

St. Bernard Parish, Louisiana Wastewater System - From Hurricane Katrina to Isaac

Case Study in the Implementation and Performance of Mitigation Measures

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**CDM
Smith**

Presentation Outline

- **Overview of St. Bernard Parish Wastewater Infrastructure**
- **Overview of Storm Impacts**
- **Overview of Comprehensive Consolidation**
- **Pump Stations**
- **Plant Processes**
- **Chemical Systems/Storage Tanks**
- **Performance During Hurricane Isaac**
- **Closing**

Overview of St. Bernard Parish

- **Pre-Katrina Population – 67,000**
- **Current Population – Approximately 40,000**
- **Location – Southeast of New Orleans, Louisiana**

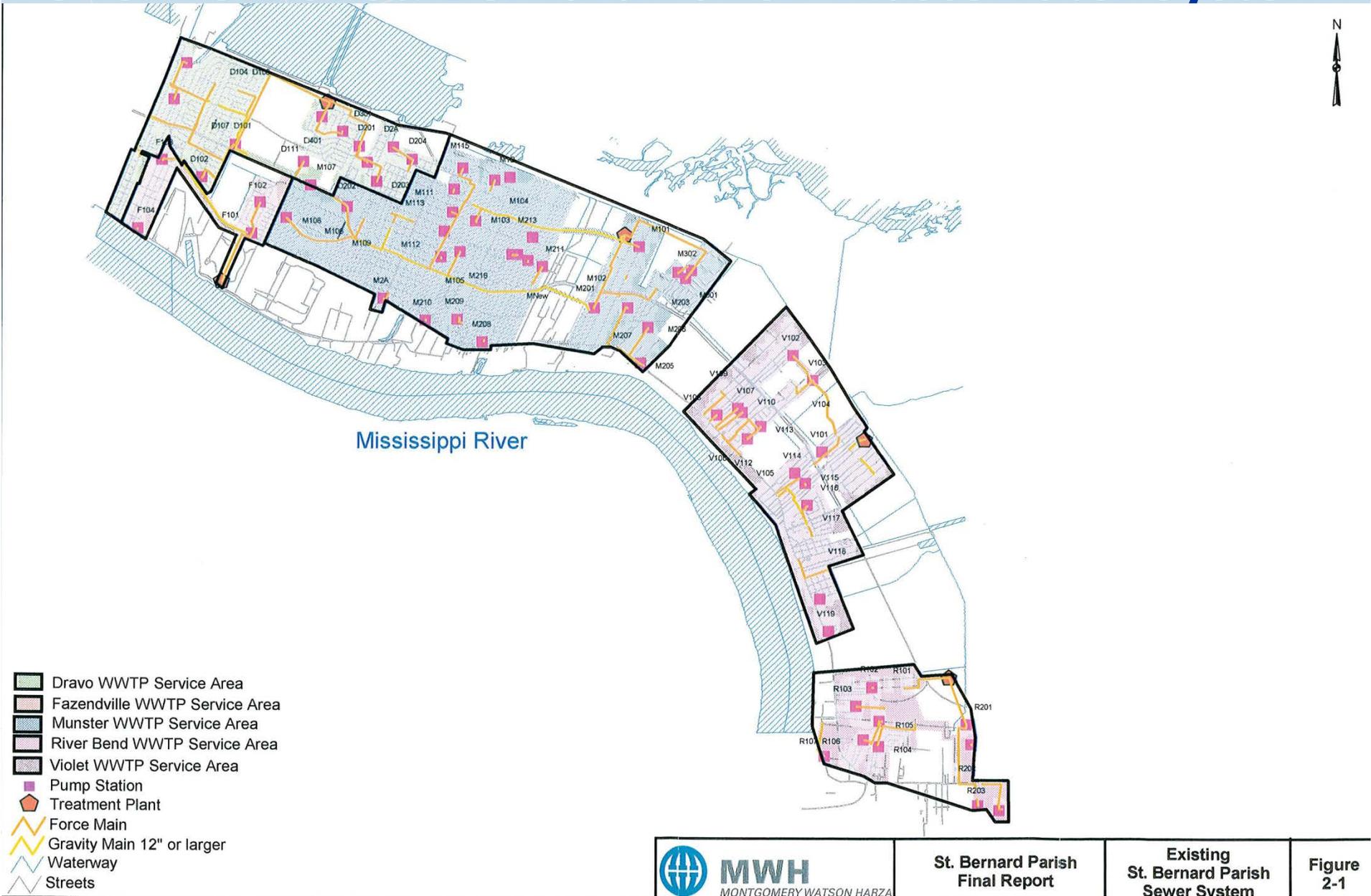
Map of St. Bernard Parish



Overview of St. Bernard Parish Wastewater System

- **Dravo WWTP – 3.5 MGD (20 to 40 years old)**
- **Violet WWTP – 2.0 MGD (>30 years old)**
- **Fazendville WWTP – 1.0 MGD (>30 years old)**
- **Munster WWTP – 7.5 MGD (expanded in 2000)**
- **Riverbend Pond – 0.5 MGD**
- **Two Package WWTPs – 0.05 MGD each**

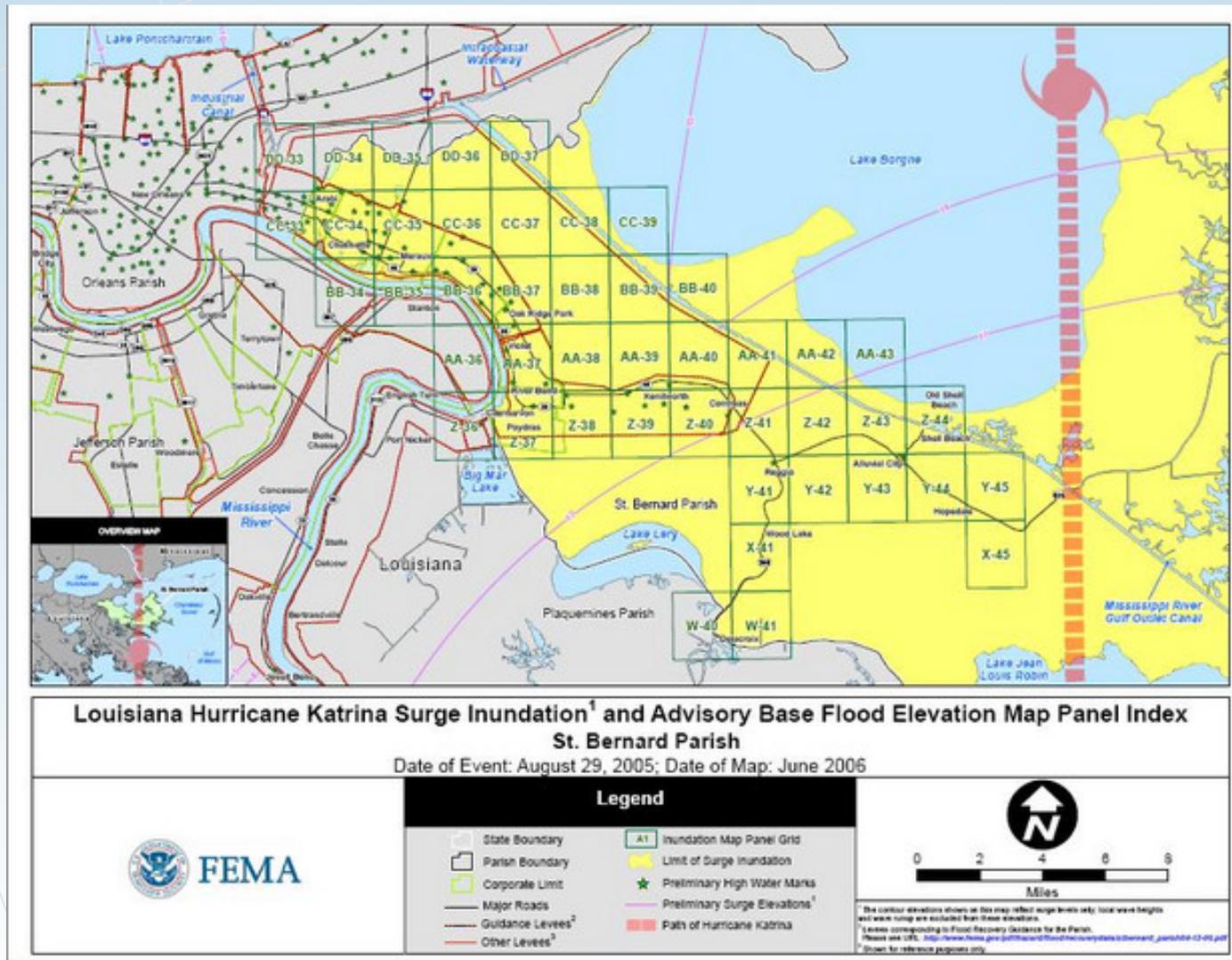
Overview of St. Bernard Parish Wastewater System



