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# Lewes BPW

## Wastewater PS Condition Assessment Study – Phase 1

### Critical Pump Stations Condition Assessment Report Presentation to the Board

June 29, 2022

# Welcome

# Agenda

1. Scope of Study
2. Overview of Condition Assessment Findings
3. Recommended Upgrades:
  - a) Lift Station 3
  - b) Lift Station 4
  - c) Lift Station 5
  - d) Lift Station 8
4. Summary of Preliminary Capital Cost Estimates
5. Existing SCADA System: General Comments & Recommendations



# 1. Scope of Study

GHD's scope of work is summarized below:

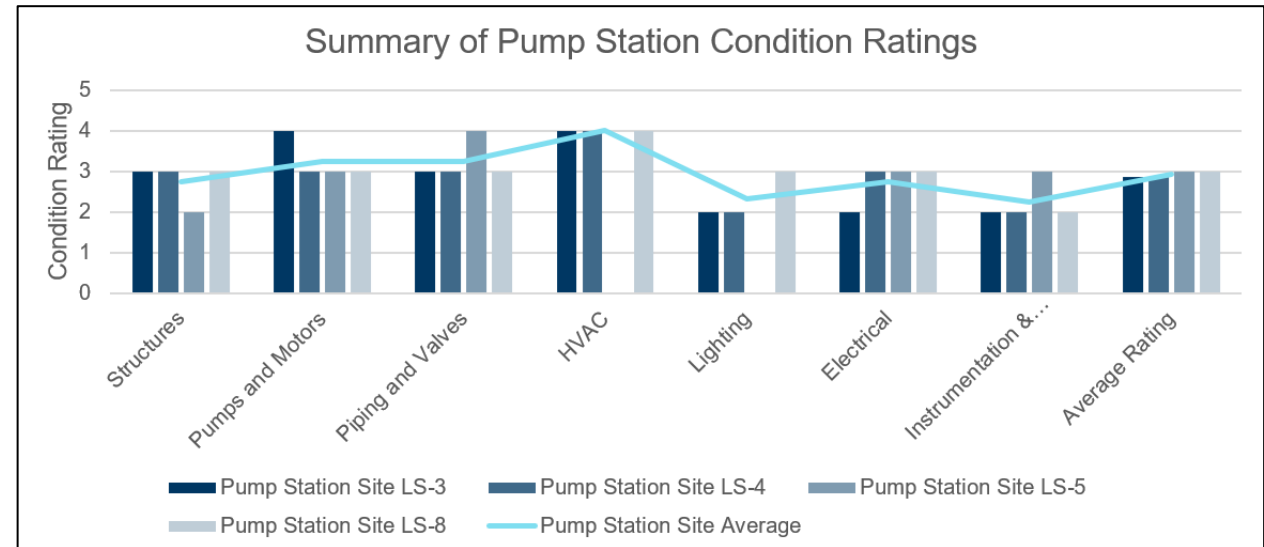
- **Review available information** provided by the BPW
- Perform **site visits to critical pump stations LS-3, LS-4, LS-5, and LS-8** to gather information and perform field condition assessments, to include the following:
  - **Visual inspections** of the general site, wet wells, dry wells, valve vaults, controls, and emergency power systems
  - Assessment of **existing bypass pumping capability** and/ or if there is space to construct in the future
  - Assessment if applicable, **whether a screening or comminutor could be constructed**
  - **Discussion of general reliability** of each station and **facility elevation with respect to flood elevations**, and other operational concerns with BPW's Operation's Team
- Preliminary Engineering Report Development, to include the following:
  - **Review reliability (including clogging issues)** of each station over the last 5 years
  - **Review and analysis of station capacity** with respect to current average and max day flows and expected growth
  - Develop an **overall condition assessment** of each station and ancillary facilities/equipment
  - Develop **recommended list of improvements** for each PS and **preliminary capital cost estimates**

# 2. Overview of Condition Assessment Findings

The following general findings were recorded:

- **Pump station structures were found to be in a good to fair condition**, with occasional damage noted to exterior finishes, windows and entrance doors.
- **Pumps and motors were generally in a fair physical condition** however operational and performance issues were noted at most sites, predominantly caused by **ragging, clogging, and other solids-related issues**.
- **Piping and valves were generally in a moderate condition**, except at LS-5 where significant corrosion was observed.
- **HVAC was consistently poor at all sites that have forced ventilation**, to the extent that it was not functional at any of the sites. This is particularly concerning at LS-4 and LS-8 as the lower levels of the pump station buildings are several stories below grade.
- Based on GHD’s visual assessment, **Lighting, Electrical, and Instrumentation & Controls components were consistently in a good to moderate condition** at all sites.

