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Project name:
MSD Odor Control Master Plan

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Date:
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Memo

Subject: Technical Memorandum #3- Pump Stations Background Document Review

1. Introduction

The Louisville and Jefferson County Metropolitan Sewer District (MSD) owns and operates 137 wastewater pump stations within the Morris Forman Service Area. These pump stations are responsible for the conveyance of wastewater flow from various areas within the MSD collection system towards the Morris Forman Water Quality Treatment Center (MFWQTC). Eight (8) facilities were selected for evaluation during initial phases of the Odor Control Master Plan (OCMP) Update:

1. Pump Station 1
2. Pump Station 2
3. Pump Station 3
4. Pump Station 4
5. Pump Station 5
6. Pump Station 6
7. Pump Station 7
8. Pump Station 8

Figure 1-1 shows the pump station locations, major trunk sewers and force mains, and the Morris Forman Service Area boundaries.

Available documentation related to existing odor control were evaluated for each of the selected pump stations. Site visits were conducted in March 2021 to further assess existing odor conditions at various process areas at each facility. This report summarizes the findings of the document review process and field investigations and provides conclusions and preliminary recommendations to improve odor emissions at target pump stations within the Morris Forman service area.

MFWQTC Service Area
Pump Stations Overview Map
Figure 1-1

Legend

Pump Stations

- OCMP-studied Pump Stations
- Other Pump Stations
- Major Force Main
- Major Gravity Trunk Sewer
- MFWQTC
- Morris Forman Service Area

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2. Site Visits

AECOM conducted site visits on March 9, 2021 at each of the pump station sites listed in **Table 2-1**. Site visits involved a walk-through of each pump station facility and its perimeter. MSD staff provided a tour of the facilities with the exception of pump stations 6 and 8. The following field observations were recorded at each site:

- Temperature
- Wind direction
- Odor sources and odor intensity observations
- Background information from MSD staff

Table 2-1 provides a summary of the pump station site visits and whether the facility is a wastewater pump station or flood pump station.

Table 2-1 Pump Station Site Visit Summary (March 2021)

Name	Type
(1) Pump Station 1	Wet Weather Treatment Facility
(2) Pump Station 2	Wastewater Pump Station
(3) Pump Station 3	Wastewater Pump Station
(4) Pump Station 4	Wastewater Pump Station
(5) Pump Station 5	Wastewater Pump Station
(6) Pump Station 6	Flood Pump Station
(7) Pump Station 7	Wastewater Pump Station
(8) Pump Station 8	Wastewater Pump Station and Flood Pump Station

A qualitative analysis was performed to assess odor conditions at major process areas within each facility. Odor intensity conditions were assessed for each process area using four (4) categories:

1) "N/A," or when no odor was observed,
2) "slight" odor, or when the odor is only discernable within approximately 2-5 feet of the source
3) "moderate" odor, or when the odor is discernable within approximately 25 feet of the source
4) "strong" odor, or extremely noticeable when near the source and discernable outside of the facility.

Photos were collected and used to assess existing odor control systems and evaluate the feasibility of installing future odor control technologies at the existing site. Field observations and photos from the March 2021 site visits are presented for each individual pump station in **Section 3** of this report.

3. Summary of Documents Evaluated

In addition to conducting site visits, AECOM reviewed available record drawings to further evaluate odor control at each of the selected MFWQTC pump stations. The findings of the document review process and March 2021 site visits were summarized and presented alphabetically in this Section of the report.

3.1 Pump Station 1

The Pump Station 1 design drawings, dated October 30, 2013, were provided to AECOM for review. During wet weather conditions, Pump Station 1 receives flow from Pump Station 5 for treatment prior to being discharged into the Ohio River through an outfall. Pump Station 1 is rated for a peak wet weather capacity of 160 million gallons per day (MGD) and is equipped with a grit handling system, a High Rate Treatment Basin (HRTB), and a concrete equalization basin.

3.1.1 *Process Area Summary*

Each process area is summarized in **Table 3-1** including number of units, dimensions, capacity and whether the area is covered or uncovered.

Table 3-1 Pump Station 1 Process Area Summary

Process Area(s)	# of Units	Total Capacity (All Units)	Covered or Uncovered
Equalization Basin	1	25 MG	Uncovered
HRTB	2	50 MG	Uncovered
Splitter Structure #2	1	200 MG	Partially Covered[1]
Grit Tanks	2	100 MGD	Uncovered

[1] Portions of the Splitter Structure #2 are equipped with access grating (see **Figure 3-2**).

This facility was equipped with Grit Removal Tanks (Grit Tanks) which collect grit from the influent wastewater before entering Splitter Structure #2. **Figure 3-1** includes photos of the Grit Tanks (left) and Splitter Structure #2 (right) which were active during the March 2021 site visit.

Figure 3-1 Pump Station 1 Grit Tanks (L) and Splitter Structure #2 (R)

Grit slurry is pumped to the grit separator and washer which is located on the second floor of the Grit and Chemical Building. This system sends processed grit to the Dumpster Room on the first floor. **Figure 3-2** shows a section view of the Dumpster Room (left) and a photo of the dumpster room from the March 2021 site visit (right).

