




**Lift Station Condition Assessment and Electronic O&M Manuals**

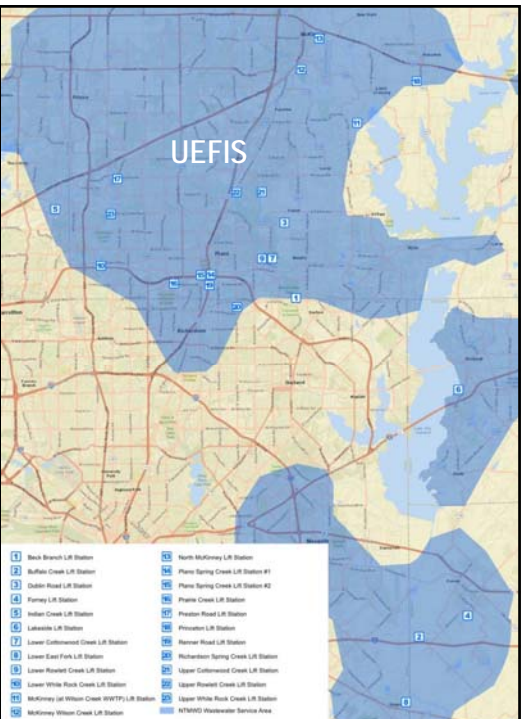
**TACWA Meeting**

September 22, 2017



**NTMWD Wastewater System**

- Serves approximately 1 million residents
- Over 500 square miles
- 25 cities/communities
- 14 WWTPs
- **Upper East Fork Interceptor System (UEFIS)**
  - 1 million LF of interceptors and force mains
  - 19 lift stations
- **Sewer System**
  - 270,000 LF of interceptors and force mains
  - 4 lift stations



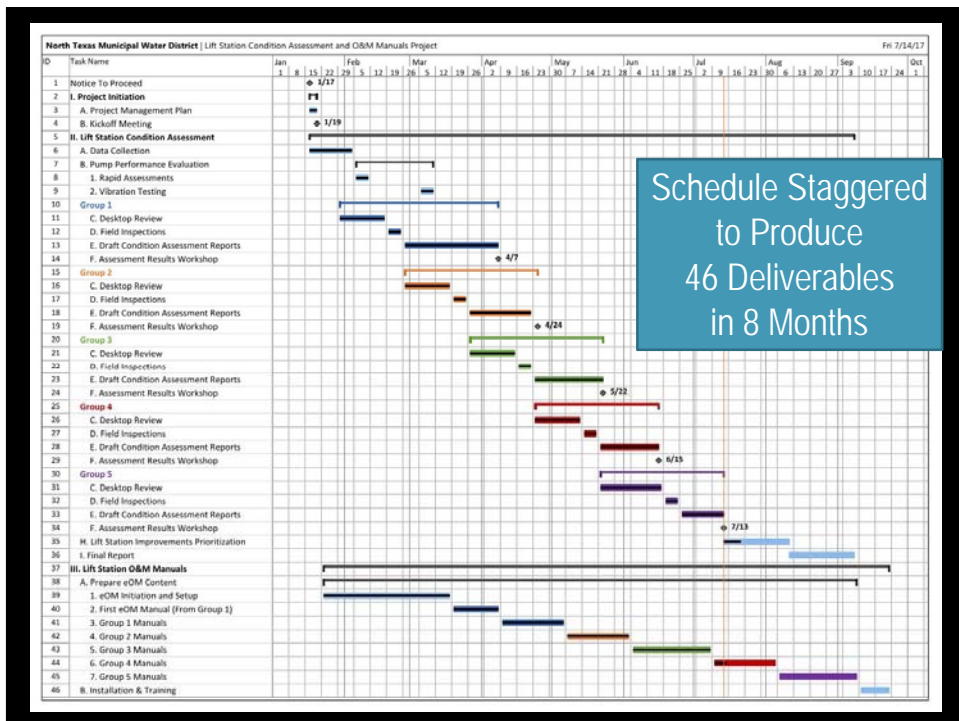
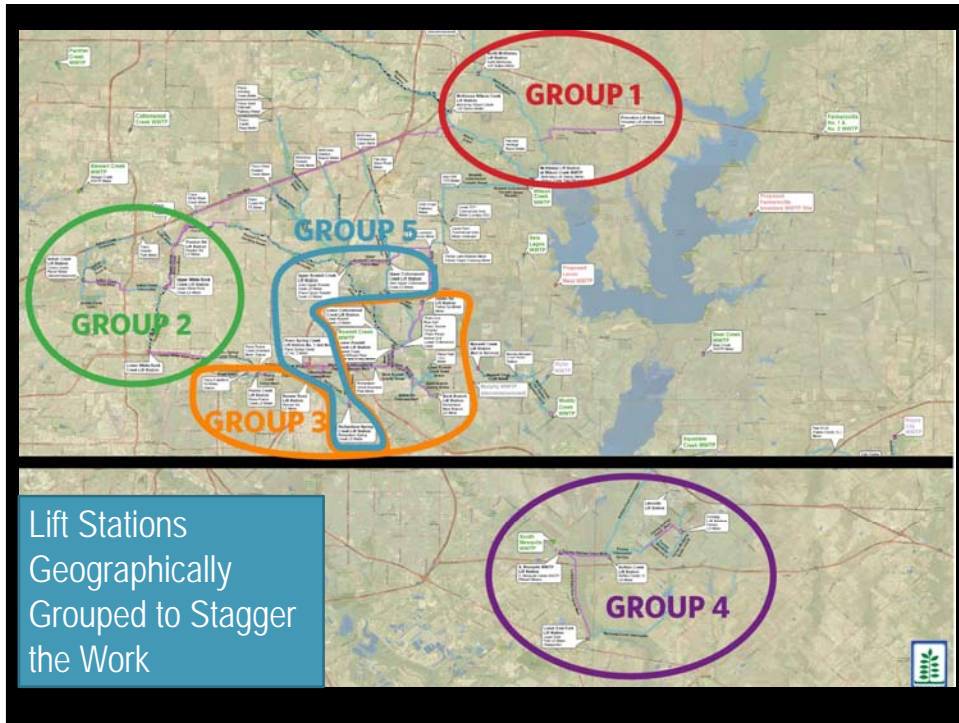
1 Back Branch L/R Station	15 North McKinney L/R Station
2 Buffalo Creek L/R Station	16 Plano Spring Creek L/R Station #1
3 Dallas Road L/R Station	17 Plano Spring Creek L/R Station #2
4 Farney L/R Station	18 Plano Creek L/R Station
5 Helton Creek L/R Station	19 Preston Road L/R Station
6 Lakeside L/R Station	20 Preston L/R Station
7 Lower Coltonwood Creek L/R Station	21 Banner Road L/R Station
8 Lower East Fork L/R Station	22 Richardson Spring Creek L/R Station
9 Lower Rowlett Creek L/R Station	23 Upper Coltonwood Creek L/R Station
10 Lower White Rock Creek L/R Station	24 Upper Rowlett Creek L/R Station
11 McKinney Jet/Wilson Creek WWTP L/R Station	25 Upper White Rock Creek L/R Station
12 McKinney Wilson Creek L/R Station	26 Upper White Rock Creek L/R Station
	NTMWD Restoration Service Area