Asset Group	Pump Station Site				Average
	LS-3	LS-4	LS-5	LS-8	
Structures	3	3	2	3	2.8
Pumps and Motors	4	3	3	3	3.3
Piping and Valves	3	3	4	3	3.3
HVAC	4	4	-	4	4.0
Lighting	2	2	-	3	2.3
Electrical	2	3	3	3	2.8
Instrumentation & Controls	2	2	3	2	2.3
<b>Average</b>	<b>2.9</b>	<b>2.9</b>	<b>3.0</b>	<b>3.0</b>	<b>2.9</b>



# 3-a. Lift Station 3: Recommendations (Capital Works)

The following capital improvement works are recommended at LS-3:

- **Replacement of the existing pumps** (34 years old, replacement is already scheduled); new pumps to have Eradicator Solids Management System pre-installed
  - For cost estimating purposes like-for-like replacement of the pumps has been assumed, however the **sizing and selection of the replacement pumps should be deferred until a detailed planning study is completed for the LS-3 sub-catchment**
  - Assuming like-for-like replacement proceeds: due to the size of the existing pumps, clogging and blockages due to rags and debris are not typically an issue and **no further capital works are recommended for the wet well or influent piping to mitigate clogging**
  - **This work has already been scheduled by BPW**; the existing project budget is not known but this work has been included in the cost estimate
  - Cost estimate includes pumps, motors, check valves (which should be installed horizontally), new NEMA rated control panels and all ancillary equipment

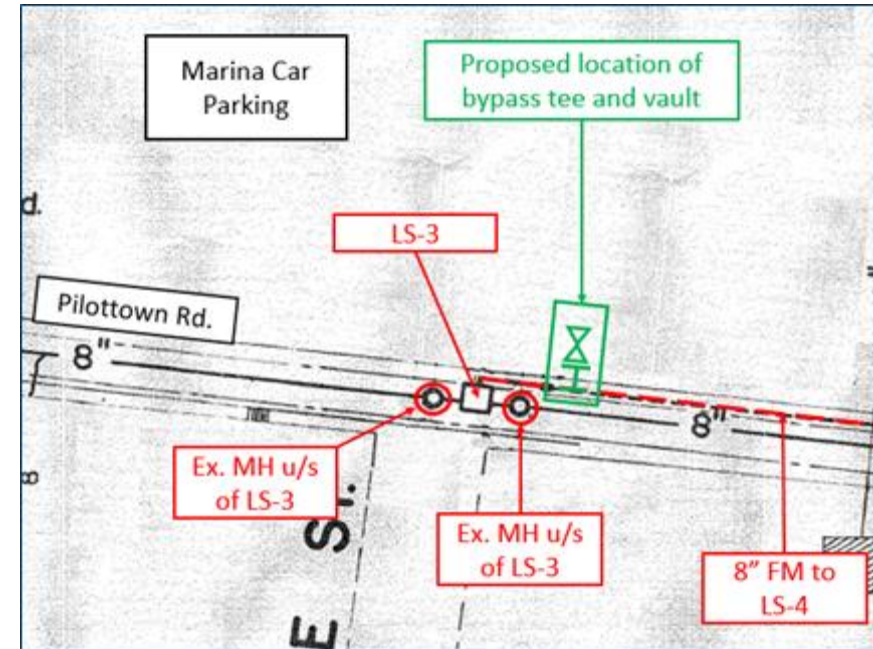


# 3-a. Lift Station 3: Recommendations (Capital Works)

The following capital improvement works are recommended at LS-3:

- **Apply an epoxy lining system to protect wet well interior concrete surface from raw sewage and H2S exposure**
- **Install an 8 in equal tee and isolation valve (in a below grade vault) on the existing force main to enable bypassing of the wet well.** Refer to Figure 36
- **Replace cover and frame at the wet well access manhole**
  - This section of Pilottown Road is scheduled to be resurfaced in May 2022, so manhole improvement works should be completed at the same time
- **Replace the wet well access ladder**
- **Replace the existing, corroded pump station building door with a new flood door to provide protection to equipment inside.**
- **Install an odor control package unit to mitigate odor issues at the wet well**
- **Repair/replace the existing forced ventilation systems in the wet well and drywell**

Component	Cost
Construction (incl. 35% contingency)	\$ 510,000
Engineering & Administration (25% of Construct.)	\$ 130,000
<b>TOTAL</b>	<b>\$ 640,000</b>



## 3-a. Lift Station 3: Recommendations (O&M)

The following operation and maintenance tasks are recommended at LS-3:

- While the existing pumps are in operation, **clearance adjustment is recommended** to optimize performance and minimize clogging
- **Check the slab drain** at the base of the access stairs and clear out as required.
- **Seal all below grade conduit penetrations**

# 3-b. Lift Station 4: Recommendations (Capital Works)

The following capital improvement works are recommended at LS-4:

- **Installation of grinders on wet well influent**
  - Clogging at this location occurs in the suction piping as well as at the pump impellers, and therefore the issue should be addressed upstream of the pump intake
- **Replacement of the existing pumps, motors, controls, isolation valves and check valves to enable duty/ standby operation**
  - New pumps should have Eradicator Solids Management Systems pre-installed
  - Consideration should be given to reconfiguring the delivery piping so that the check valves are installed horizontally
  - Consideration should be given to dividing the wet well into multiple cells to aid maintenance and cleaning (Ten States)
- **Apply an epoxy lining system** to protect wet well interior concrete surface from raw sewage and H<sub>2</sub>S exposure
- **Install an alarm system** to secure the pump station building and the wet well access covers
- **Replace broken windows and repair damaged roofing**
- **Repair the existing forced ventilation system**

Component	Cost
Construction (incl. 35% contingency)	\$ 790,000
Engineering & Administration (25% of Construct.)	\$ 200,000
<b>TOTAL</b>	<b>\$ 990,000</b>





## 3-b. Lift Station 4: Recommendations (O&M)

The following operation and maintenance tasks are recommended at LS-4:

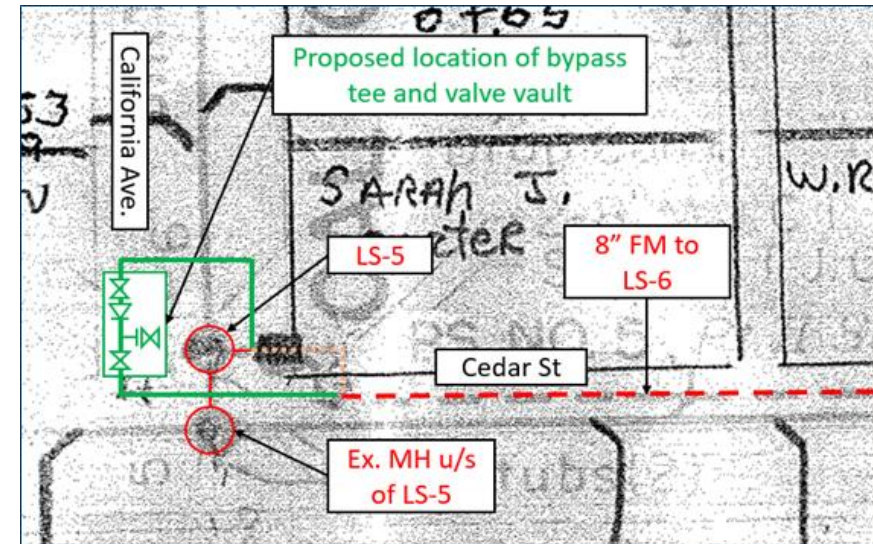
- While the existing pumps are in operation, **clearance adjustment is recommended** to optimize performance and minimize clogging
- While the temporary bypass pumps are in operation, **erect temporary barriers and/ or fencing** to keep pedestrians away from open access covers
- **Seal all below grade conduit penetrations**