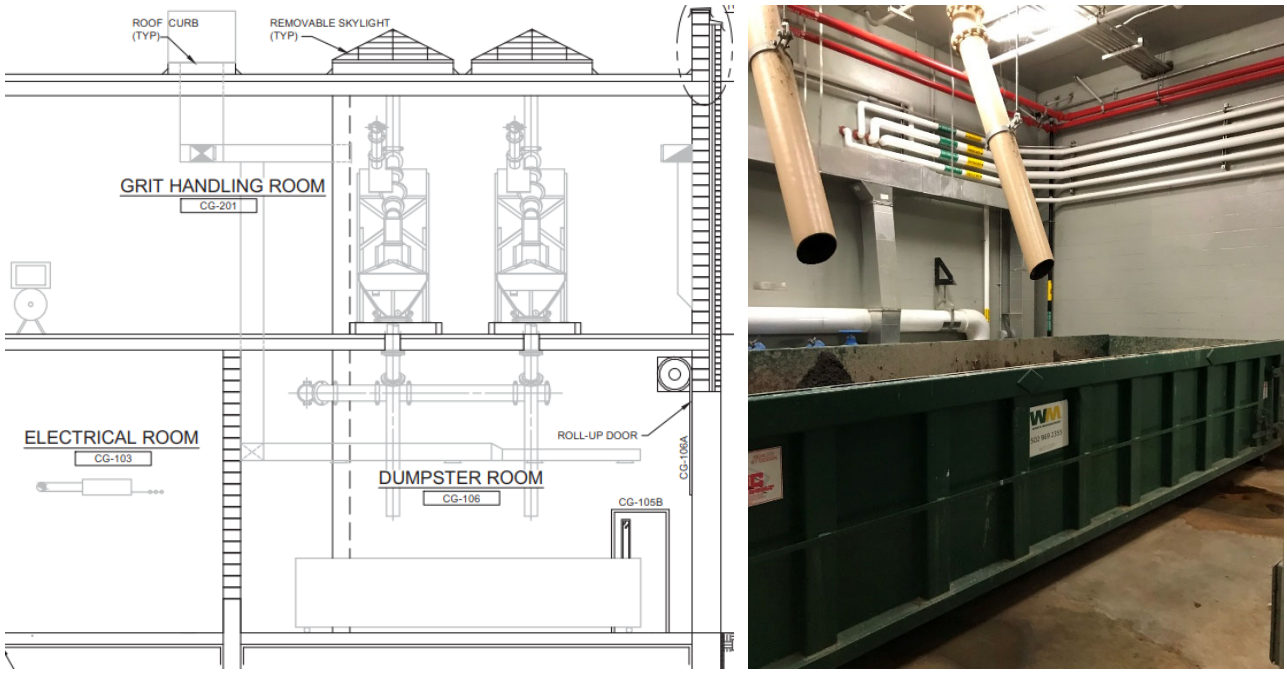

Figure 3-2 Pump Station 1 Dumpster Room Section View (L) and Site Visit Photo (R)

Wet weather flows are primarily sent to the HRTB for treatment before being discharged to the Ohio River. The equalization basin also offers 25 MG of additional storage.

3.1.2 *Odor Control*

This site is not equipped with a dedicated odor control system. In an attempt to minimize odor at the equalization basins, MSD performed a pilot study which involved adding an odor reducing chemical, "Odor Disposer" to the equalization basin. This product is a micronutrient supplement containing non-toxic materials to accelerate microbial activity.

The pilot study's findings showed low effectiveness at reducing odor and solids at the equalization basin. As a result, MSD no longer performs chemical injection at this site. Based on the existing site layout there is adequate space for future odor control equipment, if MSD chooses to pursue a new system at Pump Station 1.

3.1.3 *Field Observations*

Table 3-2 provides a summary of potential odor sources at Pump Station 1 based on the March 2021 site visit.

Table 3-2 Pump Station 1 Odor Observations Summary (Site Visit, March 2021)

Odor Source #	Odor Source Location	Covered or Uncovered	Odor Conditions[1]
1	Equalization Basin	Uncovered	Moderate[2]
2	HRTB	Uncovered	Moderate
3	Splitter Structure #2 / Grit Tanks	Uncovered	Moderate
4	Dumpster Room	Covered	Moderate

[1] Qualitative Analysis of Odor Conditions:
N/A = No odor was observed
Weak = Odor is only discernable within 2-5 feet from the source
Moderate = Odor is occasionally discernable within approximately 25 feet from the odor source
Strong = Extremely noticeable when near the source and discernable outside of the facility

[2] Equalization basin was receiving flow during March 2021 site visit, therefore odor conditions were mild. It is anticipated that odor conditions are worse during warmer months.

Each of the odor sources were categorized as moderate. The odor originating from the Dumpster Room was distinct compared to the other odors observed at the facility. It is important to note that the facility was receiving wet weather flow during the March 2021 site visit. Odor conditions were likely improved compared to operations during warmer temperatures.

3.2 Pump Station 2

Pump Station 2, located in the southeast region of the MFWQTC Service Area, was constructed in 2017. The pump station is equipped with four (4) submersible main duty pumps and two (2) submersible wet weather pumps, as well as four equalization basins, screen channels, a calcium nitrate feed system, and a dedicated odor control system. **Figure 3-3** shows the lower floor plan which was adapted from record plans to show the location of each major process area evaluated. The Odor Control Area and Dumpster Area are located on the upper floor.

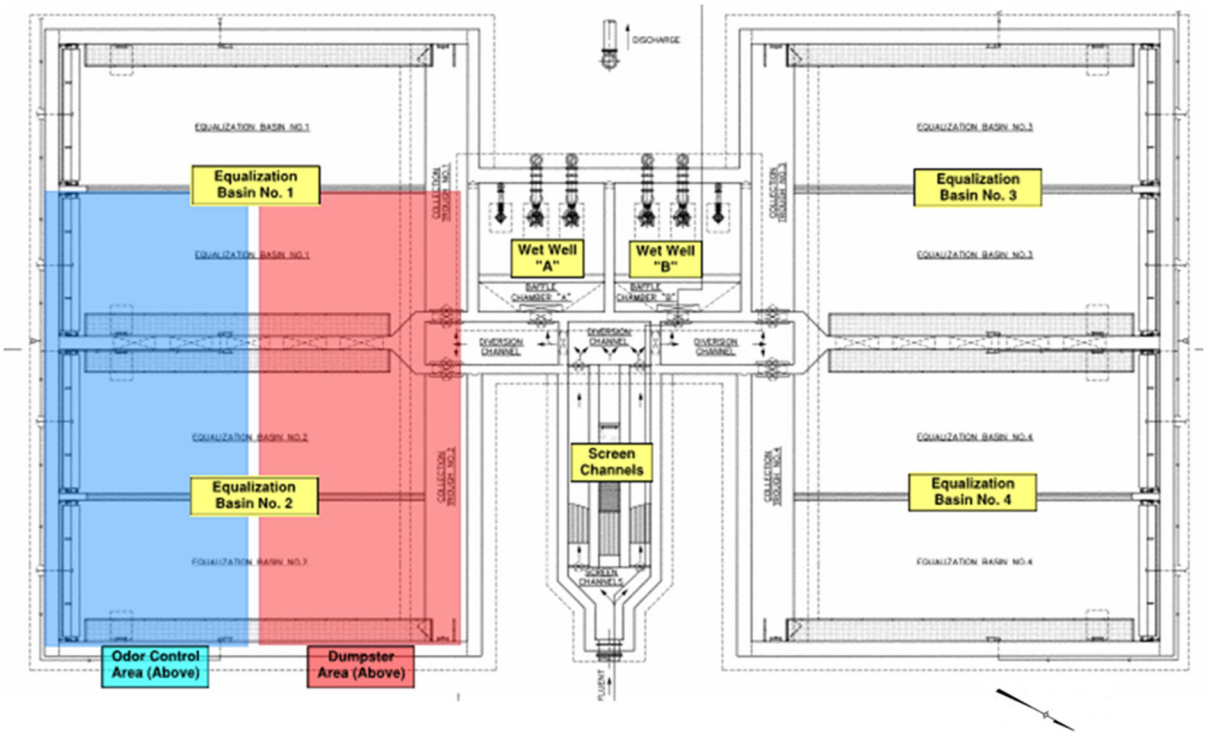

Figure 3-3 Pump Station 2 Floor Plan (Adapted from Record Plans)

3.2.1 *Process Area Summary*

Table 3-3 was developed to characterize the major process areas at Pump Station 2.