Overview of St. Bernard Parish Wastewater System – 2005 Planned Consolidation

- **Dravo WWTP – Peak Flow Improvements**
- **Fazendville WWTP – Decommission**
- **Violet WWTP – Decommission**
- **Riverbend Pond – Decommission**
- **Munster WWTP – Peak Flow Improvements**
- **Two Package WWTPs – Decommission**
- **Partial Funding through \$50M Bond Issue**

Surge Inundation Map of St. Bernard Parish



Overview of Hurricane Katrina Impacts on Wastewater Infrastructure

- **All 90 sewer lift stations rendered inoperable**
- **All power eliminated**
- **All seven wastewater treatment facilities flooded and off-line**
- **Extensive emergency measures required until treatment facilities returned to service**
- **High risk impacts to chemical feed/chlorine systems**

Katrina Impact Photos



Katrina Impact Photos



Katrina Impact Photos



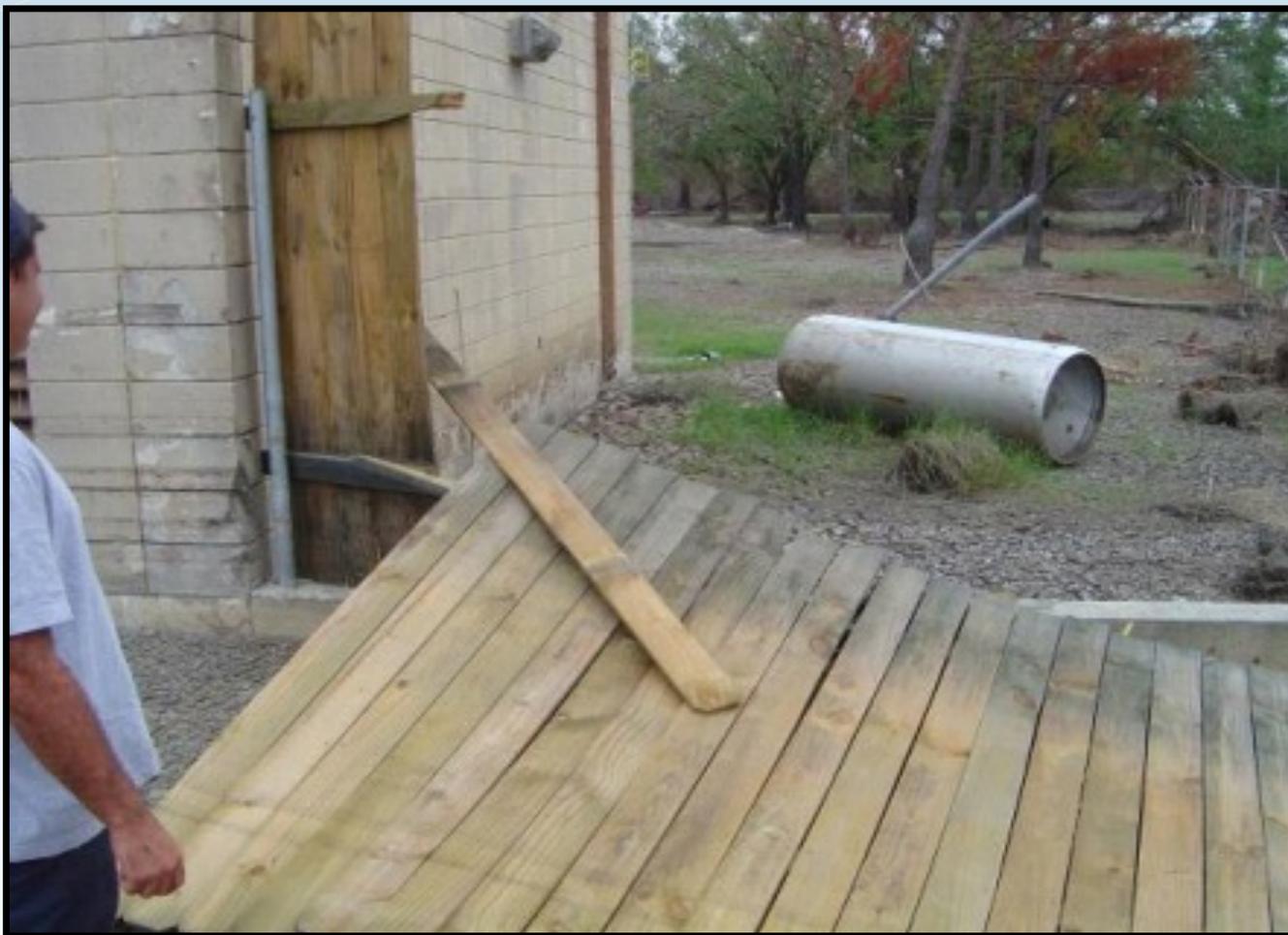
Katrina Impact Photos



Katrina Impact Photos



Katrina Impact Photos



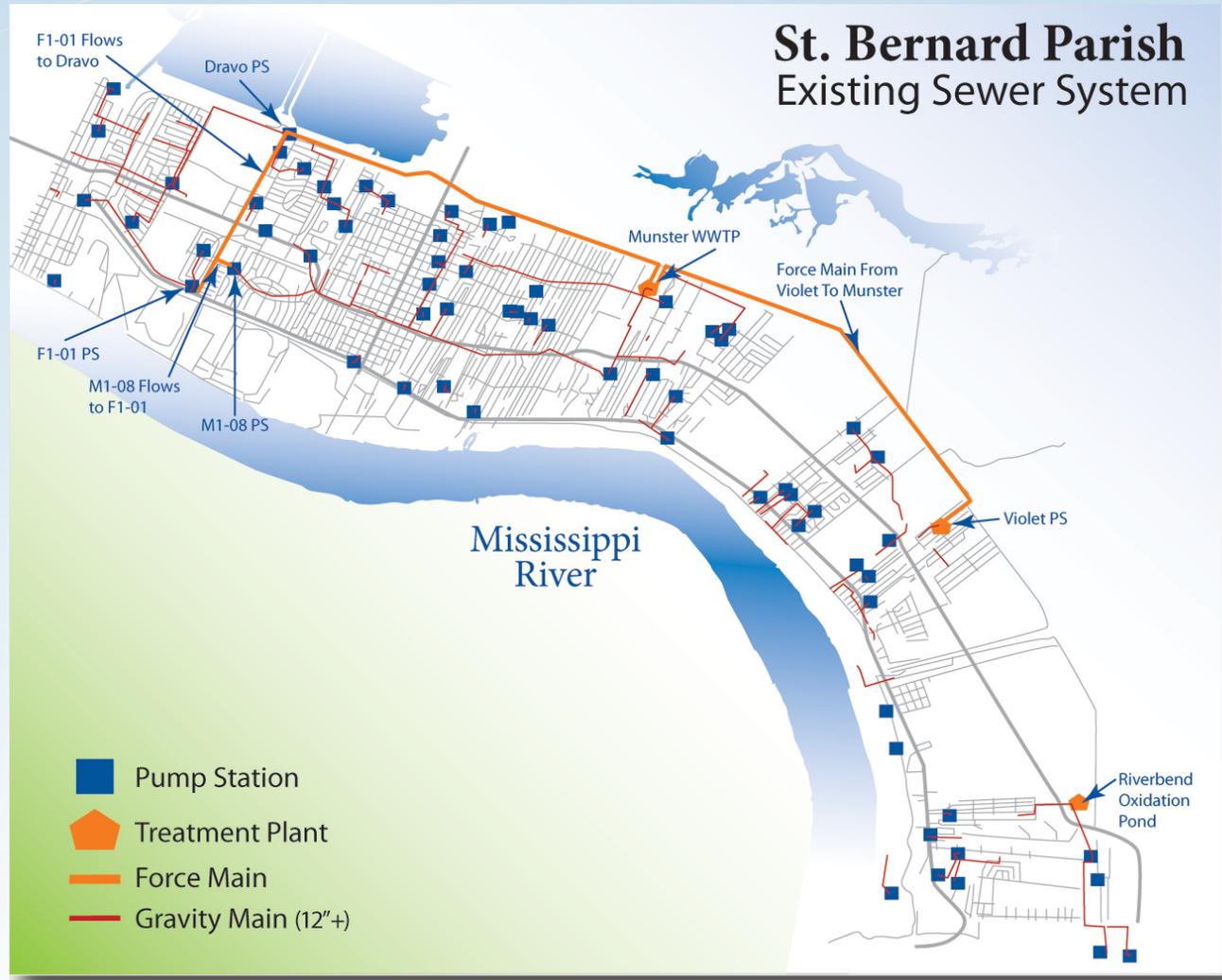
Drivers for Comprehensive Consolidation Approach

