

Longman WwPS

the restoration of operational assets at to improve system reliability and ensure regulatory compliance

by Eryn Skinner & Struan Ross

Longman Wastewater Pumping Station (WwPS) serves a critical role in managing wastewater flows for up to 90,000 customers within Inverness, Highlands. The facility is under the operation of and an asset of Scottish Water. The facility plays a key role in ensuring wastewater is transferred to Allandale WwTW, the main area wastewater and sludge treatment facility. In 2024, Scottish Water engaged RSE (Ross-Shire Engineering) to undertake necessary repairs and upgrades to the pumping station to resolve operational damage and enhance the site's operational resilience. This case study outlines the construction technologies employed, the challenges faced, and the successful restoration of the FtFT pump riser and refurbishment of the storm fine screen.



FtFT riser replaced - Courtesy of RSE



West well reinstatement - Courtesy of RSE

Background

Following a corrosion-related defect of a standby flow to full treatment (FtFT) pump riser, the west wet well chamber at Longman WwPS was left vulnerable to failure. This posed a critical risk to the station's operation for pumping wastewater to Allandale and required action to restore the well's full functionality and ensure system reliability.

One of the storm fine screens at the site had not undergone significant refurbishment since its initial installation over 20 years ago. Over time, wear and tear of the mechanical components had resulted in frequent operational failures, including overheating motors and tripping of the control system. The screen's failure posed a significant risk to Scottish Water's environmental compliance, as untreated wastewater bypassing the screen would breach SEPA's regulatory limits.

RSE was engaged to provide a solution that would not only restore the screen's operational capacity but also enhance its reliability and lifespan. The project required a detailed condition assessment, repair strategy, and careful scheduling to minimise operational disruption during the work.

Given the station's continuous operation, the work was planned during a period of low flow to allow for safe isolation of the screen without compromising the site's ability to handle peak inflows.

Project need

The immediate driver for the project was the discovery of significant corrosion within the FtFT pump riser, which was compounded by excessive seawater flow through the system. The corrosion weakened the riser structure, creating a potential failure point that could have left the standby chamber non-operational. Since the

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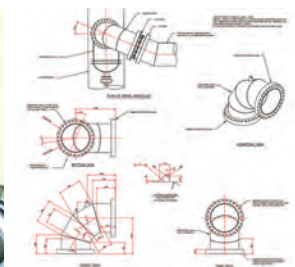
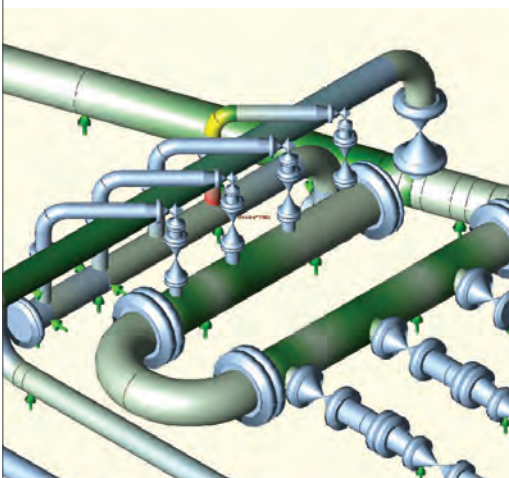
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standby chamber is a critical part of the system, this risk needed to be mitigated swiftly to ensure continuous and reliable wastewater transfer.

The project also involved the refurbishment of an aging storm fine screen that was critical to the station's operational performance in storming conditions.

Project scope

RSE's scope of work involved several key activities essential to ensure that the Longman Wastewater Pumping Station could continue operating at full capacity while mitigating risks posed by the damaged infrastructure.

The key elements within the scope of works for the refurbishment of the riser and storm fine screen were:

- Deep clean of the west wet well to create a safe, gas-free working environment.
- Installation of scaffolding to provide secure access for personnel and equipment.
- Removal of the corroded FtFT pump riser and replacement with a new riser using a contracted crane lift.
- Detailed condition assessment of the inlet screen.
- Removal of the screen for off-site refurbishment.
- Replacement of corroded and damaged components.
- Reinstallation and commissioning of the refurbished screen.
- Testing and validation to ensure compliance with performance specifications.

Construction overview: FtFT riser refurbishment

Construction was scheduled for drier months to minimise the impact on the performance of the site and risk of delays due to high flows.

Wet well clean: The first task in the project was to deep clean the west wet well. RSE subcontracted Lanes Group for this task, ensuring that the space was gas-free and safe environment for the site team.

Scaffolding installation: To facilitate the removal and replacement of the pump riser, Global Energy Services were subcontracted to install scaffolding. The scaffolding ensured that workers and equipment could access the site securely, particularly for the crane lift operation. Stair access scaffolding was installed as well as scaffolding access around the riser flanges.

FtFT pump riser removal & replacement: The corroded FtFT pump riser was dismantled by the RSE mechanical team. Stoddart Crane Hire provided the necessary crane services under a contract lift to remove the pipework out of the wet well.

