The Sewerage & Water Board

OF NEW ORLEANS

625 ST. JOSEPH STREET

504.529.2837 OR 52.WATER

www.swbno.org

September 24, 2024

Dear Mayor Cantrell, Honorable Members of the New Orleans City Council, and Orleans Parish Delegation:

This report is delivered in accordance with Revised Statute 33:4091, Section F, which states: "*In addition to the other requirements of this Section, the board shall send a report, by electronic mail, to the members of the Orleans Parish legislative delegation and the members of the governing authority of Orleans Parish detailing the pumping and electrical power of its facilities and the available manpower no later than twenty-four hours prior to a hurricane entering the Gulf of Mexico as determined by the National Weather Service and no later than forty eight hours after a flood watch or warning or thunderstorm watch or warning is issued by the National Weather Service for any area of Orleans Parish.*"

On September 11, 2024 at 5 PM, Hurricane Francine made landfall as a category 2 storm with an estimated maximum sustained winds of 100 miles per hour. The New Orleans metro region experienced heavy rain and wind impacts throughout the day. According to the National Weather Service (NWS) Post Tropical Cycle Report for Hurricane Francine[1]: *'As the storm moved inland, the northern and northeastern eyewall elongated resulting in an East-West oriented band of extremely heavy rainfall. Several observation sites recorded 3-4" of rain in an hour or less, with 2-3 hour totals upwards of 7-8 inches. Widespread flash flooding occurred in a swath from near where the storm made landfall in Terrebonne Parish through the New Orleans metro area and into the north shore region.'*

The status of SWBNO's pumping and power equipment before the event, as well as performance of these systems during the event, is detailed herein.

[1] https://www.weather.gov/media/lix/TropicalEventSummary/PSHLIX_2024AL06_Francine_Summary.pdf

STORM IMPACTS

The New Orleans area began to experience rain bands associated with the storm around 8am. A second series of rain bands crossed the area between 1pm and 4pm. The majority of the rainfall fell in a third band between 6pm and 10pm. The highest recorded rainfall was between 7pm and 9pm at DPS 6, receiving 3.5 inches in 2 hours. At the SWBNO monitored stations, a maximum rainfall intensity of 4.4 inch/hour was recorded at DPS 6.

Additional information collected by the NWS indicates that the New Orleans area received up to 9 inches of rain in the Mid City and 7th Ward areas. Of the stations monitored by NWS, 6 of the top 10 highest rainfall totals were recorded in the New Orleans metro area (including Kenner and Metairie).

Table 1. Rainfall recorded at SWBNO-monitored stations

Site Name	Neighborhood	Total Rainfall (inches)	Rain Intensity (In/hour)	Peak Rain Hour (in/hour)	Peak Hour End Time
Central Control	Hollygrove	4.14	4.32	1.49	08:57 PM
DPS-01	Broadmoor	6.60	3.36	1.84	09:01 PM
DPS-02	Mid City	6.09	3.96	1.82	09:03 PM
DPS-03	7th Ward	5.92	NR (not recorded)	NR	
DPS-04	Gentilly	5.72	2.88	1.74	09:19 PM
DPS-05	Lower 9th Ward	5.57	3.48	1.54	09:15 PM
DPS-06	Lakeview	7.13	4.44	2.29	09:02 PM
DPS-07	City Park	2.56*	2.04*	0.72*	06:53 PM
DPS-10	New Orleans East - Lakefront	6.32	2.88	1.61	09:32 PM
DPS-11	Lower Coast Algiers	6.11	3	1.34	08:43 PM
DPS-12	Lakeview	6.65	3.72	1.98	09:14 PM
DPS-13	Algiers	4.51	1.80	1.00	08:38 PM
DPS-14	New Orleans East – Lakefront	4.54	2.28	1.31	09:39 PM
DPS-15	New Orleans East – Intracoastal Waterway	NR	NR	NR	
DPS-16	New Orleans East – Lakefront	5.64	0.84	0.24	01:39 PM
DPS-17	St. Roch	5.87	NR	NR	
DPS-19	Upper 9th Ward	2.54	NR	NR	
DPS-20	New Orleans East – Intracoastal Waterway	2.48	2.16	1.67	08:52 PM