## Project Goals

- **Lift Station Condition Assessment**
  - Determine consistent baseline condition of lift stations
  - Identify assets needing immediate attention
  - Prioritize capital and operational improvements to extend asset life
- **Electronic O&M Manuals for Lift Stations**
  - Develop centralized location of documentation
  - Provide access to electronic O&M manuals by operators in the field (tablets)

## Project Challenges

- Project must be completed by September 30, 2017
- Collection of needed documentation
- Coordination across multiple departments
  - **Wastewater Operations**
  - **Engineering & Planning**
  - **Technical Services**
    - Vibration Crew
    - Electrical
    - Instrumentation
  - **Information Technology**
  - **Records**

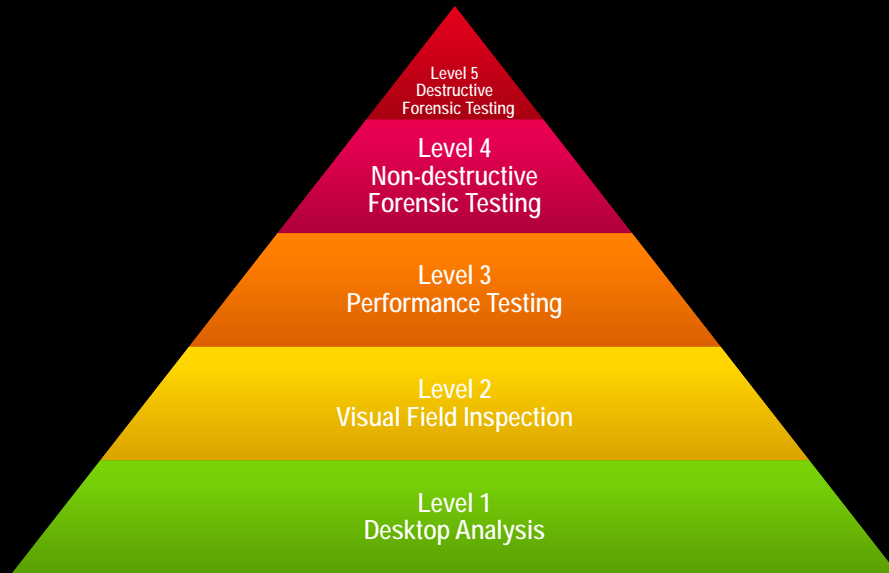




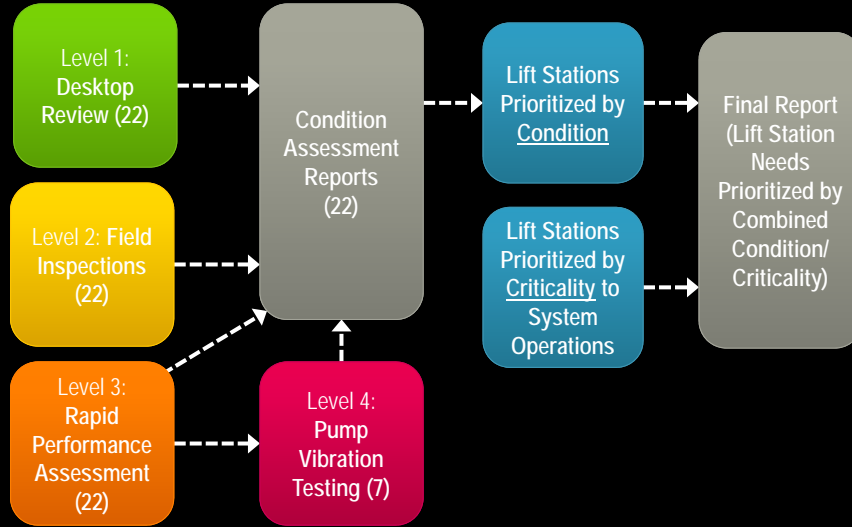
## Agenda

- 1 Lift Station Condition Assessments
- 2 Lift Station Electronic O&M Manuals

## Condition Assessment Levels



## Scope of Work Summary for Lift Station Condition Assessments



### Level 1 – Desktop Review

- Review As-Builts and Shop Drawings
- Review operational history and known maintenance issues
- Check the following:

TCEQ 217 influent pipe invert elevation compliance	→	10 of 22 lift stations meet this criteria
TCEQ 217 active wetwell volume formula compliance	→	3 of 22 lift stations meet this criteria
Variable speed wetwell volume at minimum flow	→	8 of 22 lift stations meet this criteria
TCEQ 217 force main flushing velocity > 5 feet per second	→	19 of 22 lift stations can produce required flow
Net Positive Suction Head (NPSH) Available vs. Required	→	17 lift stations adequate; 4 marginal; 1 are negative

## Level 2 – Field Inspections



- Three Disciplines:
  - › Process/Mechanical
  - › Electrical
  - › Instrumentation & Control
- Limited Structural (District provided wetwell photos)
- HDR Standard Condition Assessment Forms Used
- Each Asset Scored for:
  - › Condition
  - › Reliability
  - › Performance/Capacity

## Asset Types Inspected Include:

- **Process Mechanical**
  - › Pump
  - › Valve
  - › Piping
- **Structural**
  - › Wetwell Condition from Photos
- **I&C**
  - › Primary Element
  - › Controller (PLC, RTU, DCS)
  - › Computers, Software, Network Communication
  - › Radios and Associated Equipment
- **Electrical**
  - › Electric Motor
  - › Engine Generator
  - › Uninterruptable Power Supply (UPS)
  - › Variable Frequency Drive (VFD)
  - › Transformer
  - › Switchgear
  - › Motor Control Center
  - › Panelboard

### Level 3 – Lift Station Rapid Assessments

- Look, listen, and feel for vibration/cavitation
- Check:
  - › individual pump flow using pump or station meter
  - › suction and discharge pressure
  - › pump level (machinist's level)
- 14 of 22 lift stations with vibration/cavitation issues
- 7 lift stations recommended for further vibration testing



### Simple Vibration Test – Nickel & Penny Test

- Allowable vibration per Hydraulic Institute standards for these types of wastewater pumps is 0.34 inches/second
- If nickel stands, vibration < 0.1 in/sec
- If penny stands, vibration < 0.05 in/sec



## Level 4 – Vibration Testing – 7 Lift Stations

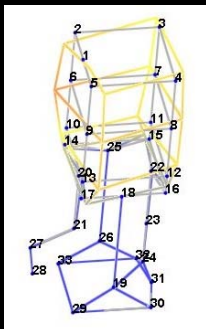


- Determine Natural Frequency of each pump
- Measure each pump's operating vibration
- Determine if a Resonance is occurring (Natural Frequency within the operating range)
- Identify any system related vibration
  - › NPSH issue
  - › Pump operating off of curve
  - › Wetwell turbulence



## Vibration Testing Reports Produced for the 7 Lift Stations

- 8 of 20 pumps tested had vibration > HI Standard
- 7 of 20 pumps tested had a Resonance
- Typical recommendations for pumps with vibration problems:
  - › Reprogram SCADA to prevent VFDs from operating at Resonance speed(s)
  - › Replace older pumps
  - › Modify newer pumps to move the natural frequency out of the operating frequency range



*Pump manufacturers can conduct a modal analysis to determine pump body weaknesses*

