

FST Rotating Bridge

Brand imagery can be downloaded
from our image library [here](#)



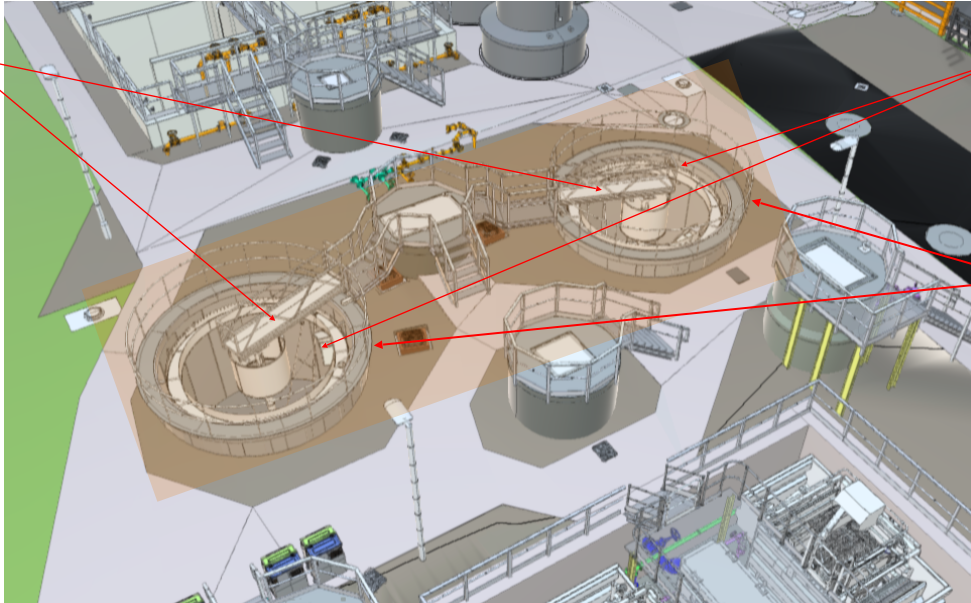
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1. Background

- As part of a WwTP upgrade, part of the process treatment scope included the provision of 2 No. Final Settlement tanks (FST) with motorised rotating half bridges per image below.

Rotating half bridge



Final Settlement Tanks

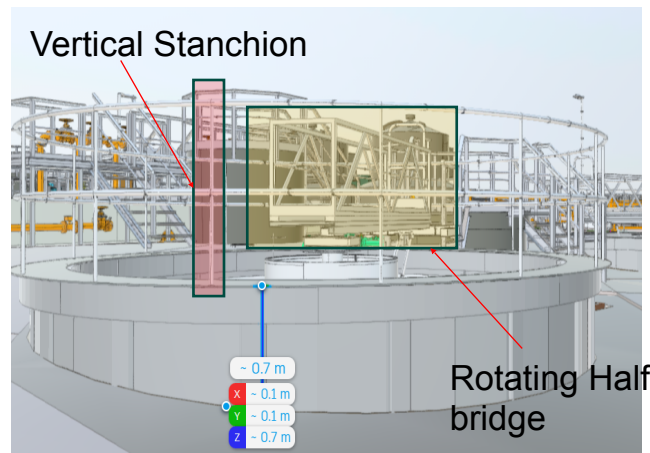
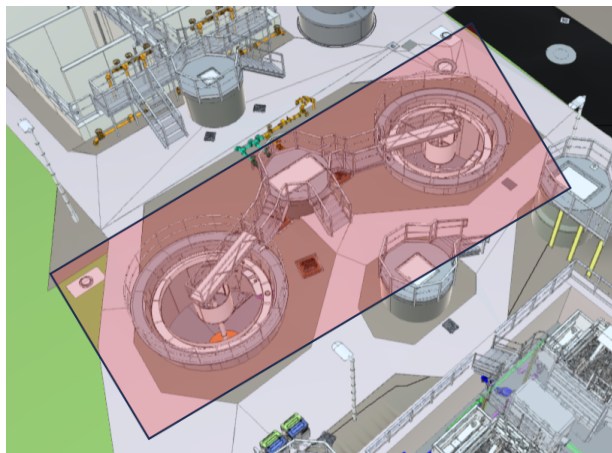
Full perimeter handrail for fall protection

2. Causes

While the main risk of exposure to water was identified and full perimeter hand railing was provided, one element was not considered:

1. Exposure of persons to rotating parts – Pinch Points

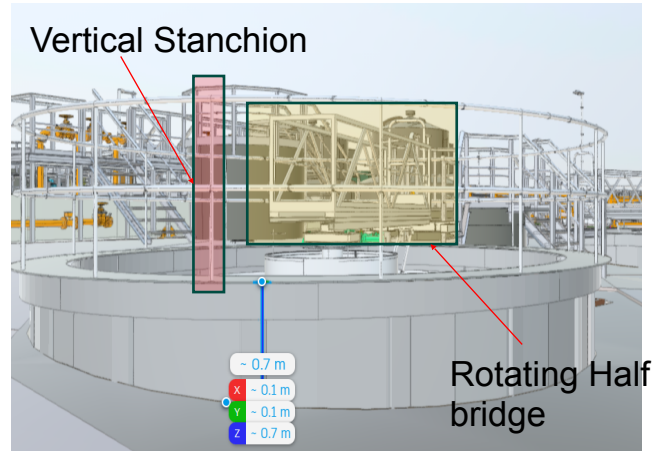
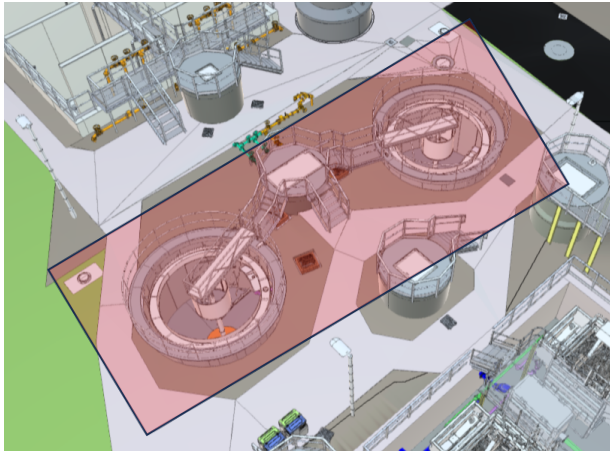
- As illustrated below (Pic bottom R), the ground levels left any person who stood adjacent to the tank and potentially placed a body part between the handrail were exposed to a pinch point between the vertical stanchion of the handrail of the rotating bridge.



3. Near Miss Incident

As outlined in the preceding slide, the risk of exposure to moving parts resulted in a Near Miss incident:

1. On an occasion a person was adjacent to the FST and while on the phone put their head through the handrail to observe an element within the FST tank, it was suddenly realised that the rotating bridge was approaching and but for the action to remove their head from the hazard area they would have been potentially caught between the rotating bridge and handrail resulting in potential serious injury.



4. Mitigations

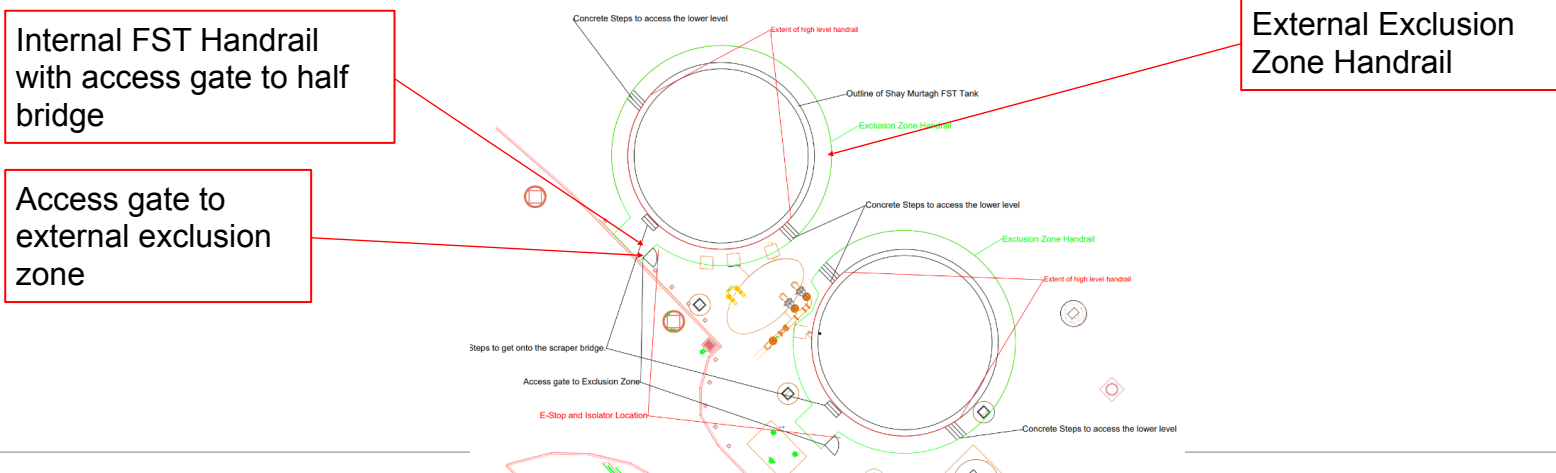
Upon review of this incident and the highlighting of the risk of exposure to moving final settlement tank bridges the contractor identified the following measures to eliminate reoccurrence. This involved consideration of two scenarios that may occur with FSTs.

1. Exposure to rotating bridges where Top of wall (TOW) is greater than 2.5m – Height where exposure to the rotating half bridge if not possible from the ground level, main concern would be when accessing from the walkway.
2. Exposure to rotating bridges where Top of wall (TOW) is less than 2.5m – Height where exposure from ground level is possible to the rotating bridge as it moves along.