Table 3-3 Pump Station 2 Process Area Summary

Process Area(s)	# of Units	Covered or Uncovered
Wet Wells	2	Covered
Screen Channels	2	Covered
Dumpster Area	1	Covered
Equalization Basins	4	Covered

Each of the process areas are located indoors and covered. Photos of the Pump Station 2 wet wells and Dumpster Area from the March 2021 site visit are shown in **Figure 3-4**.

Figure 3-4 Pump Station 2 Wet Wells (L) and Dumpster Area (R)

3.2.2 *Odor Control*

The existing odor control system consists of one (1) 10,000 cubic feet per minute (cfm) carbon adsorber in roll-off bin. Odor emissions are conveyed through a 30-inch duct and pass through a grease filter before entering the carbon adsorber for treatment. The treated air is conveyed through a 24-inch fiberglass reinforced pipe (FRP) stack before being released into the atmosphere. **Figure 3-5** shows the Pump Station 2 Odor Control Room.

Figure 3-5 Pump Station 2 Odor Control Room

The existing Odor Control Room does not have space for additional storage or equipment. A breakdown of the odor sources and associated odor emission rate was provided in the 2017 record plans and summarized in **Table 3-4**.

Table 3-4 Pump Station 2 Odor Control System Summary

Odor Source	Estimated Odor Emission Rate
Wet Well	4,000 cfm
Screen Channels	3,000 cfm
Screen Room	1,000 cfm
Dumpster Area	1,000 cfm
Total Design Capacity:	**10,000 cfm**

3.2.3 *Field Observations*

Odor observations were recorded at potential sources during the March 2021 site visit. A summary of existing odor sources at Pump Station 2 is provided in **Table 3-5.**

Table 3-5 Pump Station 2 Odor Sources Summary (Site Visit, March 2021)

Odor Source #	Odor Source Location	Covered or Uncovered	Odor Conditions[1]
1	Dumpster Area	Covered	Moderate
2	Wet Wells	Covered	Slight
3	Screening Channels	Covered	N/A
4	Equalization Basins	Covered	N/A

[1] Qualitative Analysis of Odor Conditions:
N/A = No odor was observed
Weak = Odor is only discernable within 2-5 feet from the source
Moderate = Odor is occasionally discernable within approximately 25 feet from the odor source
Strong = Extremely noticeable when near the source and discernable outside of the facility

The most notable odor at the facility originated from the Dumpster Area but was only noticeable when inside the respective room. A slight odor was observed at the wet wells when 2-5 feet away from the wet well covers. No odors were observed along the Screening Channels and Equalization Basins, or outside of the building.

3.3 Pump Station 3

3.3.1 *Process Area Summary*

Pump Station 3 was designed and constructed in 1966. In 2001, an engineering firm was contracted to design a dedicated odor control system and ventilation improvements as part of Contract No. 200109. Construction of a dual-bed carbon adsorption system was completed in 2003 to treat air streams from the screen room and influent channel. This odor control system was rated for 6,000 cfm.

In 2014, an engineering firm was contracted to design a CSO storage basin and new pump station, replacing the existing Pump Station 3 and upgrading the peak design capacity to 60 MGD. **Figure 3-6** depicts the updated process flow diagram after construction of the 2014 improvements project, which included installation of a new influent junction structure, flowmeter manhole, grinder pumping system, new pump station and valve vault, and new CSO storage basin.

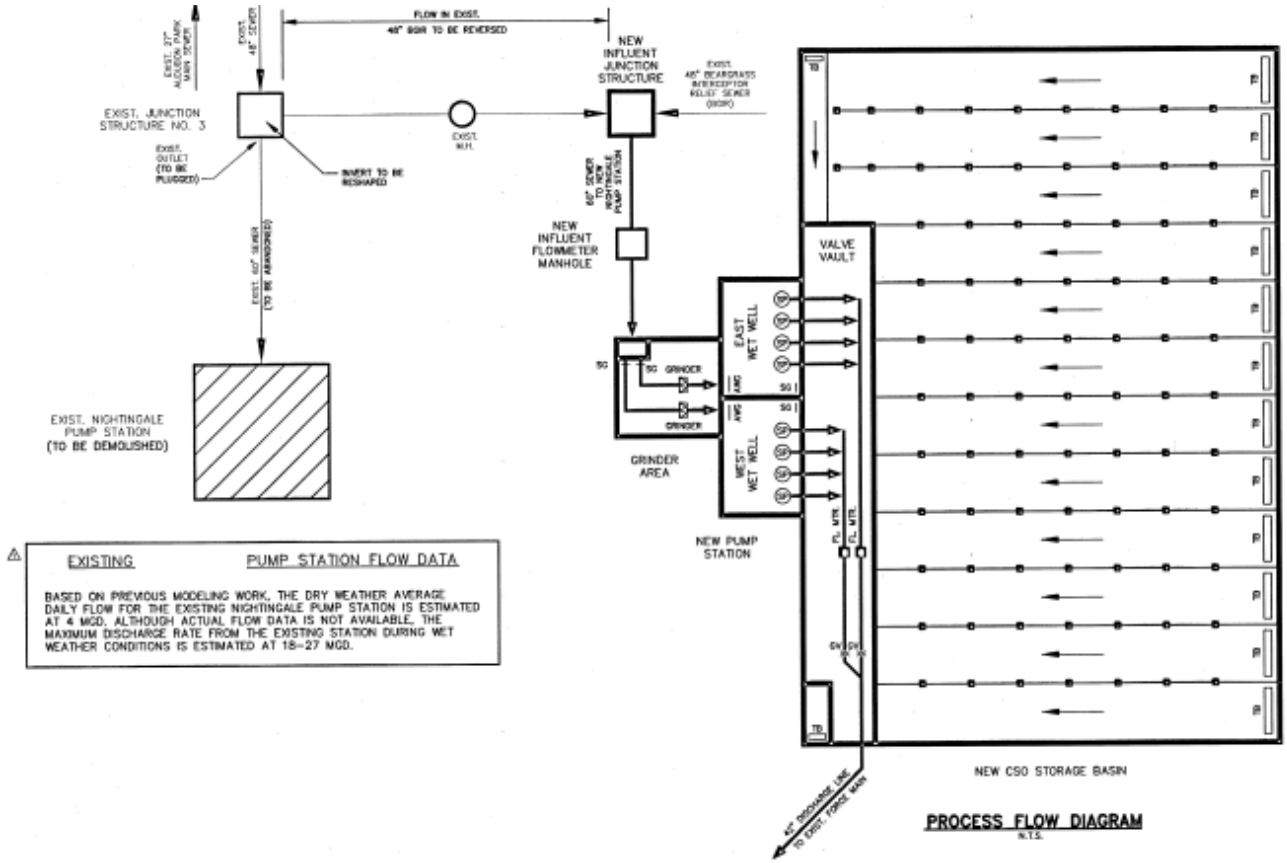

Figure 3-6 Pump Station 3 Process Flow Diagram (2014 Record Plans)