Site Name	Neighborhood	Total Rainfall (inches)	Rain Intensity (In/hour)	Peak Rain Hour (in/hour)	Peak Hour End Time
St. Joseph St. Building	Central Business District	5.34	2.64	1.01	09:02 PM
Station-A	Treme	0.25*	0.24*	0.05*	09:01 PM
WBPC	Algiers	4.8	3.24	1.21	09:04 PM
	Maximum Value	**7.13**	**4.44**	**2.29**	
	Average Value	**5.07**	**2.97**	**1.45**	

** Data connectivity/quality issues were encountered at these stations such that this data is excluded from average calculations. A NWS-monitored station near DPS 7 recorded 9 inches of rainfall.*

PUMPING AND POWER STATUS PRIOR TO THE EVENT

Below is the status of SWBNO's pumping and power equipment prior to this event.

Drainage Pumps:

A total of 90 of 99 drainage pumps were in service prior to the event.

DPS 6: **I pump is out of service while inspection of pump is in progress to determine the extent of any repairs needed. RTS October 2024**

12 additional pumps were available at this station

DPS 10: **No. 1 pump (60-hz) out of service. Vendor selected to refurbish pump. RTS October 2024.**

3 additional pumps were available at this station

DPS 13: **No. 4 pump (diesel pump) is for emergency use only. Additional drainage funding is needed to move forward with repairs.**

5 additional pumps were available at this station

DPS 14: **No. 3 and No. 4 pumps out of service due to mechanical issues. RTS pending on-going SWBNO work and contractor work required.**

2 additional pumps were available at this station

Note that drainage from this area can also be addressed by DPS 10, DPS 16, and Dwyer DPS via the Morrison Canal.

DPS 15: **No. 1 pump gearbox repairs are in progress. RTS Q2 2025.**

2 additional pumps were available at this station

DPS 17: **Pumps A & D (25-hz) out of service due to the issues with electric motor. RTS TBD, pending funding availability.**

The drainage pumps at Station D are used for 'dry weather' flow, and are not used during rain events to pump stormwater. Stormwater drainage in the Gentilly area is served by DPS 19, which has 5 pumps and is fully operational, located at Florida Ave and west side of the Industrial Canal. Future reports will remove these two pumps from the number of major drainage pumps.

DPS 18: **Pump No. 1 out of service as of May 2024. RTS pending further mechanical inspection and repairs.**
1 additional pump was available at this station, and a portable pump was installed at this location as a temporary measure.

Underpass Stations:

At UPS Old Carrollton, which services the Carrollton Ave/Interstate I-10 underpass, one of three pumps at that location is out of service. A temporary pump is deployed at this location.

Power:

Turbine 4 (25-hz), Turbine 5 (25-hz), and Turbine 6 (60-hz), along with four frequency changers on the Eastbank, and one on the Westbank are available. Additionally, all five EMDs were available.

Turbine 6 was brought online prior to the event to provide power to the Carrollton Water Plant, including potable water pumping. Turbines 4, 5, the EMDs, and the frequency changers were used during the event. Several issues were encountered, which are described in further detail below.

Table 2. Power Availability – Prior to event

Unit*	Frequency	Capacity in MW	Available
T4	25 Hz	20 MW	18.5 MW
T5**	25 Hz	20 MW	16 (revised capacity)
Carrollton Frequency Changers 1&2	Converts 60 to 25Hz	8.5 MW	8.5
Station D Frequency Changers 3&4	Converts 60 to 25Hz	12 MW	12
West Bank Power Complex (Algiers Water Treatment Plant)	Converts 60 to 25Hz	2.5 MW	2.5
Five EMDs	25Hz	12.5 MW (total) 2.5 MW (each)	12.5

Unit*	Frequency	Capacity in MW	Available
Plant Frequency Changer via T6	Converts 60 to 25Hz	3.75 MW	0 MW (RTS to be determined)
		Total 25 Hz:	**70.0 MW**
T6	60 Hz	22 MW	**22 MW**

*T3 has been decommissioned as of May 2021, and T1 has been decommissioned as of June 2022. Both units have been removed from this table.

