

Olivehurst Public Utility District



Agenda Item Staff Report

Meeting Date: 03/21/24

Item description/summary:

OPUD Received Technical Memo of investigation of causation of Lift Station 14 smell. Report suggests two (2) existing odor sources:

- 1.) 14 in sewer force main entering gravity line leading to drop within a manhole
- 2.) Within pump sump due to float elevations.

The technical memo highlights the possible solutions as such:

Recommendation 1: Relocate entrance of 14" sewer force main

Recommendation 2: Adjust floats within Lift Station

Recommendation 3: Add additional wet well already presented in original design to be implemented in future.

Recommendation 4: Install Biological Odor Control System

Fiscal Analysis:

Recommendation 1: \$237,000

Recommendation 2: \$5,000

Recommendation 3: \$527,000

Recommendation 4: \$140,000

Employee Feedback

Moving forward with design of Recommendation 1, 3, & 4 (Received Grant via Yuba Water Agency).

When time comes, moving forward with construction Recommendation 1, 3 & 4.

Sample Motion:

N/A

Prepared by: Swarnjit Boyal, Public Work Engineer

To: Swarnjit Boyal, PE
John Tillotson, PE

From: Sean Minard, PE, PLS

Date: March 5, 2024

Subject: Pump Station No. 14 Odor Issue
Plumas Lake Area



Olivehurst Public Utility District (OPUD) has been experiencing odor issue near Pump Station No. 14. Pump Station No. 14 is located in South Plumas Lake at the intersection of Zane Drive and River Oaks Blvd. The Pump Station is location in the north east corner of Eufay Wood Spray Park. There are residential lots to the north and east of the Pump Station, a pre-school to the west, and the community park. Because of the location, the Sewer Pump Station is exposed to numerous people resulting in ongoing complaints especially during the summer months.

Figure No. 1 – Location Map



The pump station receives flow from both gravity and pressure (force main) sewers. Due to anaerobic conditions (particularly in force mains), sulfate-reducing bacteria reduce sulfate to hydrogen sulfide. Hydrogen sulfide is odorous and it also increases the potential for sewer corrosion (conversion of hydrogen sulfide to sulfuric acid). Turbulence in the system flow also increases the release of hydrogen sulfide. Because gravity sewers typically only run partially full, there is a “headspace” in the pipe above the level of the sewage in the pipe. The flow of sewage will “pull” air in the headspace downstream with the sewage flow. While the air in most gravity sewer pipelines is normally contained within the conveyance system the flow of this disrupted at the end of the pipeline (normally at a wastewater treatment plant or an interim pumping plant, as is the case for situation). The air that is pulled along the gravity sewer now needs to exit the conveyance system, since no downstream gravity sewer headspace is available to transport it. The normal negative air pressure in the gravity conveyance system therefore becomes greater than atmospheric pressure outside the system, and air escapes into the nearby neighborhood.

Based on conversations with OPUD staff and site visits, most of the odor appears to be occurring in the manhole located in River Oaks Boulevard. Our investigation of the site, as-built drawings, and record drawings, indicate the potential for odor issue due to the design of the system and the on/off settings used within the pump station. Below are our findings:

Potential Odor Sources

1. Odor Source #1 (major) – The 14-inch sewer force main discharges into an 18-inch gravity line that then drops into a 24-inch sewer line at a manhole. The drop in the manhole from invert to invert is 13.60 feet. Swarnjit has also indicated this is a source of odor.
2. Odor Source #2 (major) – Within the pump sump, the on/off elevation settings result in excessive drops within the wet well. The invert of the 24-inch sewer into the sump is 21.36. The lead on elevation is 16.0 and the off elevation for all pumps is 11.0. This results in a potential drop of 10.36 feet. It is 5.36 feet drop at the lead on elevation.
3. Odor Source #3 (potential minor) – This is a future odor source. The 6-inch future sewer line invert is 27.00. This results in a potential drop of 16.0 feet. Because the flow could be minimal, we could consider some options such as inside drop and filters if this line is ever used

There could be additional minor items that could be causing odor but the main items are listed above. The other items will need to be considered at a later date but would be more typical to a standard sewer lift/pump station. If there is some issue related to chemicals in water or type of sewage being delivered to pump station than that is beyond this initial analysis.