The 2014 record plans were studied to identify critical process areas at Pump Station 3 and summarized in **Table 3-6.**

Table 3-6 Pump Station 3 Process Area Summary

Process Area(s)	# of Units	Covered or Uncovered
Grinder Area	1	Covered
Wet Wells	2	Covered
CSO Storage Basin	1	Covered

Influent flows pass through the facility's Grinder Area before entering the wet wells. The Grinder Area houses the influent channels, grinder, and adjustable weir gates. The wet wells are located outside and sealed within separate concrete basins as pictured in **Figure 3-7**. MSD placed black mats on top of the wet well access hatch to minimize odor emissions. Each wet well is equipped with four (4) submersible pumps and discharge piping for a total of eight (8) discharge lines to the CSO basin. A photo of the Pump Station 3 valve vault is also shown in **Figure 3-7.**

Figure 3-7 Pump Station 3 Wet Wells (L) and Valve Vault (R)

The Pump Station 3 CSO basin is photographed in **Figure 3-8** which is covered and graded.

Figure 3-8 Pump Station 3 CSO Basin

3.3.2 *Odor Control*

A carbon media odor control system was observed during the March 2021 site visit. The Pump Station 3 odor control system was installed in March 2018 and is rated for 7,600 cfm. **Figure 3-9** shows a photo of the odor control system.

Figure 3-9 Pump Station 3 Odor Control System

3.3.3 *Field Observations*

Table 3-7 provides a summary of existing odor sources at the Pump Station 3 based on field observations during the March 2021 site visit.

Table 3-7 Pump Station 3 Potential Odor Sources Summary

Odor Source #	Odor Source Location	Covered or Uncovered	Odor Conditions[1]
1	Wet Wells	Covered	N/A
2	CSO Basin	Covered	N/A
3	Grinder Area	Covered	N/A

[1] Qualitative Analysis of Odor Conditions:
N/A = No odor was observed
Weak = Odor is only discernable within 2-5 feet from the source
Moderate = Odor is occasionally discernable within approximately 25 feet from the odor source
Strong = Extremely noticeable when near the source and discernable outside of the facility

Odors were not observed at this facility during the AECOM site visit.

3.4 Pump Station 4

The Pump Station 4 is the oldest pump station evaluated as part of the OCMP Update, with record plans dating back to March 1956. **Figure 3-10** shows a site layout including the extents of the wet well, effluent discharge chamber, and influent and effluent pipe locations.

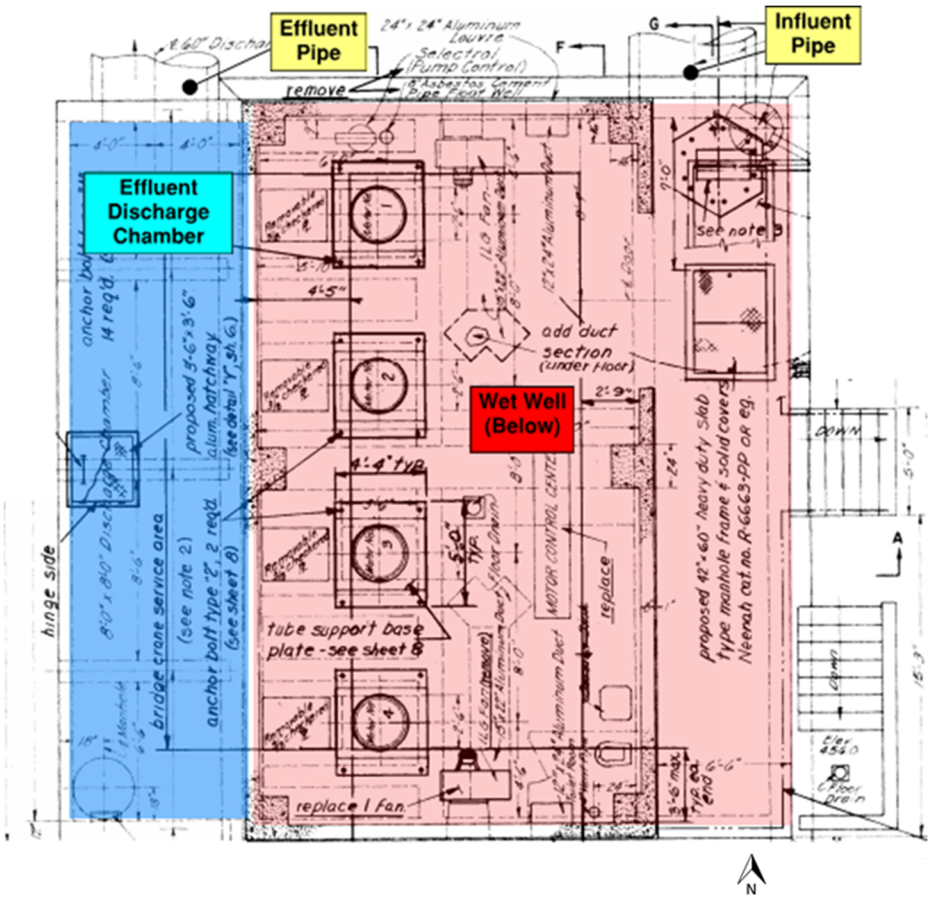

Figure 3-10 Pump Station 4 PS Site Layout

3.4.1 *Process Area Summary*

Available record plans were used to characterize major process areas at Pump Station 4 and is summarized in **Table 3-8.**

Table 3-8 Pump Station 4 Process Area Summary

Process Area(s)	# of Units	Covered or Uncovered
Wet Well	1	Covered
Effluent Discharge Chamber	1	Covered

The wet well access area is located on the sub-floor. **Figure 3-11** shows the wet well intake configuration from the sub-floor, which involves four (4) 32-ft diameter pump discharge pipes with submersible pumps.

