during repairs. It is recommended that anchor clips be added to secure the RO skid, lateral bracing be installed to the pipe supports, and additional pipe supports be installed. In addition, flexible couplings between unit processes should also be installed. These improvements should be incorporated whether the RO skid is relocated or left in place.

The engineering tasks for the seismic restraints are anticipated to include:

- Estimating overturning forces and the selection of anchor bolts;
- Details of anchor clips and lateral bracing.

The estimated cost for the installation of seismic restraints and additional pipe supports includes welding, anchor bolts, and pipe supports.

## **3. Reservoir Stabilization**

There is a concern that the existing foundation for the 20,000 gallon reservoir is inadequate to resist overturning in the event of an earthquake. A detailed analysis of the soils and mat foundation are required before final recommendations are made. An examination of the site indicated that a new larger diameter steel tank, with a lower overturning force, could not be easily installed due to space constraints. Therefore, the cost estimates include grout stabilization of the soil under the tank slab to increase soil resistance, concrete anchors to provide additional over-turning resistance to the slab, and additional anchor clips on the tank to prevent existing bolt pullout. If the resulting degree of overturning resistance is less than desired, it would be more cost effective to replace the existing tank with a new tank of a different configuration that would fit in the space, than to provide more stabilization. This would also be appropriate if it is determined that the existing tank walls will buckle during the design earthquake.

The engineering tasks for the reservoir seismic improvements are anticipated to include:

- Grout stabilization specification and plan drawing;
- Soil anchor and tank bolt details; and
- Geotechnical analysis performed as part of Item No. 1.

The estimated cost for reservoir stabilization includes the injection of cement grout below the concrete pad and the installation of deep soil anchors with tank clips. It is assumed the reservoir stays in operation during the stabilization work.

#### **4. Backup Distribution Pump**

Failure of the single existing booster pump will result in loss of water supply and basic fire protection to the residents. Installation of a backup pump and motor is recommended. The pump pressure controls would be set to start the pump automatically if a low system pressure occurs. The engineering and construction costs assume that there is adequate capacity in the existing electrical service for the added connected load. The unused blower on the old decarbonator and other unused equipment can also be disconnected to reduce the total connected electrical loads.

The engineering tasks for the spare pump are anticipated to include:

- Pump specification
- Piping details
- Electrical service and controls

With Option 1, the estimated cost includes installation of a backup pump, electrical power supply, flow control valve and meter, and sound attenuation device.

With Option 2, there is no additional cost, since two new Backup Distribution Pumps are part of the new Containerized RO WTP system.

#### **5. Blending/Acid Elimination (RO Bypass Line)**

The RO system bypass line for stabilizing RO permeate with well water was not installed as part of the original construction of the facility, although it was shown on the initial system drawings. Blending the RO permeate with filtered raw well water will increase overall system production and reduce the amount of caustic being injected into the product water. The RO bypass line will require the installation of a pipe to divert filtered well water around the RO. This bypass line should be placed downstream of the pressure filter discharge, prior to the addition of antiscalant, and be reconnected to the system downstream of the RO permeate discharge, prior to pH probe and caustic injection point.

Developments in antiscalant formulations have allowed RO systems, with similar feed water characteristics, to operate without acid injection at recovery rates above 85%. Since this RO system is only operating between 60% – 70% recovery, the elimination of acid is feasible. Elimination of acid will also reduce the amount of caustic being used to stabilize the product water.

The RO bypass line was shown on the initial system drawings, so it is assumed that an amendment to the operating permit will not be required.

This improvement will provide the District with an economic benefit by reducing chemical consumption and supplying more water per kilowatt (kW).

The engineering tasks for the bypass pipe are anticipated to include:

- Memorandum discussing operation of the bypass blending system
- Pipe installation details
- Instrumentation calibration and control modifications

With Option 1, the estimated cost for the installation of a RO bypass blend line includes: pipe; isolation, and check throttling valves; check valve; and a flow meter.

With Option 2, this item is not needed and there is no additional cost. A new RO system is part of the new Containerized RO WTP system.

## **6. Exterior Tank/Piping Coatings - Deleted as Requested**

This improvement has been deleted as requested.

## **7. Seal Abandoned Well**

The abandoned well at the site is not sealed and cemented, as required by law, which may result in movement of water between aquifers. As a minimum, the County will require that the well be filled to 50 feet below the surface with gravel and the upper 50 feet of casing be perforated and cemented. The uppermost 5 feet of casing must be removed and the area backfilled. The County inspector may require that the entire well depth be perforated and cemented which will result in an additional day of crew time and County inspector time.