Recommendations:

Our recommendations for addressing the odor are listed below. We have listed the recommendation in order of priority. Two general methods of odor mitigation proposed are 1) reduce turbulence in the system in an attempt to reduce odor release, and 2) installation of a biological odor scrubber. Since reduction in turbulence is cheaper than the installation of a biological odor scrubber, OPUD may want to initially attempt to resolve the odor issue with that approach (additionally, a biological odor scrubber will entail ongoing operation and maintenance costs). Given the fact that gravity sewer lines are bringing in air in the headspace of those gravity sewers, it may be the case that reduction in turbulence alone will not resolve the odor issue at this site.

1. Recommendation #1 – The 14-inch sewer force main from Pump Station 15 needs to be modified to enter the directly into the pump sump or into the future pump sump to eliminate the close to 14-foot drop and associated turbulence at the manhole noted above. Another option could be to lower the force main and enter the manhole where the two 15-inch gravity lines enter the 24-inch pipeline.
2. Recommendation #2 – Adjust the on/off elevation within the sump to reduce the inside drop in the pump station wet well. At a minimum, these elevations need to be raised at least six (6) feet but we understand the need for storage. Because of the loss of storage, we have included Recommendation #3 but in the near term (before the expenditure of additional capital improvements), the adjustment can be performed and operated to determine if the odor has been reduced. Because of the lower cost, this could be the first modification but we included this as the second recommendation because we feel Odor Source #1 results in most of the odor. If Recommendation #4 is considered, we can work with negative pressure and fans leaving the settings the same. If Recommendation #4 is implemented, we feel some adjustment should be considered but we will have more options.
3. Recommendation #3 – Per the original design, there was a plan for a future wet well to the south. The future wet well would provide additional storage capacity to account for the loss in the current sump once the on/off elevations are modified. The wet well would be designed to minimize depth of sump so the first phase can be simply to install sump and direct the 14-inch force main from Pump Station 15 through this new sump. The goal would be to prevent solids from settling in the base of this new sump because at this time, we are not proposing additional pumps but that could be considered as an additional option. There is already an 18-inch sewer stub installed directed towards the future wet well site.
4. Recommendation #4 – Install Biological Odor Control Systems similar to the beds proposed on the South County Project. We would use a similar design and concept. The location for the beds would probably need to be outside the current walled area. There appears to be room adjacent to the site within the park. This system would include fans that would pull air from the inside of the pump station wet well, creating a negative pressure within the wet well; that negative pressure condition would extend to include the

gravity pipelines that connect to the wet well (and therefore also include the offending manhole noted in this TM).

As noted in the potential sources section of the TM, there could be additional minor items that could be causing odor but the recommendations are focused on the larger sources. Recommendation #4 is something to consider if the larger sources are addressed and there are still some minor odor or odor on days with higher temperatures then the bio-bed will likely be required.

While not part of the scope for this assignment, we would also caution that the conditions that cause odor can also lead to the formation of sulfuric acid, as noted above. Plastic or VCP sewer pipes are generally resistant to attack by sulfuric acid, but we are aware of many pipelines in the OPUD sewer system that are cast iron. One recently discovered example would be the 8-inch cast iron force main in McGowan Parkway that takes flow from Pump Station No. 2 and sends it to the west, where it dumps into the gravity pipeline coming down Olivehurst Avenue. That 8-inch force main has been severely corroded over the years, and the expectation is that because Pump Station No. 2 cycles between “on” and “off”, the force main does not stay full during “off” pump cycles. This allows the pipe above the sewage level to become exposed, with resultant corrosion due to sulfuric acid attack. While it appears that pipelines into and out of this Pump Station No. 14 are HDPE, the District is asked to consider this concern as a final recommendation option is selected.