# 3-c. Lift Station 5: Recommendations (Capital Works)

The following capital improvement works are recommended at LS-5:

- **Install external valve vault** with relocated check valves, a new flow meter, isolation valves, a 6in equal tee and a bypass valve on the existing force main to enable bypassing of the wet well and to provide safe maintenance access to force main valves
  - The existing isolation valves in the wet well should be removed and will be superseded by the new valve vault arrangement (above)
- **Replace the existing pump guiderails and ductile iron delivery piping** in the wet well like-for-like.
- **Apply an epoxy lining system** to protect wet well interior concrete surface from raw sewage and H2S exposure
- **Install an alarm system** to secure the wet well access covers and control panel kiosk
- **Replace the existing wet well access covers with submersible covers** to mitigate against stormwater ingress
- **Provide fall protection** beneath the wet well access covers

Component	Cost
Construction (incl. 35% contingency)	\$ 310,000
Engineering & Administration (25% of Construct.)	\$ 80,000
<b>TOTAL</b>	<b>\$ 390,000</b>



# 3-c. Lift Station 5: Recommendations (Capital Works)

The following capital improvement works are recommended at LS-5:

- **Remove the open electrical junction box that is currently located in the wet well and replace it with an external above grade vented junction box mounted below the control panel**
  - Unless the wiring at this location is intrinsically safe, the replacement arrangement should be compatible with Ten States standards for explosion proof facilities
- **Replace and raise the existing control panel kiosk by 4.5ft to provide 3 ft of freeboard above flood elevation**
- **Install a new vented junction box** beneath the replacement kiosk and control panel
- **Install a new stainless steel control panel cabinet** within the kiosk to replace the existing corroded item
- **Install forced ventilation system and package odor control unit** at the wet well

Component	Cost
Construction (incl. 35% contingency)	\$ 310,000
Engineering & Administration (25% of Construct.)	\$ 80,000
<b>TOTAL</b>	<b>\$ 390,000</b>



## 3-c. Lift Station 5: Recommendations (O&M)

The following operation and maintenance tasks are recommended at LS-5:

- **Closely monitor** the recently rebuilt Myers grinder pumps
  - If clogging continues to be an issue then replace the grinder pumps with Flygt N-Type model with Adaptive Impeller (or similar) and Mix-Wash Valve
  - Estimated budget cost for both pumps, including contingency, engineering and administration, \$50,000

# 3-d. Lift Station 8: Recommendations (Capital Works)

The following capital improvement works are recommended at LS-8:

- **Installation of grinders on wet well influent**
  - Clogging at this location occurs in the suction piping as well as at the pump impellers, and therefore the issue should be addressed upstream of the pump intake
- **Retro-fit Eradicators Solids Management Systems** on existing pumps
  - Both Models are Super T Series and can accommodate Eradicators
- **Replace the seal** on Pump No. 2
- **Replace the existing check valves** like-for-like
- **Apply an epoxy lining system** to protect wet well interior concrete surface from raw sewage and H<sub>2</sub>S exposure
- **Install an alarm system** to secure the pump station building and the wet well access covers

Component	Cost
Construction (incl. 35% contingency)	\$ 450,000
Engineering & Administration (25% of Construct.)	\$ 110,000
<b>TOTAL</b>	<b>\$ 560,000</b>