The new FtFT pump riser and associated pipework were installed by a joint effort from the RSE mechanical team and Stoddart Crane Hire. The new riser was designed to withstand the harsh environmental conditions and excessive seawater flow that had previously led to corrosion in the old riser. By selecting corrosion-resistant materials and ensuring precision in installation, the project team successfully restored the system's operational integrity. New pump guide rails and brackets were installed before FtFT Pump 902 was reinstalled into the west wet well.

Before flows to the west wet well could be enabled, the new system pipework was checked and scaffolding access equipment was removed.

Once the pipework, pump guide rail and all relevant fittings were installed, the flows to the west wet well were reinstated and the pipework was checked to ensure no leakages were occurring.



The existing FtFT pump riser to be replaced - Courtesy of RSE



The west wet well scaffolding set-up - Courtesy of RSE

Construction overview: Storm screen replacement

The storm fine screen was heavily corroded and required extensive refurbishment. RSE's mechanical and electrical teams disconnected the screen and transported it to the Muir of Ord workshop for overhaul. The refurbishment involved:

- Inspection of reusable components not included in OEM refurbishments kit.
- Fabrication of replacement parts for any reusable components unfit for service.
- Reassembly of storm screen.
- Function testing to verify operational performance.

Once the refurbishment was complete, the screen was transported back to the site and reinstalled. RSE's commissioning team conducted a thorough testing and validation process to confirm that the screen was operating within the specified performance parameters. The work was completed without any significant disruption to the station's overall operation.

Longman WwPS: Supply chain - key participants

- **Principal contractor:** RSE (Ross-shire Engineering)
- **Structural calculations:** Wallace Stone & Partners
- **Crane contractor:** Stoddart Crane Hire
- **Scaffolding contractor:** Global Energy Services
- **Pipes & fittings:** FT Ductile Ltd
- **Cleaning contractor:** Lanes Group
- **Guide rail & fittings:** Xylem Water Solutions
- **Storm screen equipment components:** Jacopa Ltd

Challenges & requirements

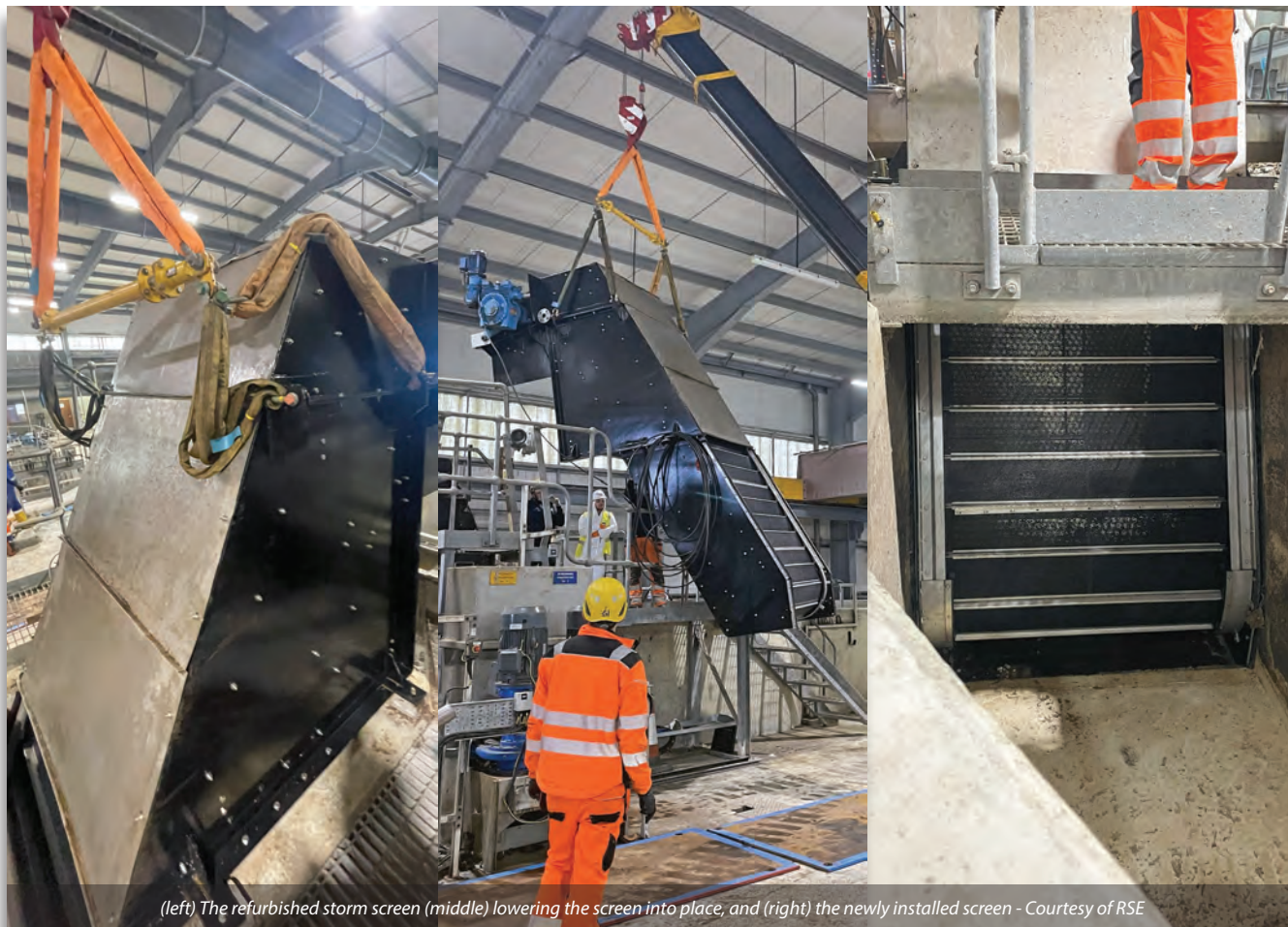
The refurbishment of the flow to full treatment pump riser and the storm fine screen presented several technical and logistical challenges:

1. **Flow management:** The work required isolation of the west wet well and isolation of the inlet screen, which could only be safely achieved during low flow conditions. Careful scheduling was required to minimise the risk of high flow events that could have resulted in operational disruption.
2. **Corrosion & structural integrity:** The existing screen frame and mechanical components were severely corroded, which increased the complexity of the removal and reinstallation process.
3. **Material compatibility:** Replacement parts had to be fabricated to match the existing pipework dimensions/sizes and the existing screen design and specifications while improving durability and corrosion resistance.
4. **Health & safety:** The proximity of the crane to the west wet well required detailed load calculations and health and safety assessments to avoid risks associated with lifting operations.
5. **Environmental compliance:** The work had to be completed within a strict regulatory framework to ensure that the station remained compliant with SEPA's discharge quality requirements.

Innovations, cost savings, and carbon reduction

The project involved several key innovations and efficiency measures:

- **Corrosion-resistant materials:** The selection of advanced materials for the new riser and refurbished screen helped ensure that the infrastructure would be more resistant to the corrosive effects of seawater, reducing the likelihood of future failures and maintenance costs.
- **Crane lift efficiency:** By utilising a contracted crane lift, the project team minimised the need for manual labour in dangerous or confined areas, enhancing worker safety and reducing the overall time required for installation. This



(left) The refurbished storm screen (middle) lowering the screen into place, and (right) the newly installed screen - Courtesy of RSE

method also allowed for a more precise and controlled removal and replacement process, ensuring minimal disruption to the station's operations.

- **Off-site refurbishment:** Transporting the screen to the RSE yard at Muir of Ord allowed for controlled working conditions and higher refurbishment quality.
- **Careful scheduling:** Reduced operational disruption and avoided the need for temporary screening measures and additional storm capacity.
- **Sustainability:** Achieved by reusing the majority of the existing screen frame and replacing the essential components.

Results

The refurbishment works at the Longman Wastewater Pumping Station started in August 2024 and were successfully completed in October. The project resulted in several key benefits for Scottish Water:

- **Restored operational performance:** The refurbished storm fine screen was restored to full functionality, improving the station's ability to handle peak flows without tripping or mechanical failure.
- **Extended asset lifespan:** The refurbishment extended the lifespan of the inlet screen, reducing the need for further major repairs or replacement in the near future.
- **Cost savings:** By refurbishing rather than replacing the screen, Scottish Water achieved significant cost savings while maintaining asset reliability.
- **Improved compliance:** The successful operation of the inlet screen ensured that the station remained compliant with SEPA's environmental discharge requirements.
- **Operational efficiency:** The refurbished screen improved flow handling capacity, reducing the risk of bypass events and regulatory breaches.
- **Enhanced durability:** The use of galvanised and painted components improved corrosion resistance, reducing the likelihood of future failures.

The restoration of the FtFT pump riser at Longman WwPS has significantly improved the operational reliability of the Longman WwPS' west wet well. By using high spec materials and adopting efficient construction techniques, RSE ensured that the facility can continue to function smoothly, with reduced risk of system failure.

The newly installed pump riser will provide long-term resilience against corrosion, allowing the station operate at full capacity even under extreme conditions.

The Longman WwPS fine screen No. 1 repair is an example of RSE's capability to deliver complex infrastructure refurbishment projects in a live operational environment. The project restored the operational capacity of the inlet screen, enhanced compliance with environmental regulations, and delivered long-term cost savings.

The careful planning, effective coordination with subcontractors, and technical expertise applied throughout the project ensured that the work was completed on time, within budget, and to the satisfaction of Scottish Water.

The success of the works at Longman WwPS underscores the importance of proactive infrastructure maintenance and the investment in robust, modern technologies to safeguard critical infrastructure. The lessons learned here will inform future upgrades at Longman WwPS and similar facilities, ensuring that they remain operational and effective for years to come.

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FtFT riser replaced - Courtesy of RSE