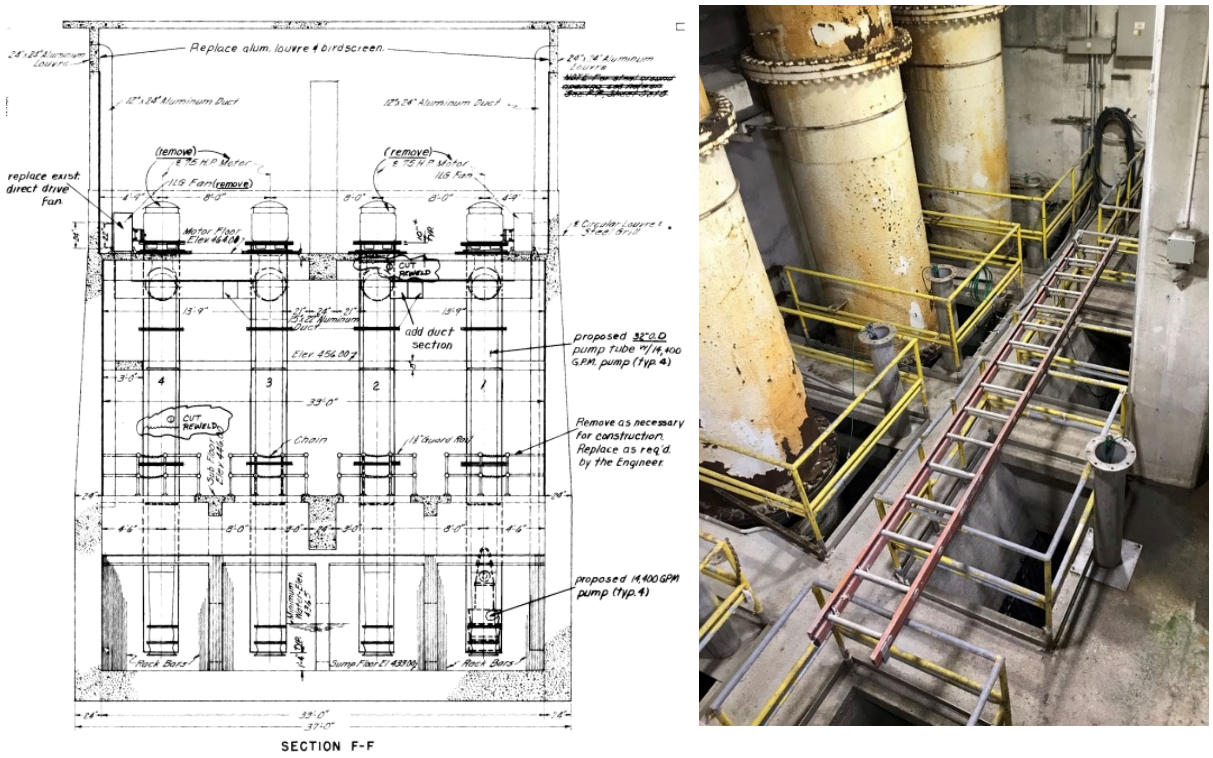

Figure 3-11 Pump Station 4 Wet Well Intake

Each of the wet well discharge lines are covered and sealed via anchor bolts at the main floor, which is referred to as the “Motor Floor” in the 1956 record plans. The covers are located adjacent to the facility’s motor control center. **Figure 3-12** was taken at the Motor Floor and shows the wet well discharge tube covers.

Figure 3-12 Pump Station 4 Wet Well Discharge Tube Covers

3.4.2 *Field Observations*

Pump Station 4 does not have an existing odor control system. **Table 3-9** provides a summary of odor observations at Pump Station 4 based on the March 2021 site visit.

Table 3-9 Pump Station 4 Potential Odor Sources Summary

Odor Source #	Odor Source Location	Covered or Uncovered	Odor Conditions[1]
1	Wet Well Area	Covered	Moderate

[1] Qualitative Analysis of Odor Conditions:
N/A = No odor was observed
Weak = Odor is only discernable within 2-5 feet from the source
Moderate = Odor is occasionally discernable within approximately 25 feet from the odor source
Strong = Extremely noticeable when near the source and discernable outside of the facility

Odor conditions at the wet well access area were described as moderate considering the odors were not discernable until entering the sub-floor via the stairwell. Occasional odors were noticeable around the perimeter of the facility, which may be attributed to the wet wells or the effluent discharge chamber. Further investigation would be required to confirm the source of odor observed at the perimeter of the pump station.

3.5 Pump Station 5

The Pump Station 5 was originally constructed in 1958 and upgraded in 2013 as part of the Pump Station 1 construction project (see **Section 3.1**). The 2013 upgrades included addition of a screening system, new pumps, sluice gates, construction of Splitter Structure No. 1, and installation of a dedicated odor control system.

3.5.1 *Process Area Summary*

Each major process area at Pump Station 5 is summarized in **Table 3-10** including number of units, dimensions whether the area is covered or uncovered.

Table 3-10 Pump Station 5 Process Area Summary

Process Area(s)	# of Units	Covered or Uncovered
Splitter Structure #1	1	Partially Covered
Wet Wells	2	Covered
Screen Channels	2	Covered
Screen Room	1	Covered

[1] Portions of access grating at Splitter Structure #1 are covered with rubber mats for odor control (see **Figure 3-13**).

Splitter Structure #1, shown in **Figure 3-13**, was constructed during the 2013 improvements project to divert wet weather flows to Pump Station 1 during high-flow conditions. In an attempt to minimize odor emissions, MSD has placed mats over portions of the access grating at Splitter Structure #1.

Figure 3-13 Pump Station 5 Splitter Structure #1

The Screenings Building houses two (2) bar screens, which are both equipped with a screening conveyor system for collection and transport of screenings waste. The screenings conveyor discharge and drainage system is depicted in **Figure 3-14**.

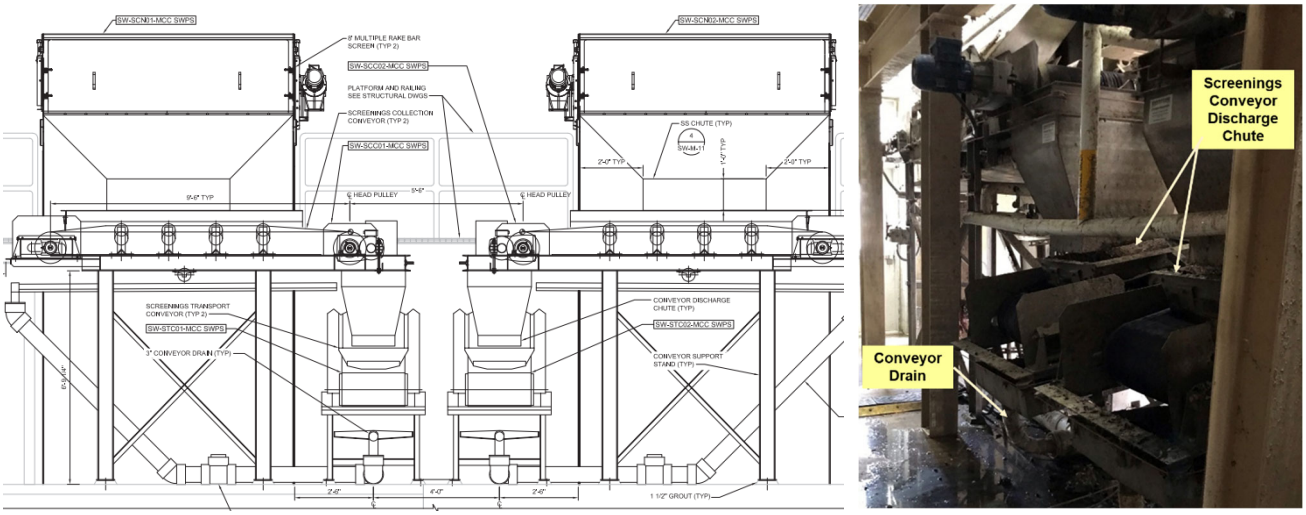

Figure 3-14 Pump Station 5 Screenings Conveyor Drawings (L) and Photo (R), Screen Room

Screenings waste is collected in a dumpster located on the ground floor of the Screenings Building. The screenings disposal area is shown in **Figure 3-15**.