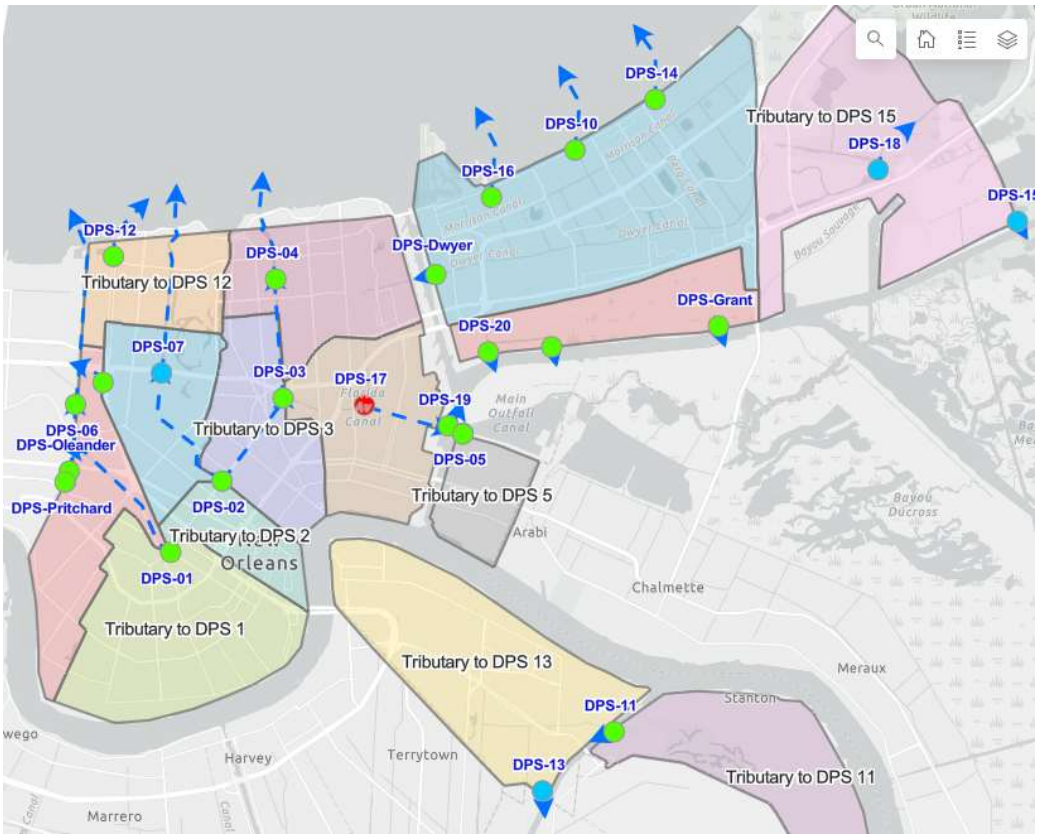
STAFFING

In addition to the stations that are already manned 24/7, additional staff were staged at DPS 10, DPS 12, DPS 14, and DPS 16. Other locations in the New Orleans East area are not suitable for sustained occupancy.

SYSTEM PERFORMANCE

Overall, the system performed well. The following pumping and power issues were experienced during the event. A map of the drainage system is included below for reference.