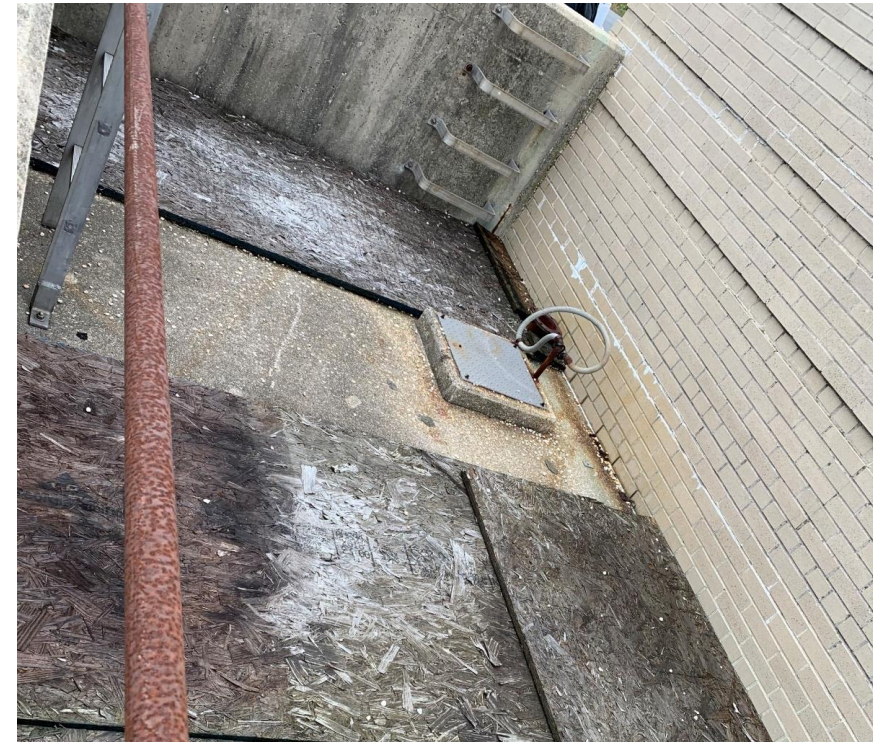


# 3-d. Lift Station 8: Recommendations (Capital Works)

The following capital improvement works are recommended at LS-8:

- **Replace the existing pump station door and frame** with a new flood door and frame
- **Repair the damaged brickwork** around the existing door frame
- **Install removable access covers** on the wet well and provide an odor control system
- **Repair areas of damaged concrete** in lower level ceiling
- **Replace the corroded electrical panel** on the upper level
- **Repair the existing forced ventilation system**
- **Install air release valves on the discharge force main**

Component	Cost
Construction (incl. 35% contingency)	\$ 450,000
Engineering & Administration (25% of Construct.)	\$ 110,000
<b>TOTAL</b>	<b>\$ 560,000</b>



## 3-d. Lift Station 8: Recommendations (O&M)

The following operation and maintenance tasks are recommended at LS-8:

- **Evaluate flows in the sewershed** and, if possible, amend the pump duty point to manage velocities in the force main, or alternatively utilize VFDs to minimize the duration of high velocity flow
- **Commission a structural survey** to review the damaged brickwork to assess if any significant settlement has occurred at the structure
- **Closely monitor** the pumps (10 years old) as they approach the end of their useful life, particularly the Classic T-Series model which cannot be retrofitted with an Eradicator Solids Management System.
  - If seals continue to fail or pumps break down, replace wear components like-for-like as applicable
  - Estimated budget cost for both pumps, including contingency, engineering, and administration, \$75,000
  - When the pumps are replaced, consideration should be given to reconfiguring the delivery piping so that the check valves are installed horizontally
- **Clearance adjustment** is recommended to optimize performance of the existing pumps
- **Seal all below grade conduit penetrations**