Construction Cost Estimate:

Our Engineers’ estimate of probable construction cost is as follows:

1. Recommendation #1 – Pump Station “on/off” Settings.
\$5,000 (assume some PLC programming work will be required but possible this could be performed by staff and could be \$0)
2. Recommendation #2 – 14-inch Sewer Force Main Modification
\$237,000
3. Recommendation #3 – New Wet Well.
\$527,000
4. Recommendation #4 – Biological Odor Control Systems
\$140,000

Summary

The next step would be for OPUD to provide direction to MHM to prepare improvements plans. Our scope of work includes funds to prepare improvement plans to direct 14-inch force main directly in the pump sump and design of a bio-bed. The design of a second wet wall was not considered and will result in additional design scope. Our recommendation is to modify the settings as soon as possible to the settings stated above. The modification of the 14-inch force

main into the wet well is the next item that should be considered. We included the new wet well as the third item because we feel if the first two items are completed, the need for a bio-bed might be deferred or avoided. We would recommend waiting at least one summer following modification of the settings and modification of force main before considering the bio-beds. The second wet well does not solve an odor issue but does address the loss of storage capacity in the wet well as a result of modify the on/off settings. Since adjust of the setting is our initial recommendation, we feel the District should consider replacement of the storage by construction of the new wet well.

Table No. 1 – Recommendation #2 - 14 Inch Force Main Modification Estimate

COUNTY OF YUBA
PUMP STATION NO. 14 - FORCEMAIN MODIFICATIONS
DETAILED COST ESTIMATE - MARCH 5, 2024 - PUMP STATION NO. 14

DESCRIPTION	CO.	RCVD. BY	DATE
Pump Station No. 14 - Forcemain Modification	Yuba	S.M. Minard	5-Mar-24
MHM PROJECT NO.	QTY. BY	IN	CONST. INDEX
23189	J. Mallen	25-Jun-23	13176.3
ESTIMATE NO.	QTY. CHK.	OUT	BLDG. INDEX
1	S. Minard	5-Mar-24	8000.61

Item No.	Item Description	Estimated Quantity	Unit	Unit Price (\$/Unit)	Amount (\$)
----------	------------------	--------------------	------	----------------------	-------------

Bid Schedule A (14 Inch Forcemain Modification Improvements)

1	Mobilization/Demobilization	1	LS	\$8,350.39	\$8,350.39
2	Clearing and Grubbing	0.25 (F)	AC	1,500.00	375.00
3	Class 2 Aggregate Base (1.00 - feet)	40 (F)	TON	36.00	1,440.00
4	Minor Concrete (Barrier Curb and Gutter)	20	LF	64.00	1,280.00
5	Minor Concrete (6 Inch Curb) - Median/Center Lane	20	LF	65.00	1,300.00
6	Minor Concrete (Cobble) - Median/Center Lane	20	SF	31.00	620.00
7	Minor Concrete (Sidewalks) (4 inches thick)	60	SF	16.00	960.00
8	18 inch AWWA C-900 PVC 235 PSI DR 18 PVC Pipe - Green	40	LF	309.91	12,396.56
9	Type A - Precast Polymer Concrete Manholes	1	EA	23,500.00	23,500.00
10	14 inch AWWA C-900 PVC 235 PSI DR 18 PVC Pipe - Green	250	LF	235.30	58,826.17
11	Minor Concrete (Area Around Pump Station)	400	SF	30.00	12,000.00
12	Dewatering and Non-Storm Water Discharge Control	1	JOB	6,500.00	6,500.00
13	Type TR2 - Type C Trench Restoration	250	LF	120.00	30,000.00
14	SWPPP - Temporary Silt Fence	100	LF	5.00	500.00
15	SWPPP - Temporary Storm Drain Inlet Filter Bags	2	LF	80.00	160.00
16	SWPPP - Temporary Fiber Rolls and Gravel Bags	100	LF	4.00	400.00
17	SWPPP - Temporary Stabilized Construction Site Access	1	EA	5,250.00	5,250.00
18	SWPPP - Construction Waste Management	1	LS	5,000.00	5,000.00
19	Trench Sheet piling, Shoring, and Bracing, as required by Section 6707 of the California Labor Code)	1	LS	6,500.00	6,500.00