- **Consolidation Plan already in place pre-Katrina**
- **Avoid repairs to two WWTPs slated for decommissioning**
- **Ability to provide a comprehensively hardened system**
- **Ability to reduce future emergency measures**
- **Staffing and operating budget impacts**

Components of Consolidation Approach

- **Fazendville WWTP Decommissioning – Hardening of F1-01 Pump Station and New Force Main**
- **Dravo WWTP Decommissioning – Hardening and Reuse of Effluent Pump Station and Force Main**
- **Violet WWTP Decommissioning – Hardening and Reuse of Influent Pump Station and New Force Main**
- **Munster WWTP – Hardening and Expansion**
- **Riverbend Oxidation Pond – Conversion to Wetlands Assimilation Discharge**

Post-Katrina Consolidation Approach



Fazendville Decommissioning (F1-01 Pump Station)

- **Raised Control Panels**
- **Reused Existing Dry Pit**
- **Conversion to Dry Pit Submersible Pumps**
- **Force Main to Dravo Effluent Pump Station**
- **Future Ability to Monitor from Munster WWTP (SCADA)**

Dravo Decommissioning

- **Elevated Electrical/Control Building**
- **Elevated Emergency Generator**
- **Reuse of Existing Effluent Pump Station**
- **Conversion to Submersible Pumps**
- **Reuse of Existing Force Main from Dravo to Munster WWTP**
- **Future Ability to Monitor from Munster WWTP (SCADA)**

Dravo Photo



Violet Decommissioning

- **Elevated Electrical/Controls on Existing Structure**
- **Elevated Emergency Generator on Existing Wet Well**
- **Reuse of Existing Influent Pump Station**
- **Conversion to Dry Pit Submersible Pumps**
- **New Force Main from Violet to Munster WWTP**
- **Future Ability to Monitor from Munster WWTP (SCADA)**

