

FRASER COAST'S SLUDGE DEWATERING UPGRADE: SMARTER SOLUTIONS FOR DEWATERING CHALLENGES

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ABSTRACT

This presentation discusses a recent Fraser Coast Regional council project that upgraded the sludge dewatering systems with screw presses at the Pulgul and Eli Creek Sewerage Treatment Plants for asset renewals and to improve capacity. This was an innovative and efficient alternative approach to replacing the traditional belt press. Additionally, due to site constraints another innovative approach was adopted, replacing the traditional conveyors with a cake pump for sludge cake transport—a technology currently only utilized in select locations in Europe. This is the first implementation of such technology in Southeast Queensland.

We will discuss the technical challenges, stakeholder collaboration, adoption of innovative solutions and the learning process leading to a successful upgrade in sludge dewatering infrastructure.

INTRODUCTION

Fraser Coast Regional Council commissioned the replacement of the aging belt filter press, which was installed in 2002 at the Eli Creek STP. The belt filter press was in poor condition and required urgent replacement to ensure a reliable means of dewatering sludge as part of the treatment process.

During the preparation of the tender for the new sludge dewatering equipment, the need to upgrade the existing dewatering screw press at the Pulgul STP was also identified, as part of the overall treatment plant capacity upgrade. Although the existing screw press at Pulgul STP was only installed in 2018 and remains in good condition, it was decided to remove, refurbish, relocate, and install this screw press at the Eli Creek STP, and to procure a new larger screw press for the Pulgul STP.

As part of the procurement for the supply and installation of the new screw press at Pulgul STP, modifications and design of supporting structures—such as plinths, access platforms, stairs, and railings—were required to ensure the equipment could be safely accessed and maintained.

The scope of work also includes the development of decommissioning and recommissioning plans for the relocation of units between the Pulgul and Eli Creek STPs. These plans are to be workshopped with Fraser Coast Regional Council (FCRC) Engineering and Treatment staff to ensure minimal disruption to the day-to-day operations of both treatment plants.

Since the existing screw press from Pulgul STP will be transferred to Eli Creek STP, the scope of work at Eli Creek is limited to replacing the existing polymer dosing system—due to its poor condition—along with the sludge conveyor. Additionally, modifications and design

of supporting structures such as plinths and platforms are required to accommodate the screw press, as the existing structures were originally designed for a belt press.



Figure 1 – Pulgul STP Existing Screw Press and sludge Conveyor



Figure 2 – Eli Creek STP Existing Belt Filter Press and sludge Conveyor

CHALLENGES AND OUTCOME

In this section we will discuss the challenges we encountered during the scoping, design, installation, commissioning and operation stages of the project.

Scoping of Works and Design

The contract was awarded to Innovative Filtration Solutions (IFS) for the design, supply, and installation of sludge dewatering systems at both the Eli STP and Pulgul STP sites. Following the contract award, IFS, in coordination with FCRC, conducted a joint inspection to clarify the scope of works and ensure that all necessary items required to deliver a complete and operable dewatering solution were identified and included.

Screw Press Upgrade and Sludge Handling Modifications at Pulgul

One of the challenges we encountered during the scoping phase was that the screw press model initially selected during the contract award was not suitable for the required upgrade and increased sludge capacity. Consequently, we upgraded the originally awarded screw press model from the SP HF 075XG to a larger model, the SP HF09.

Due to the upgrade of the screw press, the unit was larger than initially anticipated. One of the key issues raised by the contractor was the positioning of the upgraded screw press. The contractor proposed three options, and during the stakeholder engagement, a variation of Option 2 was suggested: installing the new machine in the same location and orientation as the existing one, with a slight shift such that approximately one metre of the equipment would extend over the open digester tank.

This suggestion aimed to address space constraints in the sludge dewatering area, particularly to allow for maintenance access and movement of equipment such as forklifts.

However, upon further review with the contractor, several risks were identified – including safety concerns and maintenance challenges, such as the need to install a walkway over the digester. As a result, it was decided to proceed with the original Option 2 location.

Another issue encountered was related to the sludge conveyor. The original plan was to reuse the existing conveyor, but due to the height of the sludge hopper, the truck body, and the position of the structural columns of the sludge dewatering shed, it was determined that the existing conveyor would no longer be functional or fit for purpose.

As a result, a cake pump was introduced to overcome this constraint and ensure efficient sludge handling.