Figure 3-15 Pump Station 5 Screen Room Dumpster

3.5.2 *Odor Control*

As mentioned previously, Pump Station 5 was built with a carbon media odor control system under the 2013 improvements project. According to available record plans the odor control system treats foul air from the wet wells (two 12" intakes)

Splitter Structure #1 is not tied into the existing odor control system. The system is rated for 10,000 cfm and is a dual bed carbon adsorber. **Figure 3-16** shows photos of the existing Pump Station 5 odor control system which is located outside of the main pump station building.

Figure 3-16 Pump Station 5 Odor Control System

Prior to the 2013 odor control improvements, MSD performed hydrogen peroxide injections at Pump Station 5. A photo of the abandoned hydrogen peroxide feed area is shown in **Figure 3-17**.

Figure 3-17 Pump Station 5 Abandoned Hydrogen Peroxide Feed Area

3.5.3 *Splitter Structure #1 Sampling*

MSD contracted an environmental consultant in October 2020 to perform reduced sulfur compound (RSC) and volatile organic compound (VOC) sampling at Splitter Structure #1. Two (2) 1-L Zefon bag grab samples were taken on October 1, 2020 at various collection times and were analyzed by an environmental consultant. Sample #1 was collected at 9:15 AM and Sample #2 was collected at 3:50 PM.

The samples were sent to the environmental consultant for analysis. Two (2) standard test methods were performed on the samples – ASTM D5504-12 and EPA TO-15 Modified. ASTM D5504 is utilized for the determination of volatile sulfur-containing compounds while the EPA TO-15 Modified method is used to detect VOCs in air samples. Sample #1 concentrations were higher than Sample #2 concentrations for the RSC samples. Similarly, Sample #1 concentrations were generally higher than Sample #2 concentrations for VOC samples, with the exception of Ethanol and Ethyl Acetate.

MSD also performed hydrogen sulfide (H_2S) monitoring at Splitter Structure #1 for several weeks in June and July 2020. Temperature, humidity, and H_2S levels were continuously monitored and recorded in three (3) separate datasets. The maximum and average observed H_2S concentrations were highest between June 29-July 16, 2020 and from July 11-July 17, 2020.

Average H_2S concentrations for the three monitoring periods ranged from 5.3 ppm to 16.6 ppm. The overall peak H_2S level of 316 ppm occurred in mid-July and was captured at both H_2S monitors installed during that time period.

3.5.4 *Field Observations*

Table 3-11 provides a summary of odor observations at Pump Station 5 during the March 2021 site visit. The wet well access area was not toured and therefore was not included as a potential odor source.

Table 3-11 Pump Station 5 Potential Odor Sources Summary

Odor Source #	Odor Source Location	Covered or Uncovered	Odor Conditions[1]
1	Splitter Structure #1	Uncovered	Moderate
2	Screen Room	Covered	Slight

[1] Qualitative Analysis of Odor Conditions:
N/A = No odor was observed
Weak = Odor is only discernable within 2-5 feet from the source
Moderate = Odor is occasionally discernable within approximately 25 feet from the odor source
Strong = Extremely noticeable when near the source and discernable outside of the facility

The strongest relative odor conditions were observed at Splitter Structure #1 and were described as "moderate," or occasionally noticeable when within 25 feet from the structure. These field observations align with available 2020 sampling and H_2S monitoring data which indicated relatively high concentrations of H_2S and other odor-causing compounds at the structure. The area near Splitter Structure #1 is considered relatively spacious and could be used for future odor control improvements.

Slight odorous conditions were noted at the Screen Room as a result of the open maintenance garage door adjacent to the dumpster. The screenings dumpster was considered the source of these conditions.

3.6 Pump Station 6

Pump Station 6 is designed to operate during both dry and wet weather conditions. MSD performed improvements at Pump Station 6 in 2010, which consisted of installing electrically actuated butterfly air control valves on each of the four (4) existing flood pump discharge lines. **Figure 3-18** shows a general site layout, which was adapted from the roof plan included in the 2010 Air Control Valve Project record plans.