Figure 1. Drainage system map



Drainage and Power Issues

- **DPS 12 in Lakeview** experienced an electrical issue around 4:30 p.m., causing the only pump at this station to go offline temporarily.
    - SWBNO brought the pump back online by 6:10 p.m., and it remained online throughout the night and into the morning hours. Canal levels reached a maximum level of -8.2 ft NAVD 88[2] around 9:10pm.
- **DPS 14 in New Orleans East** experienced a loss of Entergy power around 6:08 p.m.
    - The backup generator was online providing power to the two available pumps at this location around 7 p.m.; and DPS 14 continued running on generator power until the generator went down around midnight, and did not return to service until repairs were made the following day.
    - In the meantime, DPS 10 and 16 continued to drain New Orleans East via the common canal.
    - Around 4:36 a.m., Entergy power was restored and Pumps 1 and 2 were brought back online.
- **DPS 3, 4, and 7** each temporarily lost one drainage pump (three in total) around 6:30 p.m. after **Frequency Changer (FC) #3** tripped offline due to an Entergy feeder issue.
    - SWBNO brought additional pumps online at these stations using different power sources.
        - At Station 3, D pump was brought online, such that 3 pumps remained online
        - At Station 4, D pump was brought online, such that 3 pumps remained online
        - At Station 7, concurrent issues were experienced with the 60-hz power, as described further below. One pump remained online following the loss of C pump, and D pump was able to resume pumping around 6:45pm.

[2] NAVD 88 is the common vertical datum used in the United States

    - Although the power equipment was available again by 8pm, issues with an aerial feeder prevented distribution of power from the Frequency Changer to these stations. As such, power was supplied to pumps at these stations via other sources throughout the remainder of the event.

- **DPS 7 in City Park** experienced a series of 60-hz power outages from the Entergy grid, affecting pump D.
    - One of the three drainage pumps, D pump, at this station uses 60-hz power. At 6:40 and at 7:45pm, power to D pump was lost, resulting in an increase in canal levels to -4.6 ft NAVD 88 by 8:30pm.
    - Although C pump resumed pumping around 7:55pm following the frequency changer issue at 6:30, and D pump resumed operation around 9:05 pm, canal levels remained elevated above -7.1 NAVD 88 until around 11:30pm, when canal levels began to drop.
- **DPS 1 in Broadmoor** encountered an electrical-related issue with pump D around 8:40 p.m.
    - Eight other pumps remained available at this station, and an additional pump was brought online.
    - Canal levels rose to -6.3 ft NAVD 88 until around 9:15 p.m., when the pumps that were online were able to pull down the canal levels.
    - This pump was returned to service on 9/12/2024.
- **DPS 1, 2, and 6** each temporarily lost two pumps (six pumps total) after **Electro Motive Diesels (EMDs)** tripped offline around 9:12 p.m. due to issues with an auxiliary generator.
    - The EMDs were restarted and used for pumps at all three stations between 10:10 and 10:30pm. When additional issues were encountered at 10:30pm, SWBNO switched to using power from Turbine 4 for these pumps, which was already online serving other loads.
    - At 11 p.m., pumps were restarted at Stations 2 and 6 using Turbine 4. Levels at Station 1 were decreasing, such that an additional pump was not required.
    - The EMD failures caused Stations 2 and 6 to run at reduced capacity for roughly two hours.

    - At DPS 1 and 2, the canal levels at these stations did not rise due to the outages of the EMDs. At DPS 6, the canal levels increased for 10 minutes, and then stayed steady during the remainder of the time period until additional pumps were able to be used.

- **Underpass pump stations** at Canal Street and Tulane/Carrollton Ave were flooded and impassable until the next morning, according to reports from the Real Time Crime Center (RTCC).

- **DPS 15** lost power at some point during the storm, which was discovered the next morning. The backup generators were used until Entergy power was restored by mid-day on September 13.

- A temporary overtopping of the Monticello Canal near the Pritchard Pump Station in the Hollygrove neighborhood was reported in the late evening of September 11. Water had receded in this specific area by the early morning of September 12.