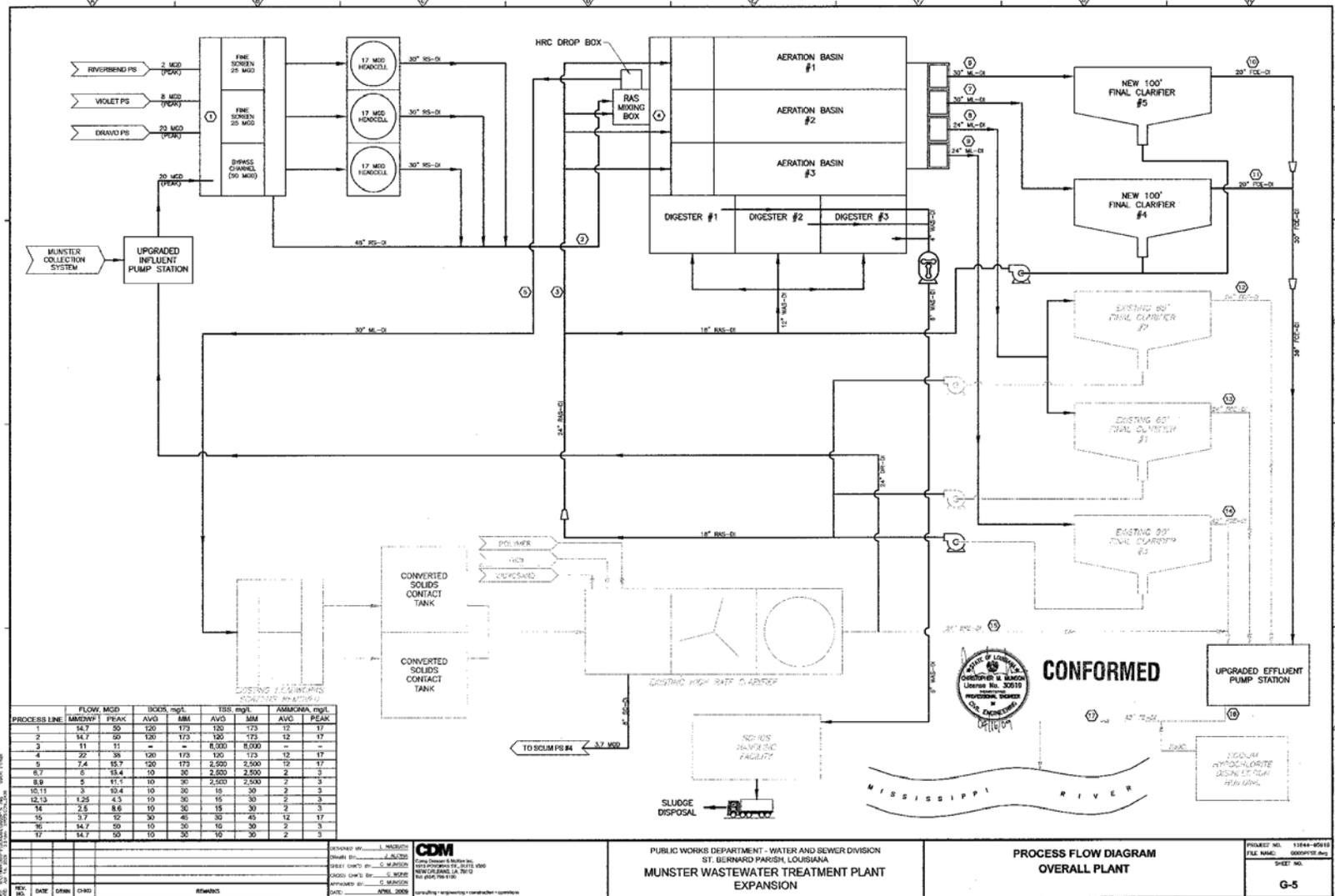
Violet Photo



Munster WWTP Expansion – Highlights

- **Comprehensive Mitigation of Entire Facility**
- **Capacity Expansion to Accommodate Decommissioned Facilities**
- **Extensive Emergency Generation Capabilities**
- **Innovative Treatment Process to Increase Resiliency and Minimize Capital Costs**
- **Elimination of Future Chlorine/Chemical Hazards**

Munster WWTP Process Flow Diagram



Influent Pump Station and Headworks

- **Influent Pump Station**
 - Elevated Electrical/Control Building
 - Reuse of Existing Influent Pump Station
 - Conversion from VTSH Pumps to Submersible Pumps
- **Headworks**
 - Elevated Electrical/Control Building