Total Bid Schedule A = \$175,358.11

Contingency @ 20.0% = 35,071.62

Project Manager @ 0.5% = 876.79

County, OPUD, and RD 784 Plan Check @ 1.5% = 2,630.37

County, OPUD, and RD 784 Inspection @ 2.5% = 4,383.95

County CSDA Support Fee @ 7.0% of plan check and inspection total = 491.00

City Management and Administration @ 0.0% = 0.00

Preliminary Engineering @ 0.5% = 876.79

Design Engineering and Surveying @ 10.0% = 17,535.81

Construction Surveying @ 2.0% = 3,507.16

Grand Total = \$237,224.46

For Budget Purposes = \$237,000.00

Table No. 2 – Recommendation #3 – New Wet Well Estimate

COUNTY OF YUBA
PUMP STATION NO. 14 - NEW WET WELL
DETAILED COST ESTIMATE - MARCH 5, 2024 - PUMP STATION NO. 14

DESCRIPTION Pump Station No. 14 - New Wet Wall	CO. Yuba	RCVD. BY S.M. Minard	DATE 5-Mar-24
MHM PROJECT NO. 23189	QTY. BY J. Mallen	IN 25-Jun-23	CONST. INDEX 13176.3
ESTIMATE NO. 1	QTY. CHK. S. Minard	OUT 5-Mar-24	BLDG. INDEX 8000.61

Item No.	Item Description	Estimated Quantity	Unit	Unit Price (\$/Unit)	Amount (\$)
----------	------------------	--------------------	------	----------------------	-------------

Bid Schedule A (New Wet Well Improvements)

1	Mobilization/Demobilization	1	LS	\$18,838.77	\$18,838.77
2	Clearing and Grubbing	0.25 (F)	AC	1,500.00	375.00
3	Class 2 Aggregate Base (1.00 - feet)	20 (F)	TON	54.00	1,080.00
4	Asphalt Concrete (Type B)	10 (F)	TON	210.00	2,100.00
5	Minor Concrete (Barrier Curb and Gutter)	20	LF	64.00	1,280.00
6	Minor Concrete (6 Inch Curb) - Median/Center Lane	20	LF	65.00	1,300.00
7	Minor Concrete (Cobble) - Median/Center Lane	20	SF	31.00	620.00
8	Minor Concrete (Sidewalks) (4 inches thick)	60	SF	16.00	960.00
9	24 inch AWWA C-900 PVC 235 PSI DR 18 PVC Pipe - Green	30	LF	475.01	14,250.39
10	Type A - Precast Polymer Concrete Manholes	1	EA	23,500.00	23,500.00
11	Minor Concrete (Area Around Pump Station)	50	SF	30.00	1,500.00
12	Amorock Wet Well (16'-0" x 16'-0") (includes structural backfill, structural excavation, and shoring)	1	JOB	285,000.00	285,000.00
13	Dewatering and Non-Storm Water Discharge Control	1	JOB	18,500.00	18,500.00
14	SWPPP - Temporary Silt Fence	100	LF	5.00	500.00
15	SWPPP - Temporary Storm Drain Inlet Filter Bags	2	LF	80.00	160.00
16	SWPPP - Temporary Fiber Rolls and Gravel Bags	100	LF	4.00	400.00
17	SWPPP - Temporary Stabilized Construction Site Access	1	EA	5,250.00	5,250.00
18	SWPPP - Construction Waste Management	1	LS	5,000.00	5,000.00
19	Trench Sheet piling, Shoring, and Bracing, as required by Section 6707 of the California Labor Code)	1	LS	15,000.00	15,000.00