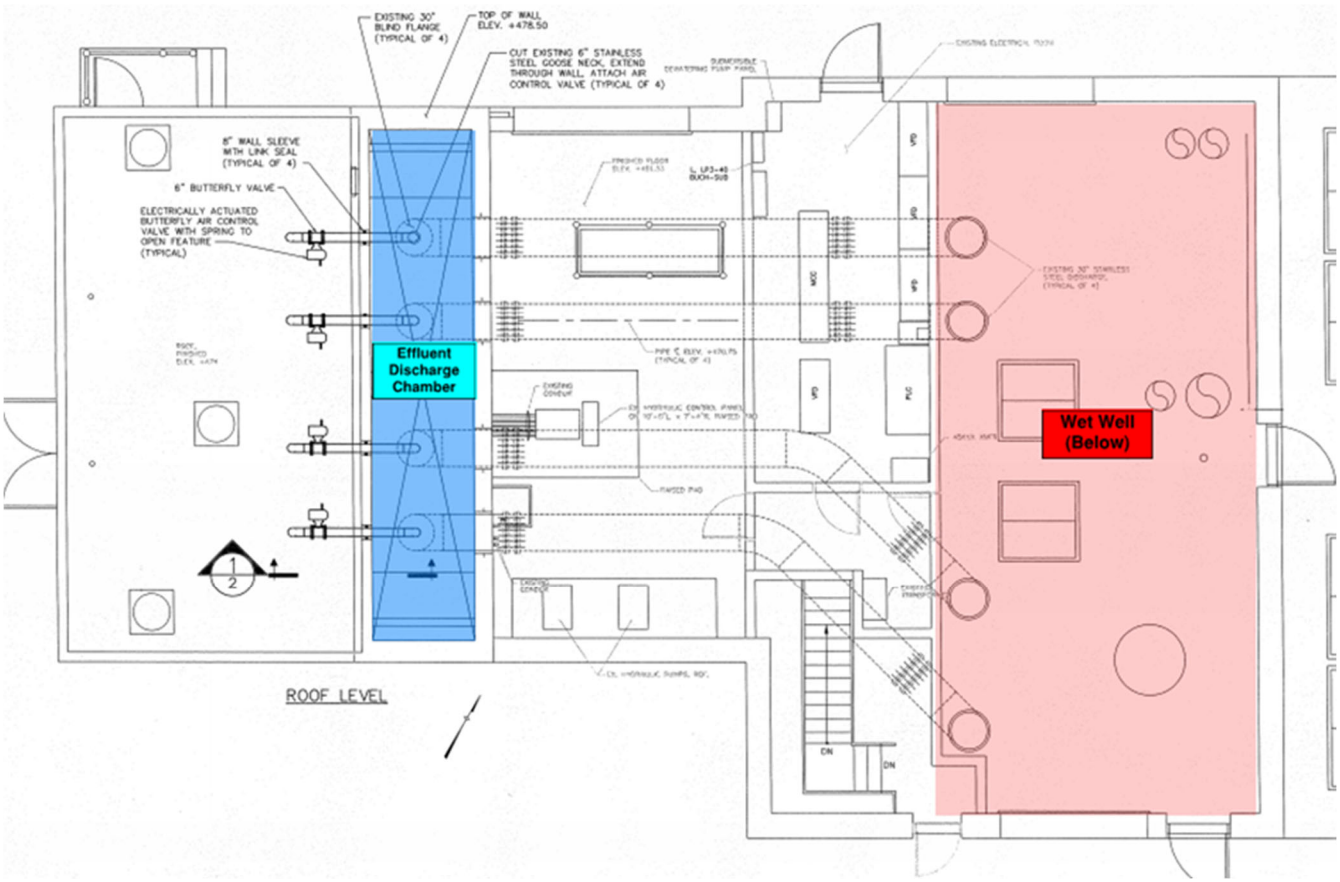

Figure 3-18 Pump Station 6 Site Layout (Adapted from 2010 Record Plans)

A summary of the Pump Station 6 process areas is provided in **Table 3-12**, including number of units, estimated dimensions based on available record plans, and whether the area is covered or uncovered.

Table 3-12 Pump Station 6 Process Area Summary

Process Area(s)	# of Units	Covered or Uncovered
Wet Well	1	Covered
Effluent Discharge Chamber	1	Covered

During the March 2021 site visit, AECOM staff did not have access to the interior of the pump station or the roof level. The facility is located on the corner of an intersection and surrounded by industrial facilities.

Figure 3-19 shows the Pump Station 6 wet well access area. The wet well area is located under an overhead roof. The effluent discharge chamber access area is located on the top level of the facility.

Figure 3-19 Pump Station 6 Wet Well Access Area

This site is not equipped with an odor control system. AECOM staff toured the entire perimeter of the facility and did not observe any presence of odors. Based on site photos, there is adequate space for odor control equipment within the facility, particularly at the wet well access area.

3.7 Pump Station 7

Pump Station 7, constructed in 1972, is designed to convey wastewater flows from an MSD interceptor into a trunk sewer. This facility does not contain an odor control system. **Figure 3-20** shows the general site layout which was adapted from the 1972 record plans.

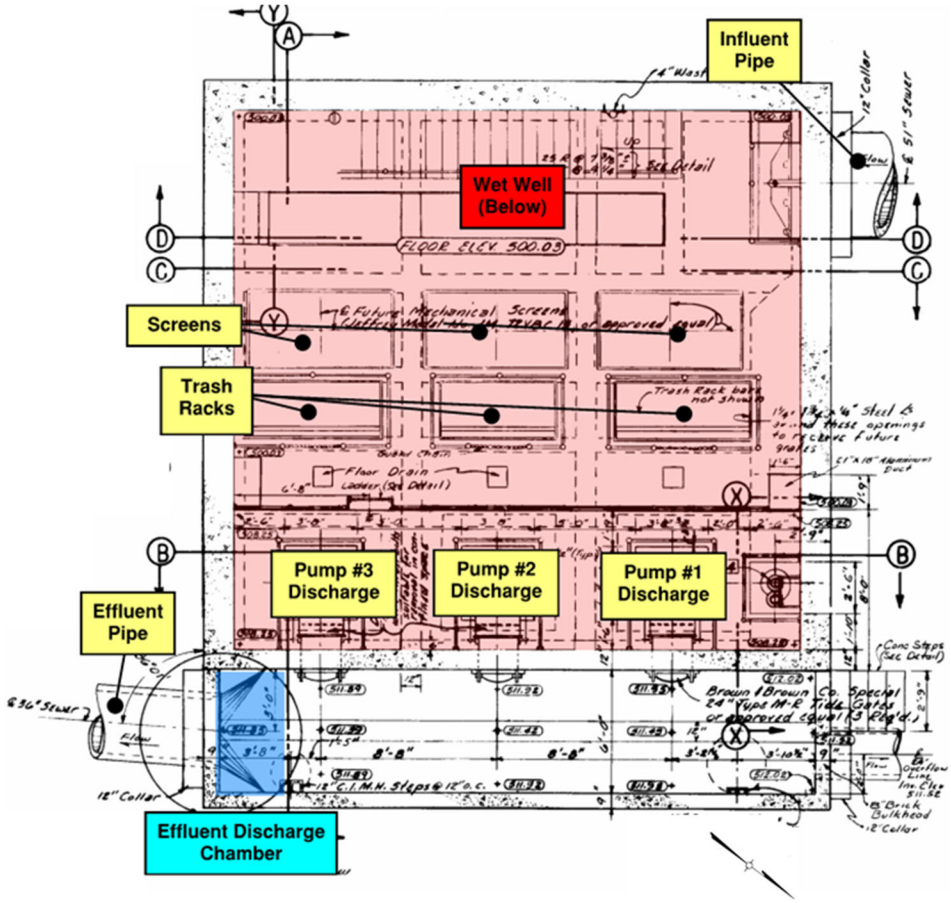

Figure 3-20 Pump Station 7 Site Layout (Adapted from 1972 Record Plans)

3.7.1 *Process Area Summary*

Each major process area is summarized in **Table 3-13** including number of units, approximate dimensions, capacity and whether the area is covered or uncovered.

Table 3-13 Pump Station 7 Process Area Summary

Process Area(s)	# of Units	Covered or Uncovered
Wet Well	1	Covered
Effluent Discharge Chamber	1	Covered

Influent flows enter the wet well through a 51-inch pipe at the southwest corner of the pump station. The wet well was equipped with mechanical screens, trash racks, three (3) wet well pump discharge lines, and a submersible sump pump system. The wet well and related appurtenances can be accessed from the sub-floor. **Figure 3-21** shows the various access areas located on the sub-floor.

Figure 3-21 Pump Station 7 Sub-Floor Photos

A maintenance area is located on the main floor of the pump station which includes a workbench, storage cabinets and miscellaneous maintenance equipment. **Figure 3-22** shows photos of the Pump Station 7 maintenance area.

Figure 3-22 Pump Station 7 Maintenance Area Photos

3.7.2 *Odor Control*

This facility is not equipped with an odor control system. There is limited area on the property to install odor control equipment. There is also limited space available in the existing maintenance area located on the main floor. According to MSD staff, the sub-floor area frequently floods and therefore would not be suitable as a potential odor control area.