- With the exception of the southern and easternmost areas of New Orleans East, drainage canal levels returned to normal the morning of September 12. Water levels in these areas remained elevated for several days, and reports of standing water were received along Almonaster Blvd, Oak Island and Village de L'est areas. Canal levels at the Elaine location returned to normal on September 15, and canal levels at DPS 18 remained high through September 17. Canal levels at DPS 16 also remained elevated through September 15.

Sewer Pump Stations

- The sewer pumps at **Sewer Pump Station D** experienced an electrical issue due to a power surge around 6:30pm, making them inoperable.
- Around 8:30 p.m., SWBNO asked customers via press release and the NOLAREADY messaging system to conserve water to prevent sewer overflows.
- SWBNO procured an emergency contract for 16 vacuum trucks to begin operations at 5:00am the following morning. The Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) also provided

vacuum trucks. These vacuum trucks were used to pump down wastewater from Station D and transport to the Eastbank wastewater treatment plant.

- Portable pumps were mobilized to the facility. One pump was installed by the end of the day of September 12, and another was installed on September 13. These pumps were able to control sewer levels, such that the voluntary conservation request was lifted around 9am on Friday, September 13.
- Other sewer pump stations were initially affected by the widespread power loss in the area, on both the Eastbank and Westbank. Temporary generators were deployed at SPS Huntlee and Memorial on the Westbank, and Gentilly Oaks and SPS 6 on the Eastbank, as a temporary measure. Power service to all sewer pumping stations by the afternoon of September 13, with no other mitigation efforts required.

Remote communications were interrupted at DPS 1, 7, 16, and Grant at various times during the event due to 60-hz power losses at the individual stations, such that real-time visibility into the system was not available throughout the duration of the storm.

Water and Wastewater Treatment operations were not impacted by the storm event or subsequent recovery efforts.

SUMMARY AND LESSONS LEARNED

In Hurricane Francine, the New Orleans metro region received between 7 and 9 inches of rain over a 14-hour period in the most impacted areas. Based on NOAA Atlas 14[3], these values are characterized between a 25- and 50-year storm. This volume and intensity of rainfall is more than the system is capable of handling, even if it has performed without incident.

SWBNO had adequate power availability in advance, as well as adequate staffing in place at the pump stations and power facilities. Electrical and mechanical specialists were also staged at locations across the City, who responded to concerns as they were encountered throughout the evening. SWBNO also provide continuous potable water service during and after the event.

[3] https://hdsc.nws.noaa.gov/pfds/

The loss of sewer pumping at Station D in the evening of September 11 required immediate action to remove accumulated sewerage and install temporary pumps at that location. The temporary pumps will remain in place while repair options for the electrical components of the pump are scoped, evaluated, and implemented. It is estimated that these repairs, including sourcing of material, will take between 4-6 months to complete. The ability to receive and treat wastewater was not impacted by the storm.

With the exception of the southern and easternmost areas of New Orleans East, drainage canal levels returned to normal between 2 and 3am on the morning of September 12. Canal levels in some areas of New Orleans East remained elevated through September 17, which is a function of the drainage characteristics in that area. The two specific power issues encountered by SWBNO's 25-hz self-generation assets reduced the drainage capacity of the stations that serve specific areas in the Hollygrove, Lakewood, Uptown, and Mid City areas for approximately 2 hours. While widespread canal rises were not observed, canals remained elevated for 1-2 hours longer than may have otherwise.

Smaller, automated stations in New Orleans East were also impacted by the city-wide Entergy power outage, along with a small number sewer pumping facilities. However, power was restored to all facilities by end of day September 13. SWBNO made use of permanent backup generators, as well as rented portable generators as an interim measure to provide power for pumps at these location.

Prior to the event, SWBNO launched its 'Storm Center' website, to provide customers with a single location to find status updates and information related to the storm (https://www.swbno.org/News/StormCenter). Additional resources and efforts will be put into place for future storms to reach as many stakeholders as possible via multiple media and communication outlets with relevant and timely updates as information becomes available.