# 4. Summary of Preliminary Capital Cost Estimates

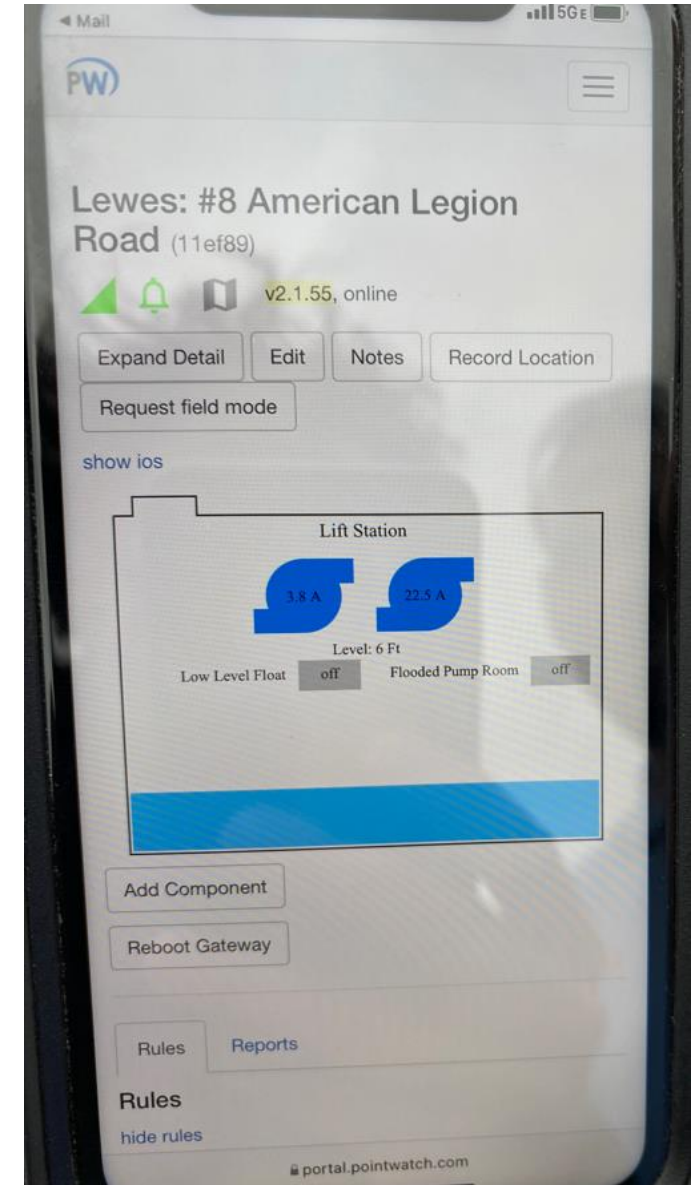
Preliminary Capital Cost Estimates:

<b>Component</b>	<b>LS-3</b>	<b>LS-4</b>	<b>LS-5</b>	<b>LS-8</b>	<b>TOTAL</b>
Construction (incl. 35% contingency)	\$ 510,000	\$ 790,000	\$ 310,000	\$ 450,000	<b>\$ 2,020,000</b>
Engineering & Administration (25% of Construct.)	\$ 130,000	\$ 200,000	\$ 80,000	\$ 110,000	<b>\$ 500,000</b>
<b>TOTAL</b>	<b>\$ 640,000</b>	<b>\$ 990,000</b>	<b>\$ 390,000</b>	<b>\$ 560,000</b>	<b>\$ 2,520,000</b>



# 5. Existing SCADA System: General Comments

- The PointWatch cellular RTU system is employed at each of the remote pumping stations, which gives mock SCADA capabilities.
- Operators can monitor and receive alarms on cell phones but cannot control remotely.
- PointWatch is also used for pump cycling and is used as a mapping tool to locate pump stations across the network.
- Inframark have noted the following key issues with the PointWatch system:
  - No flow meter data for stations with meters installed
  - There are regular issues with signal coverage at remote sites
  - Several instances have been noted where the alarms were not configured correctly for high level conditions and instead call out for low level conditions
- BPW does not currently have a secondary method of communication for the remote pump stations if there is an issue with PointWatch.



# 5. Existing SCADA System: General Comments

- Recommendations
  - The reliability of the existing cellular-based SCADA system is **not in line with current best practice** for remote monitoring applications in local municipalities.
  - If BPW would like to improve the reliability and capability of the existing system then **GHD recommends completing a Communications Study.**
  - Since the issues reported at the four critical pumps stations appear to be network-wide, it is recommended that the study is undertaken to develop a **Recommended Design Standard for the wider BPW SCADA system.**
  - The study would outline the requirements for all current and future remote pump stations and would form the basis of design for site-specific upgrades to existing sites, as well as future new or expanded facilities.



**\* Thank You**