The engineering tasks for the well abandonment are anticipated to include:

- Development of abandonment description and procedures.

The estimated cost for this Item is the same for both Options 1 and 2. The estimated cost assumes that the full well depth must be perforated and cemented.

## **8. Miscellaneous Plant Repairs and Modifications**

There are several items in need of repair and several modifications that are recommended to improve safety. The seal on the RO high pressure pump and several pressure gauges should be replaced. Several couplings on the stainless steel pipe are corroding, which is causing corrosion on the pipe, and should be prepped and repainted. The well water feed line into the plant should either be raised or lowered to allow access through the plant. All chemical tubing should be secondary contained in rigid pipe.

It is anticipated that an itemized list of repairs and modifications would be developed by the District or County.

With Option 1, the estimated cost to perform the miscellaneous plant repairs and modifications to existing facilities is significantly higher than with Option 2. The cost



includes replacing the seal of the existing RO pressure pump, replacing some of the existing pressure gauges; repairing corroding couplings or pipe; secondary containment for existing chemical tubing, repainting existing pipe, and removing and replacing the existing chemical tank and metering pumps.

With Option 2, the estimated cost of this item is greatly reduced since a new RO system is part of the new Containerized WTP and most of the miscellaneous repairs and modifications are eliminated.

## **9. Instrumentation (Conductivity Meter, Chlorine Analyzer)**

Replace the RO permeate conductivity meter and the chlorine analyzer.

The engineering tasks for the instrumentation improvements are anticipated to include:

- Develop instrumentation specification;
- Develop installation details; and
- Electrical service and controls.

With Option 1, the estimated cost to replace the existing conductivity meter and chlorine analyzer includes instruments and connections to electrical service and PLC.

With Option 2, there is no additional cost; as new conductivity meter and chlorine analyzer are included in the Item 1 New Containerized RO WTP System.

## **10. Emergency Power - Deleted as Requested**

This improvement has been deleted as requested.

## **11. Remote Monitoring (Telemetry)**

Currently it is not possible to remotely monitor the operation of the Willows Mobile Home Park facilities. Assuming all the instruments are capable of being monitored, basic treatment plant telemetry can be installed so maintenance personnel can remotely monitor the operations of the plant. The recommended basic monitoring data includes critical and advisory discrete signals and critical analog signals.

### **Discrete (Critical)**

- Well pump "Fail"
- RO pump "Fail"
- Distribution pump "Fail"
- Hypochlorite pump "Fail"
- Caustic pump "Fail"
- Anti-scalant pump "Fail"
- Emergency eyewash/shower "Start"

- Main Power "Fail"
- Emergency generator "Run"

#### **Analog (Critical)**

- RO feed pH
- Plant product water pH
- Plant product water conductivity

#### **Discrete (Advisory)**

- RO System "Run"
- Hydro tank level "High"
- Storage tank level "High"
- Storage tank level "Low"

The engineering tasks associated with installation of the telemetry system are anticipated to include:

- Identify existing output availability and power requirements;
- Design a PLC panel for M-28 site and DWD radio telemetry interface;
- Develop ladder logic for alarms, on/off control, database screens, and historical files; and
- Review shop drawings and provide startup and commissioning support.

The estimated cost for this Item is the same for both Options 1 and 2. The estimated cost includes the PLC equipment, interface panel, and modems.

## **12. Pipe Labels - Deleted as Requested**

This improvement has been deleted as requested.

## **13. Fencing Repairs**

The existing fencing has several locations where it can be scaled without much difficulty. The installation of new tension wires, barbed wire stands and replacement (as needed) of fence panels will be needed in several locations to fit the new site layout. The fence repairs would be completed as part of the modifications required for implementation of Item 1.

The estimated cost for this Item is the same for both Options 1 and 2.

Mr. Mike Yeraka  
August 7, 2008  
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If you have any questions or require additional information, please contact us at 925-933-2900.

Very truly yours,

A handwritten signature in blue ink that reads "Lisa House". The signature is fluid and cursive, with the first name "Lisa" and the last name "House" clearly distinguishable.

Lisa House  
Project Manager  
Camp Dresser & McKee Inc.

cc: Ker-Sing Yang  
Jeff Sellberg