Outcome

Although there were challenges associated with the location of the upgraded, larger-size screw press, its implementation has delivered significantly improved outcomes. The increased capacity of this unit has enabled the integration of a cake pump (see figure 3) and the potential to utilize two sludge storage bins (see figure 4). The inclusion of the cake pump has enhanced safety standards by allowing flexible sludge storage configurations, including the possibility of a third bin, which aligns with the upcoming Pulgul STP Upgrade and future capacity planning.

Additionally, this upgrade offers the potential to reduce reliance on sludge storage in the back lagoon and provides more efficient, higher-capacity dewatering solutions.



Figure 3



Figure 4

An additional feature installed by the contractor is the sight glass, which allows visual monitoring of sludge flocculation from the conditioning tank (Figure 5) and the filtrate from the screw press (Figure 6)



Figure 5



Figure 6

Eli STP Screw Press Installation and Associated Works

The sludge dewatering equipment replacement at Eli Creek STP commenced after the Pulgul upgrade, as the screw press previously used at Pulgul was refurbished and repurposed to replace the belt press at Eli Creek STP. While there were no major design issues identified at Eli Creek STP, we encountered several challenges related to the existing sludge dewatering infrastructure. Notably, the sludge and wash water pipework were severely corroded (see figure 7). In collaboration with the contractor, it was decided to be necessary to replace this pipework and reroute it to accommodate the installation requirements of the new screw press.

Additionally, there were concerns regarding the safety of the existing corroded platform and whether the catwalk leading to the screw press was still required. After consultation with the contractor, their design consultant, and relevant stakeholders, it was agreed to modify the platform to suit the new screw press operations. The catwalk was removed, as it is no longer necessary due to changes in access requirements introduced by the new polymer system. The redesigned location of the screw press and platform now meets operational requirements, providing clear, safe access to both sides of the screw press screen.

Outcome

Following the successful implementation of the cake pump at Pulgul STP, it was decided to install a similar cake pump at Eli Creek STP (figure 8), as the existing sludge conveyor was also due for replacement. This approach supports the standardisation of equipment across the region.



Figure 7



Figure 8

Commissioning and Operational

Following the successful installation of the screw presses at both Pulgul and Eli Creek Sewage Treatment Plants (STPs), several issues were encountered during the commissioning phase of the sludge dewatering systems.

At Pulgul STP, one of the initial issues involved insufficient water pressure, which resulted in the screens not being adequately washed. This issue was resolved by upgrading a service water pump and adjusting the control parameters related to wash water pressure.

Additionally, there were problems with the level transducers installed inside the sludge hopper before the cake pump. These triggered faults in the system, which were later identified as being caused by sludge bridging and the incorrect positioning of the level sensor. The contractor made the necessary adjustments to the level sensor and added PID VSD control of the cake pump, after which the system operated correctly.

There were also issues related to the programming and control integration with SCADA. These were addressed in collaboration with the contractor, who implemented the required changes to meet the operational needs of both plants. Furthermore, operators were granted access to adjust process parameters within the SCADA system, providing them with greater control and flexibility during operation.

At Eli Creek STP, operators faced challenges adapting to the new screw press system, which differed significantly from the belt press previously used. Their main difficulties included understanding the machine's operation, familiarizing themselves with key parameters, and knowing what adjustments could be made during the dewatering process.

Another operational issue at Eli Creek STP was that the sludge produced was too wet, failing to meet the required dry solids content and filtrate quality. With support from the contractor,

this problem was resolved through adjustments in polymer concentration and other process parameters in SCADA.

CONCLUSION AND FUTURE WORKS

While both sludge dewatering systems are now operating effectively, further works are required to enhance system performance and operational flexibility. These include modifications to the valving configuration to allow sludge to be pumped directly from the lagoon to the screw press, which will also necessitate changes to the overall control methodology.

Additionally, ongoing efforts are needed to resolve the issue of screen staining in the screw presses. This involves further investigation into the sludge characteristics to better understand the root causes.

Finally, the replacement of the aging polymer dosing system at Pulgul STP has been identified as a priority and will be addressed as part of the planned STP upgrade works.

ACKNOWLEDGEMENTS

The authors would like to acknowledge all individuals and organisations involved in the project, including the contractor, suppliers, and stakeholders, for their valuable contributions and support.

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