Influent Pump Station and Headworks Photos



Influent Pump Station and Headworks Photos



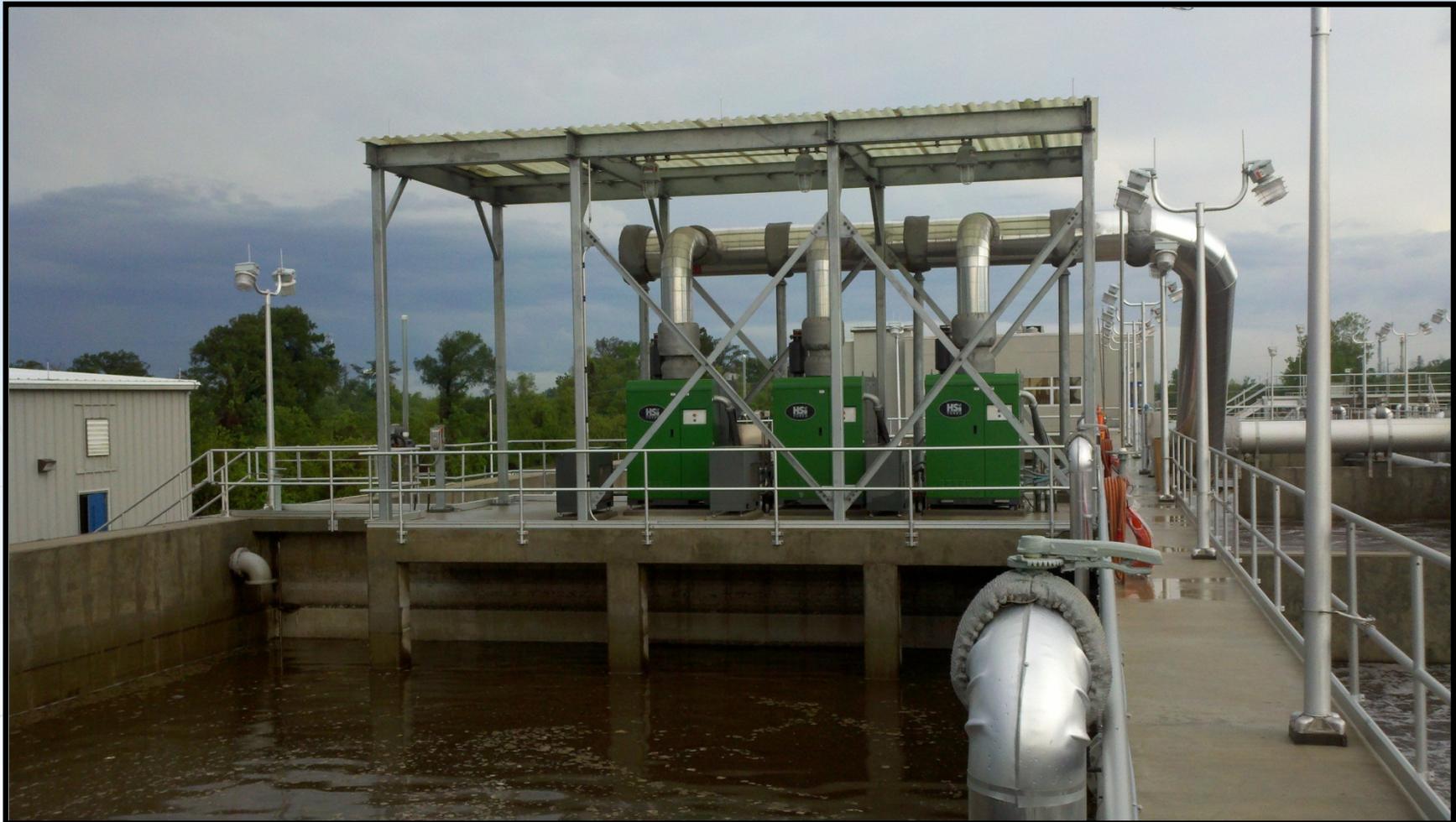
Aeration Basins and Digesters

- **Elevated Electrical/Control Building**
- **Top of Structure Above Katrina Flood Elevation**
- **Aeration Basin Blowers Located on Top of Structure**

Aeration Basins and Digesters Photos



Aeration Basins and Digesters Photos



Aeration Basins and Digesters Photos



Effluent Pump Station

- **Elevated Electrical/Control Building**
- **Reuse of Existing Effluent Pump Station**
- **Conversion to Dry-Pit Submersible Pumps**

Electrical Feed and Emergency Generators

- **Elevated Main Electrical Building**
- **Elevated Transformers**
- **Elevated Generators and Fuel Storage**
 - **Two 2000 kW Generators**
 - **7 Days of Fuel Storage**

Electrical Feed and Emergency Generators



Administration Building



Munster WWTP – Biologically Enhanced HRC

- **Replaces 3.5 MGD of Dry Weather Capacity at Low Capital Cost (12 MGD Peak Capacity)**
- **Provides High Level of Treatment at Low Horsepower**
- **Limits Emergency Generator Needs and Fuel Consumption under Emergency Conditions**
- **Limits Other Emergency Operation Needs**

Biologically Enhanced HRC Photos



Biologically Enhanced HRC Photos



Munster WWTP – Chlorination

- **Converted from Gaseous Chlorine to Sodium Hypochlorite Disinfection**
 - Eliminates chlorine gas hazards during normal operations
 - Eliminated dangerous gaseous releases during flood conditions
 - Simplifies hazard mitigation approach