*Modifications can be made to increase stiffness to change natural frequency*





## Each Asset is Rated and Scored to Develop an Overall Asset Score – Example: Prairie Creek LS Proc/Mech

Asset ID	Asset Description	Assessment Score				Weighted Score (X 0.25)	Criticality Score		Useful Remaining Life Score		Total Asset Score
		Cond	Rel	Cap	Total		Relative Criticality	Weighted Score (X 0.75)	Useful Remaining Life Score	Weighted Score (X 1.00)	
<b>Process/Mechanical</b>											
PMP000939	Pump No. 1	3	3	3	9	2.25	4	3.00	4	4.00	9.25
PMP000940	Pump No. 2	3	3	3	9	2.25	4	3.00	4	4.00	9.25
PMP000941	Pump No. 3	3	2	3	8	2.00	4	3.00	4	4.00	9.00
CKV000XXX	Pump No. 1 Check Valve	2	3	2	7	1.75	3	2.25	3	3.00	7.00
VLV001676	Pump No. 1 Gate Valve (Suction)	2	3	2	7	1.75	2	1.50	3	3.00	6.25
VLV001679	Pump No. 1 Gate Valve (Discharge)	2	3	2	7	1.75	2	1.50	3	3.00	6.25
CKV000XXX	Pump No. 2 Check Valve	3	3	2	8	2.00	3	2.25	3	3.00	7.25
VLV001677	Pump No. 2 Gate Valve (Suction)	2	3	2	7	1.75	2	1.50	3	3.00	6.25
VLV001680	Pump No. 2 Gate Valve (Discharge)	2	3	2	7	1.75	2	1.50	3	3.00	6.25
CKV000XXX	Pump No. 3 Check Valve	2	3	2	7	1.75	3	2.25	3	3.00	7.00
VLV001678	Pump No. 3 Gate Valve (Suction)	2	3	2	7	1.75	2	1.50	3	3.00	6.25
VLV001681	Pump No. 3 Gate Valve (Discharge)	2	3	2	7	1.75	2	1.50	3	3.00	6.25
VLV003826	Surge Relief Valve	2	3	2	7	1.75	2	1.50	3	3.00	6.25
VLV001683	Surge Relief Isolation Valve	2	3	2	7	1.75	2	1.50	3	3.00	6.25
PMP000XXX	Sump Pump No. 1	3	4	2	9	2.25	2	1.50	4	4.00	7.75
PMP000XXX	Sump Pump No. 2	3	4	2	9	2.25	2	1.50	4	4.00	7.75
VLV001682	Header Isolation Valve	2	2	2	6	1.50	2	1.50	2	2.00	5.00
NA	Above Ground Pipe	3	2	2	7	1.75	2	1.50	3	3.00	6.25

## Develop Prioritized Improvements List for Each Lift Station – Example: Prairie Creek Lift Station

Asset Score	Discipline	Description	Timeframe (years)	Estimated Construction Cost <sup>1</sup>
9.25	Process/Mech	Pump No. 1 Replacement (w/Motor)	0-5	\$ 122,000
9.25	Process/Mech	Pump No. 2 Replacement (w/Motor)	0-5	\$ 122,000
9.00	Process/Mech	Pump No. 3 Replacement (w/Motor)	0-5	\$ 152,000
9.00	I&C	Wetwell Level Instruments	0-5	\$ 20,000
7.75	Process/Mech	Header Iso GV (20-inch)	6-10	\$ 28,000
7.25	Process/Mech	Pump No. 2 CV (14-inch)	6-10	\$ 11,000
7.00	Process/Mech	Pump No. 1 CV (14-inch)	6-10	\$ 11,000
7.00	Process/Mech	Pump No. 3 CV (14-inch)	6-10	\$ 11,000
6.50	Electrical	MCC Replacement	0-5	\$ 163,000
6.25	Process/Mech	Pump No. 1 Suction Iso GV (18-inch)	6-10	\$ 24,000
6.25	Process/Mech	Pump No. 1 Discharge Iso GV (14-inch)	6-10	\$ 11,000
6.25	Process/Mech	Pump No. 2 Suction Iso GV (18-inch)	6-10	\$ 24,000
6.25	Process/Mech	Pump No. 2 Discharge Iso GV (14-inch)	6-10	\$ 11,000
6.25	Process/Mech	Pump No. 3 Suction Iso GV (18-inch)	6-10	\$ 24,000
6.25	Process/Mech	Pump No. 3 Discharge Iso GV (14-inch)	6-10	\$ 11,000
6.25	Process/Mech	Surge Relief Valve (8-inch)	6-10	\$ 16,000
6.25	Process/Mech	Surge Iso GV (8-inch)	6-10	\$ 4,000
6.25	Process/Mech	Exposed Piping Recoating	0-5	\$ 30,000
5.75	Structural	Wetwell Coating	0-5	\$ 119,000
5.75	Structural	Bypass Pumping for Wetwell Coating	0-5	\$ 120,000