Total Bid Schedule A = \$395,614.16

Contingency @ 20.0% = 79,122.83

Project Manager @ 0.5% = 1,978.07

County, OPUD, and RD 784 Plan Check @ 1.5% = 5,934.21

County, OPUD, and RD 784 Inspection @ 2.5% = 9,890.35

County CSDA Support Fee @ 7.0% of plan check and inspection total = 1,107.72

City Management and Administration @ 0.0% = 0.00

Preliminary Engineering @ 0.5% = 1,978.07

Design Engineering and Surveying @ 8.0% = 31,649.13

Construction Surveying @ 1.0% = 3,956.14

Grand Total = \$527,274.55

For Budget Purposes = \$527,000.00

Table No. 3 – Recommendation #3 – Biological Odor Control System Estimate

**COUNTY OF YUBA
PUMP STATION NO. 14 - BIOLOGICAL ODOR CONTROL SYSTEM
DETAILED COST ESTIMATE - MARCH 5, 2024 - PUMP STATION NO. 14**

DESCRIPTION Pump Station No. 14 - Biological Odor Control	CO. Yuba	RCVD. BY S.M. Minard	DATE 5-Mar-24
MHM PROJECT NO. 23189	QTY. BY J. Mallen	IN 1-Mar-24	CONST. INDEX 13176.3
ESTIMATE NO. 1	QTY. CHK. S. Minard	OUT 5-Mar-24	BLDG. INDEX 8000.61

Item No.	Item Description	Estimated Quantity	Unit	Unit Price (\$/Unit)	Amount (\$)
----------	------------------	--------------------	------	----------------------	-------------

Bid Schedule A (Biological Odor Control Improvements)

1	Mobilization/Demobilization	1	LS	\$6,923.25	\$6,923.25
2	Clearing and Grubbing	0.25 (F)	AC	1,500.00	375.00
3	12 inch AWWA C-900 PVC 235 PSI DR 18 PVC Pipe - Green	60	LF	198.00	11,880.00
4	Minor Concrete (Area Around Pump Station)	50	SF	30.00	1,500.00
5	2 Inch Water Service	1	EA	4,500.00	4,500.00
6	Biological Odor Control System	1	JOB	35,000.00	35,000.00
7	6 Foot Masonry Block Wall (includes foundation)	200	EA	265.00	53,000.00
8	25 Foot Wrought Iron Roll Gate	1	EA	9,500.00	9,500.00
9	Dewatering and Non-Storm Water Discharge Control	1	JOB	4,500.00	4,500.00
10	SWPPP - Temporary Silt Fence	400	LF	5.00	2,000.00
11	SWPPP - Temporary Storm Drain Inlet Filter Bags	2	LF	80.00	160.00
12	SWPPP - Temporary Fiber Rolls and Gravel Bags	200	LF	4.00	800.00
13	SWPPP - Temporary Stabilized Construction Site Access	1	EA	5,250.00	5,250.00
14	SWPPP - Construction Waste Management	1	LS	5,000.00	5,000.00
15	Trench Sheet piling, Shoring, and Bracing, as required by Section 6707 of the California Labor Code)	1	LS	5,000.00	5,000.00

Total Bid Schedule A = \$145,388.25

Contingency @ 20.0% = 29,077.65

Project Manager @ 0.5% = 726.94

County, OPUD, and RD 784 Plan Check @ 1.5% = 2,180.82

County, OPUD, and RD 784 Inspection @ 2.5% = 3,634.71

County CSDA Support Fee @ 7.0% of plan check and inspection total = 407.09

City Management and Administration @ 0.0% = 0.00

Preliminary Engineering @ 0.5% = 726.94

Design Engineering and Surveying @ 8.0% = 11,631.06

Construction Surveying @ 1.0% = 1,453.88

Grand Total = \$193,773.46

For Budget Purposes = \$194,000.00