If an odor control system was installed outdoors, existing vegetation surrounding the building would likely need to be removed. Further investigation is required to determine if an odor control system is required and whether adequate space is available for a future odor control system.

3.7.3 *Field Observations*

Table 3-14 summarizes the odor observations recorded at Pump Station 7 during the March 2021 site visit.

Table 3-14 Pump Station 7 Potential Odor Sources Summary

Odor Source #	Odor Source Location	Covered or Uncovered	Odor Conditions[1]
1	Wet Well (Sub-Floor)	Covered	Moderate
2	Maintenance Area	Covered	Slight

[1] Qualitative Odor Conditions:
N/A = No odor was observed
Weak = Noticeable odor only when in close proximity to the odor source (within approximately 2-5 feet) or when left uncovered
Moderate = Odor is occasionally discernable within approximately 25 feet of the odor source
Strong = Extremely noticeable when near the source and discernable outside of the facility

Moderate odor conditions were noted at the pump station sub-floor area. The source of this odor was attributed to the wet well and related appurtenances. Outside of the facility, a slight odor was observed which originated from the garage doors leading to the Maintenance Area.

3.8 Pump Station 8

Pump Station 8 has the ability to intercept wet weather flows from an MSD trunk sewer. The pump station was equipped with three (3) sanitary pumps and three (3) larger flood pumps. MSD performed process improvements at Pump Station 8 in 2016 which involved replacing the existing motors on the sanitary pumps. **Figure 3-23** shows a general site layout which was adapted from the 2016 record plans.

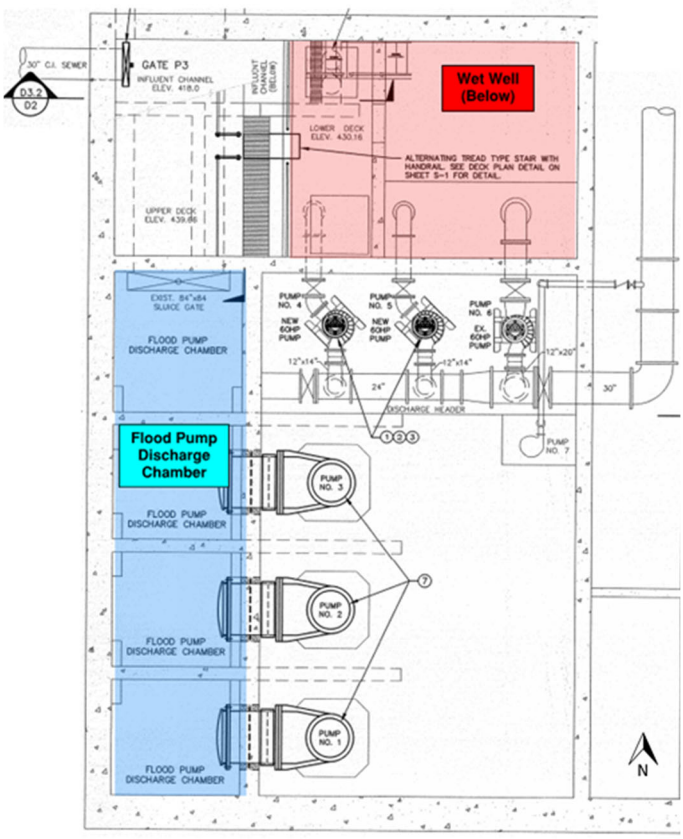

Figure 3-23 Pump Station 8 Site Layout (Adapted from 2016 Record Plans)

Table 3-15 provides a summary of the major process areas at the facility, including number of units, sizing and whether the area is covered or uncovered.

Table 3-15 Pump Station 8 Process Area Summary

Process Area(s)	# of Units	Covered or Uncovered
Wet Well	1	Covered
Effluent Discharge Chamber	1	Covered

This site is located in a heavily trafficked commercial area of downtown. As a result, there is limited space for additional equipment at the facility. **Figure 3-24** shows photos around the perimeter.

Figure 3-24 Pump Station 8 Perimeter

AECOM staff toured the perimeter of the facility and did not observe any presence of odors.

4. Conclusions and Recommendations

4.1 Conclusions

Available documents were reviewed, and site visits were performed to understand existing odor control systems and potential odor sources at selected pump stations located in the Morris Forman Service Area. The findings of this report will aid in identifying pump stations for further evaluation as part of the OCMP Update.

MSD has installed carbon media odor control systems at three (3) of the eight (8) pump stations evaluated**. Table 4-1** summarizes the pump stations evaluated and existing odor control technology, if applicable. Odor observations from the March 2021 site visit are also presented to show the potential impact of existing odor control efforts at each facility.

Table 4-1 MF Selected Pump Stations Existing Odor Control System Summary

Pump Station Name	Existing Odor Control	Odor Observation(s) Description (March 2021)[1]
(1) Pump Station 1	N/A	Moderate Odor
(2) Pump Station 2	Carbon Adsorber	Slight – Moderate Odor
(3) Pump Station 3	Carbon Adsorber	N/A
(4) Pump Station 4	N/A	Moderate Odor
(5) Pump Station 5	Carbon Adsorber	Slight – Moderate Odor
(6) Pump Station 6	N/A	N/A
(7) Pump Station 7	N/A	Slight – Moderate Odor
(8) Pump Station 8	N/A	N/A

[1] Qualitative Analysis of Odor Conditions:
N/A = No odor was observed
Weak = Odor is only discernable within 2-5 feet from the source
Moderate = Odor is occasionally discernable within approximately 25 feet from the odor source
Strong = Extremely noticeable when near the source and discernable outside of the facility

Table 4-1 highlights potential gaps in the existing odor control systems at Pump Station 2 and Pump Station 5. While foul air is treated from the Screening Building and wet wells at Pump Station 5, Splitter Structure #1 is not tied into the system. MSD has recently performed sampling and monitoring at the structure to identify potential odor issues. H_2S monitoring data also showed that the peak H_2S concentration at this structure was 316 ppm during July 2020. High concentrations of several reduced sulfur compounds were also detected during October 2020 through additional sampling. Moderate odors were noted at Pump Station 2, which were attributed to the Dumpster Area, which is enclosed and equipped with foul air intakes for subsequent treatment.

4.2 Recommendations

Qualitative odor observations were used to determine preliminary priority ranking for the pump stations evaluated as part of this report. The pump stations were associated with “moderate” odor emissions from at least one (1) process area should be considered for inclusion into the OCMP planned sampling

program. Pump Station 4 was also selected for inclusion in the sampling program based on discussions with MSD regarding known odor observations near the facility.

1. Pump Station 1
2. Pump Station 3
3. Pump Station 5
4. Pump Station 7
5. Pump Station 4

Performance testing results from the existing odor control systems at Pump Station 2, Pump Station 4, and Pump Station 5 should be provided by the Contractor or included in the planned sampling program. Odor sampling should also be performed at these facilities to validate the performance of existing odor control systems.