## Final Report Combines Results of Individual Assessments

### Ranking by Condition:

Lift Station Name	Average Asset Condition Score				Total Condition Score
	Process/Mechanical	Electrical	I&C	Structural	
Plano Spring Creek #1	8.29	8.94	6.69	6.50	30.42
Lower White Rock Creek	6.98	7.79	5.81	6.25	26.83
McKinney at Wilson Creek	6.67	5.67	6.29	8.00	26.62
Lakeside	7.32	5.25	6.44	6.50	25.51
Buffalo Creek	6.63	5.93	6.57	5.75	24.89
Indian Creek	6.46	5.47	5.85	6.50	24.29
Prairie Creek	6.99	6.13	5.34	5.75	24.20
Preston Road	6.38	5.50	5.66	6.50	24.03
Beck Branch	6.63	5.52	5.29	6.50	23.94
Plano Spring Creek #2	5.62	5.86	5.92	6.50	23.90
Lower Rowlett	6.67	5.73	5.23	5.75	23.38
Lower East Fork	5.93	6.03	5.96	5.25	23.18
Upper White Rock Creek	6.43	5.32	4.78	6.50	23.02
Upper Rowlett	6.45	4.97	5.06	6.50	22.98
Renner Road	6.42	5.80	5.00	5.75	22.97
Upper Cottonwood	6.54	4.50	4.97	6.50	22.51
Princeton	6.03	4.70	5.61	5.75	22.10
Richardson Spring Creek	6.16	5.14	4.98	5.75	22.02
Forney	5.63	5.19	5.14	5.75	21.71
Dublin Road	5.19	5.15	4.77	5.75	20.85
Wilson Creek	5.46	5.00	4.73	5.00	20.18
North McKinney	5.42	4.77	4.73	4.75	19.67
<b>Average</b>	<b>6.38</b>	<b>5.65</b>	<b>5.49</b>	<b>6.08</b>	<b>23.60</b>

### Ranking by Criticality:

Lift Station Name	System Criticality	Weighted Criticality Score (x3)
Preston Road	5	15.00
Beck Branch	4	12.00
Lakeside	4	12.00
McKinney at Wilson Creek	4	12.00
Lower White Rock Creek	4	12.00
Plano Spring Creek #2	4	12.00
Upper White Rock Creek	4	12.00
Buffalo Creek	3	9.00
Indian Creek	3	9.00
Lower Rowlett	3	9.00
Upper Rowlett	3	9.00
Richardson Spring Creek	3	9.00
Forney	3	9.00
Upper Cottonwood	3	9.00
Princeton	3	9.00
Dublin Road	3	9.00
Prairie Creek	2	6.00
Lower East Fork	2	6.00
Renner Road	2	6.00
Wilson Creek	2	6.00
North McKinney	2	6.00
Plano Spring Creek #1	1	3.00
<b>Average</b>	<b>3.05</b>	<b>9.14</b>

## Combined Condition/ Criticality Ranking

- Results in prioritized, systemwide lift station improvement needs
- These needs, combined with growth/capacity needs, can be considered in annual CIP planning

Lift Station Name	Condition Score	Criticality Score	Total	OPCC for Recommended Improvements
Preston Road	24.03	15.00	39.03	\$4,644,000
Lower White Rock Creek	26.83	12.00	38.83	\$2,157,000
McKinney at Wilson Creek	26.62	12.00	38.62	\$2,015,000
Lakeside	25.51	12.00	37.51	\$533,000
Beck Branch	23.94	12.00	35.94	\$691,000
Plano Spring Creek #2	23.90	12.00	35.90	\$782,000
Upper White Rock Creek	23.02	12.00	35.02	\$1,908,000
Buffalo Creek	24.89	9.00	33.89	\$812,000
Plano Spring Creek #1	30.42	3.00	33.42	\$2,554,000
Indian Creek	24.29	9.00	33.29	\$978,000
Lower Rowlett	23.38	9.00	32.38	\$3,744,000
Upper Rowlett	22.98	9.00	31.98	\$1,477,000
Upper Cottonwood	22.51	9.00	31.51	\$877,000
Princeton	22.10	9.00	31.10	\$672,000
Richardson Spring Creek	22.02	9.00	31.02	\$70,000
Forney	21.71	9.00	30.71	\$110,000
Prairie Creek	24.20	6.00	30.20	\$1,144,000
Dublin Road	20.85	9.00	29.85	---
Lower East Fork	23.18	6.00	29.18	\$215,000
Renner Road	22.97	6.00	28.97	\$1,232,000
Wilson Creek	20.18	6.00	26.18	\$51,000
North McKinney	19.67	6.00	25.67	---
<b>Average</b>	<b>23.60</b>	<b>9.14</b>	<b>32.74</b>	<b>\$1,333,300</b>
<b>Total</b>				<b>\$26,666,000</b>
<b>Total High Priority</b>				<b>\$12,730,000</b>
<b>Total Medium Priority</b>				<b>\$11,184,000</b>
<b>Total Low Priority</b>				<b>\$2,752,000</b>