Sodium Hypochlorite Storage



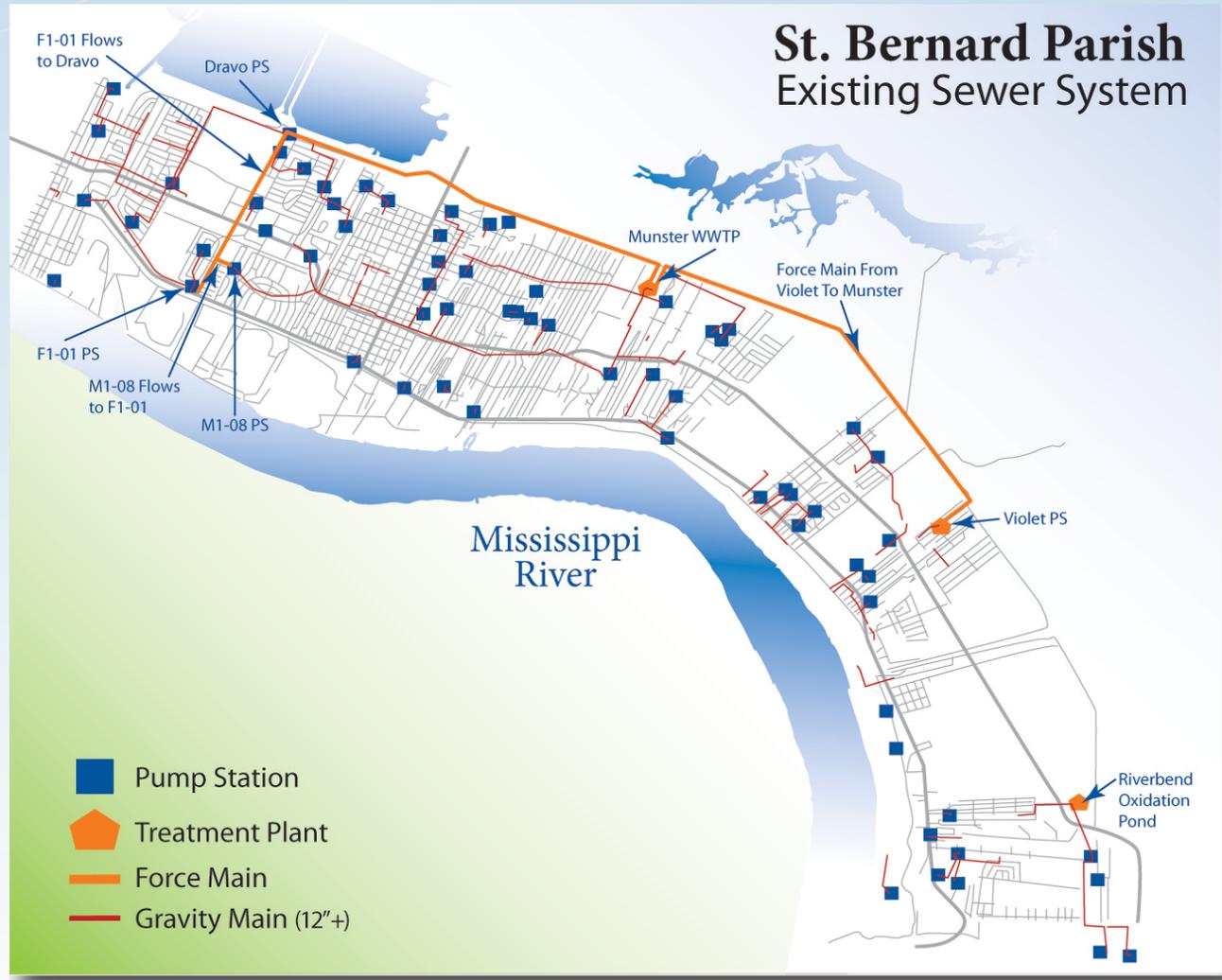
Hurricane Isaac

- **Slow Moving Category 1 Hurricane**
- **Limited Evacuations**
- **Landfall near mouth of Mississippi River and then Port Fourchon, Louisiana on August 28, 2012**
- **Storm Surge Flooding Outside of Levees**
- **Widespread Power Outages Throughout Southeast Louisiana**

Hurricane Isaac – St. Bernard Parish

- **Storm Surge Flooding in Coastal Areas**
- **Power Outage Lasting 3+ days Throughout the Parish**

Post-Katrina Consolidation Approach



Hurricane Isaac – St. Bernard Parish

- **Continued to Pump/Treat up to 3 time ADWF (21 MGD)**
 - During Peak of Storm
 - Throughout Power Outage
- **Limited System Overflows and Home Backups**
- **Storm Surge Flooding Outside of Levees**
- **Widespread Power Outages Throughout Southeast Louisiana**

Benefits of Comprehensive Hazard Mitigation

- **Provides a System-Wide Approach to Avoid Damages**
- **Greatly Reduces the Need for Future Extensive Emergency Measures**
- **Facilitates Quick Community Return After Storm Event**
- **Reduces Operational Costs and Staff Needs for Severely Impacted Communities**
- **Maintain System Operation During Extended Power Loss**

Questions?