## Operational Recommendations to Increase Asset Life

- Final Report also provides general operational recommendations for:
  - › Wetwell operational levels
  - › NPSH guidelines
  - › Pump cycling
  - › Vibration (identify and prevent resonance)
  - › Force main flushing velocities
- Final Report also provides specific operational recommendations for each lift station



## Agenda

- 1 Lift Station Condition Assessments
- 2 Lift Station Electronic O&M Manuals

## O&M Manual Content per EPA:

### “Considerations for the Preparation of O&M Manuals”

1. Description of operation and control
  - Unit processes/equipment
  - Normal and alternate operations
  - Automation
2. Maintenance
3. Design attributes / capacity
4. Safety
5. Staffing and responsibilities
6. Testing and analysis
7. Records and recordkeeping
8. Permit information



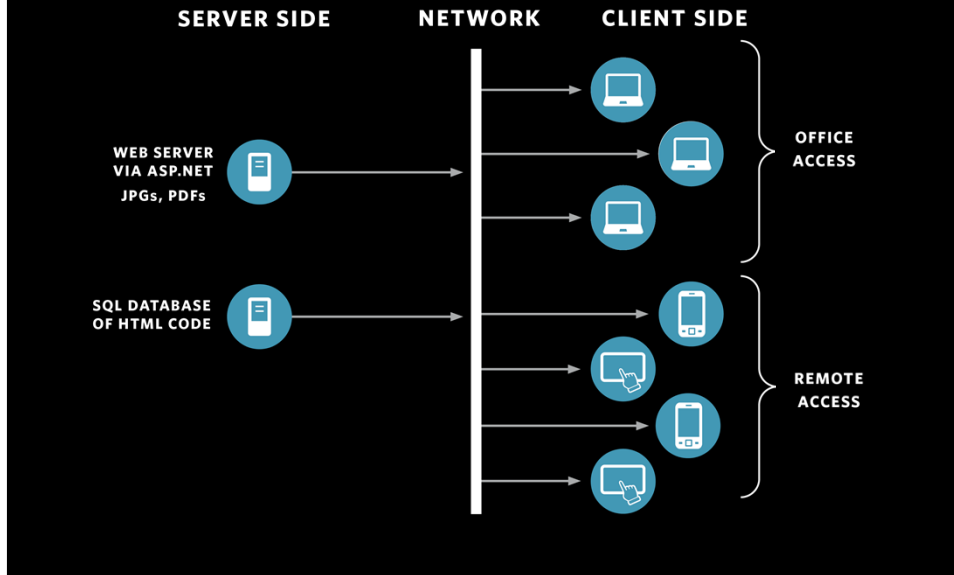
## Advantages of Electronic O&M Manuals

Typical Information Management System:



- One master copy resides on server
- Full access in the field
- One-click access to:
  - Equipment manuals
  - Construction drawings
  - Photos
  - Reports
  - Records
  - SOPs
  - Safety info.
- Version control: easily updated each time a change is made to the facility
- Can “surf” the facility for information
- Helps to address “Brain Drain” as experienced employees retire

## Electronic O&M Client Server Architecture



## Electronic O&M Manuals Completed for All Lift Stations - Framework in Place for Entire Wastewater System

The screenshot shows a web browser displaying the "Electronic Operation and Maintenance Manual" for the North Texas Municipal Water District. The browser address bar shows the URL: <http://www.adeem.com/ECMNTMWD/LiftStations/Manual/0>.

The page features a navigation menu on the left with a tree view structure:

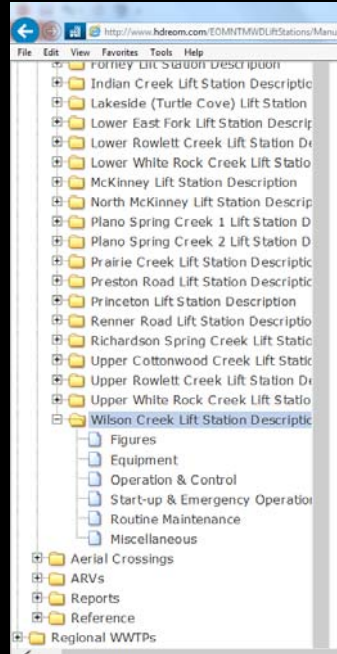
- ECMNTMWD/LiftStations
  - Conveyance
    - Back Branch Lift Station Description
    - Bullfroga Creek Lift Station Description
    - Dublin Rail Station Description
    - Ferney Lift Station Description
    - Indian Creek Lift Station Description
    - Lakewood (Turtle Cove) Lift Station Desc
    - Lower East Fork Lift Station Description
    - Lower Rowlett Creek Lift Station Desc
    - Lower White Rock Creek Lift Station D
    - McGowen Lift Station Description
    - North McKinney Lift Station Description
    - North Spring Creek 1 Lift Station Desc
    - Plano Spring Creek 2 Lift Station Desc
    - Prine Creek Lift Station Description
    - Preston Road Lift Station Description
    - Trinacion Lift Station Description
    - Wannan Road Lift Station Description
    - Richardson Spring Creek Lift Station C
    - Upper Cottonwood Creek Lift Station I
    - Upper Rowlett Creek Lift Station Desc
    - Upper White Rock Creek Lift Station D
    - Wilson Creek Lift Station Description
  - Aerial Crossings
  - AVIS
  - Reports
  - Reference
    - Regional WWTPs
    - Server System WWTPs
    - Odor Control
    - Meters
    - Reference

The main content area displays the North Texas Municipal Water District logo and the title "Wastewater Electronic Operation and Maintenance Manuals". Below the title, there is a note: "Note to Reader - The eOM is a work in progress. In the menu on the left, click on the + sign to expand a folder." and three links: "Wastewater System Map", "NTMWD Website", and "Wastewater System Website".

At the bottom of the page, there is a "Back To Top" link and a timestamp: "Last updated: 6/5/2017 10:54:08 AM".

## eOM Sections for Each Lift Station

- Description
- Figures
- Equipment
- Operation & Control
- Startup & Emergency Operations
- Routine Maintenance
- Miscellaneous



## eOM – Description

### Wilson Creek Lift Station Description WW0140

**Overview**

The Wilson Creek Lift Station is in the UFFIS and is located at 500 Old Mill Rd, McKinney, TX 75069. The station was built in 2011 under Project No. 140. The station receives flow from three NTMWD McKinney sewers, one 15", one 24" and one 30". The lift station discharge is pumped through the 36" Wilson Creek Parallel force main and is discharged to the Wilson Creek WWTP. An image of the lines entering and leaving the station is available [here](#). Two 500 HP lift pumps are installed with provisions to install three more pumps in the future. Electro-magnetic flow meters (mag meters) are installed on the discharge piping of each pump, but not on the combined discharge.

Lift Station System	Interceptor(s)	Influent Inversion Structure?	Force Main (Duct)	Discharge (Duct)	WWTP Proposed to
None	McKinney sewers	Yes	Wilson Creek Parallel FM	None	Wilson Creek

**Pump Control**


Pumps operate in a Lead/Lag sequence. For more information, see the [Operation & Control](#) section.

Number of Pumps	Pump Horsepower	AFD Drive?	Pump Capacity
2	500	Yes	12.5 mgd each, (8,660 gpm)

**Odor Control Systems**


Odor	Carbon	Bioside	Fink
Yes	No	Yes	No

**Pump AFD**




Two 500 hp adjustable frequency drives (AFDs) power the lift pumps. In addition to automatic control, the AFDs are also equipped to allow local control at the AFD cabinet.

**Pump Flow Meters**



A 20" mag meter is installed on the discharge piping of each pump to monitor each pump's flow rate. Each flow meter has individual flow meter displays in the electrical room to indicate the flow from each pump.

**Surge Relief Valve**



A surge relief valve is provided on the 42" discharge header inside the lift station. The valve automatically opens to relieve any surge pressures created by power failure, etc. Relief discharge from the valve is routed to the lift station wet well.

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## eOM – Figures

### Wilson Creek Figures

Graphics
System Relationship Figures
NTMWD System Map
UEFIS Bubble Map - Draft
Pipelines Into / Out of Pump Station
Process Flow Diagram
P&IDs - 2011 Wilson Creek Lift Station Project No 140
P&IDs - 2015 Wilson Creek Lift Station Project No 348
Site Plan Drawings
Site Plan Drawings - 2011 Wilson Creek Lift Station Project 140
Plan and Section Drawings
Plan and Section Drawings - 2011 Wilson Creek Lift Station Project 140
Wet Well Figure
Wet Well Pump Start/Stop Levels
Electrical One-Line Drawings
One Line Drawings - 2011 Wilson Creek Lift Station Project 140
Record Drawings
Record Drawings - 2011 Wilson Creek Lift Station Project 140
Conformed Drawings - 2015 Upper East Fork Interception System Supervisory Control & Data Acquisition System Improvements Project No 348

## eOM – Equipment

### Wilson Creek Equipment

Equipment	Maximo Asset ID	Data	Description
<b>Sewage Lift Pumps</b>			
Manufacturer's Website	PMP002039-Lift Pump 1	Quantity	Two
O&M Manual	PMP002040-Lift Pump 2	Location	Dry well
Pump Data		Manufacturer	Fairbanks Morse
		Model	2446
		Type	Non clog centrifugal
		Capacity	12.5 mgd, (8680 gpm @ 151 TDH)
		Horsepower	500
<b>Pump AFDs</b>			
Manufacturer's Website	VFD000184	Quantity	Two
O&M Manual	VFD000185	Location	Electrical room
		Manufacturer	Schneider Electric
		Model	Altivar 61
		Type	Adjustable frequency drive
		Horsepower	600
<b>Pump Flowmeters</b>			
Manufacturer's Website	MET000045 - Meter 101	Quantity	Two
O&M Manual	MET000060 - Meter 102	Location	Pump discharge piping
		Manufacturer	Endress + Hauser
		Model	Promag W
		Type	Electro-magnetic
		Size	20"

## eOM – Operation and Control

### Lift Station Control

The Wilson Creek Lift Station is programmed to operate in a lead-lag configuration. The set-points for the lift station are programmed into the control system and can be viewed at the display panel. The lead pump is the first pump to run when the wet well reaches the programmed set-point elevation. Adjustable speed drives (AFDs) control the speed (and therefore the pumping rate) of the pumps in order to maintain the wet well level set-point. As the wet well level increases above the set-point, the AFD will increase the speed of the pump. As the wet well level decreases below the level set-point, the AFD decreases the pump speed. During periods of lower flows, the lead pump is configured to shut off when a low level wet well elevation is reached. During high flow events, the lag pump starts on rising wet well level if the lead pump can not maintain wet well level set-point. Both the lead and lag pumps will then ramp up or down together as necessary to meet the wet well level setpoint. As the two pump operation causes the level in the wet well level to drop, both pumps stop running at the pump off set-point. The lead pump will start again when the wet well level increases to the lead pump start set-point.

If the wet well level continues to rise after both the lead and lag pump are operating a full capacity, a programmed high level alarm is activated to provide notification to operators.

To maximize the service life of the lift pumps and evenly distribute long-term wear, the lead pump is automatically rotated by the PLC.

The instrumentation is using the top of the wet well floor as the reference (or zero) point. See [wet well figure](#).

### Standard Operating Procedures

SOP Placeholder

### Control Strategies

[Sewage Pumps Control Narrative](#)

### P&IDs

[Station P&IDs](#)

### Wilson Creek Lift Station Operational Set Points

Wet Well Operational Control Settings	Programmed Level Set Points
Wet Well Operating Level	15'
Lead Pump ON	15'
Lag Pump ON	19'
Stop All Pumps	12'
High Level	19.5'
Critical High Level	20'
Low Level Lockout (Generated in PLC)	11'
Pump Speed Control Settings	

## eOM – Routine Maintenance

### Wilson Creek Routine Maintenance

#### Routine Maintenance

The Wilson Creek Lift Station equipment and related components, referred to as assets, are catalogued in MAXIMO. Routine maintenance activities required on lift station assets are presented in the table below along with MAXIMO Asset ID and the recommended frequency for each routine maintenance activity.

MAXIMO Asset/ Eqpt Description	MAXIMO Asset ID	Routine Maintenance	Recommended Frequency
Lift Pump 1	PMP000978	Grease lift pumps	Monthly
Lift Pump 2	PMP002089	Grease lift pumps	Monthly
Lift Pump 1 Motor	MTR000931	Grease lift pump motors	Every 6 Months
Lift Pump 2 Motor	MTR002224	Grease lift pump motors	Every 6 Months
Emergency Generator	GEN000070	Generator, annual inspection and load test	Annually
Emergency Generator	GEN000070	Generator, run and check generator	Monthly
Emergency Generator	GEN000070	Generator, take oil sample	Every 6 Months
Odor Control Unit	PNL000826	Check for proper operation	Monthly
Surge Relief Valve		Check for leaks and bypassing	Monthly
Exhaust Fan EF-1	FAN000136	Fan and belt checks	Every 3 Months
Supply Fan SF-1	FAN000137	Fan and belt checks	Every 3 Months
Flowmeter	MET000045	Quarterly flow meter calibration	Every 3 Months
Flowmeter	MET000060	Quarterly flow meter calibration	Every 3 Months
Radar Level Indicator		Calibrate	Annually
Gas Detector	GDS000056	Bi-annual gas detector calibration	Every 6 Months
Gas Detector	GDS000057	Bi-annual gas detector calibration	Every 6 Months



## eOM – Miscellaneous

### Wilson Creek Miscellaneous

Miscellaneous
Studies and Reports
<a href="#">Vibration Report 1</a>
<a href="#">Vibration Report 2</a>
Condition Assessment Report
Miscellaneous Mechanical O&M Manuals
<a href="#">Valve O&amp;M (Gate valves, check valves, knife valves)</a>
Miscellaneous Electrical O&M Manuals
<a href="#">Distribution Switchboards</a>
<a href="#">Dry Type Transformers</a>
<a href="#">Panelboards</a>
<a href="#">Motor Controllers</a>
<a href="#">Endosed Circuit Breakers and Disconnect Switches</a>
<a href="#">Instrumentation (Flowmeters, level sensors, SCADA, Radio)</a>
Miscellaneous HVAC O&M Manuals
Placeholder
Placeholder