4. Mitigations

— Scenario 1 – Exposure to FSTs from ground level – TOW <2.5m

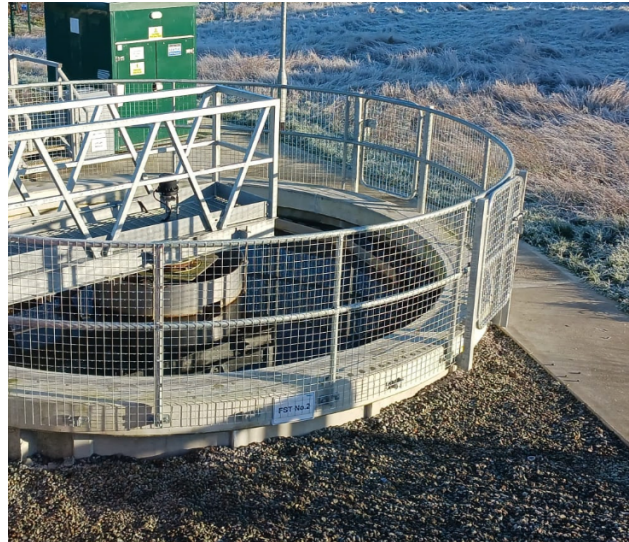
Option 1 – An outer exclusion zone has been included into the design. Access to the external zone is via a gate with a magnetic contactor which only releases one the isolator for the relevant bridge is switched off. The bridge shall only recommence rotation once the gate is closed, isolator back in the on position and a reset back at the HMI. Where maintenance is needed on the bridge, there is a “stop at Home” button on the HMI, when activated the bridge will stop at the internal gate and only at that point will the magnetic contactor allow the gate to open. An E-Stop and Isolator will be installed at each gate also.



4. Mitigations

— **Scenario 1** – Exposure to FSTs from ground level – TOW <2.5m

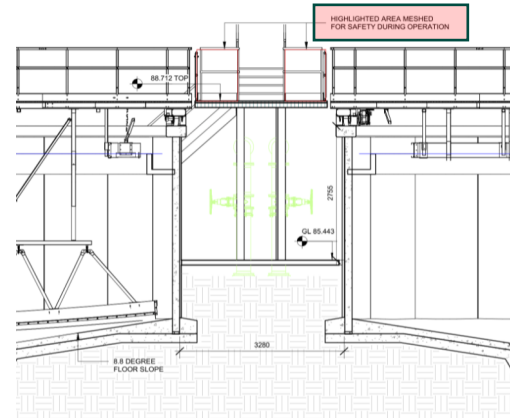
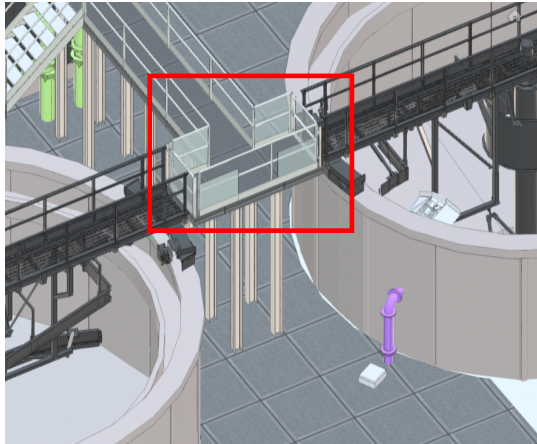
Option 2 – Full mesh protection on handrail around the top of the tank per image below. Return to home function to be provided at HMI i.e. bridge to return to access gate in handrailing. Digital switch on gate to pause bridge when activated and FST cannot recommence until gate closed and reset at the HMI.



4. Mitigations

— **Scenario 2** – Exposure to FSTs from access bridge. – TOW >2.5m

Option 1 – Full mesh protection at access gate and 1m along bridge nearest to FST structure. Return to home function to be provided at HMI i.e. bridge to return to access gate in handrailing. Digital switch on gate to pause bridge when activated and FST cannot recommence until gate closed and reset at the HMI.



4. Mitigations

General Design Approach

This item has been included as a permanent risk on Wastewater Design Risk Assessments ensuring it is always considered in design development going forward. Hence ensuring a minimum of at least 1 of the preceding solutions are implemented where best suited.

Risk Type (Scheduled or non-scheduled)	Risk Description	Ref.	Raised by (Company)	Key hazards identified	Parties affected	Location	Impact (Refer to Settings Tab)	Likelihood (Refer to Settings Tab)	Risk	Initial Risk	Risk mitigation measures (design decisions made, or alternative actions)	Impact (Refer to Settings Tab)	Likelihood (Refer to Settings Tab)	Risk	Remaining Level of Risk	Tag List	Residual Risks that Cannot be Designed Out
2.5 Other Particular Risks (Operations/Maintenance)	Design	2.1.5	Glanua	Pinch Points resulting from rotating bridge and surrounding handrailing	Design	FST Tanks	4- High (75-90%)	3- Medium High (50-75%)	12	Medium	Ability to access opens in handrailing around FST is not possible due to height of the proposed tanks ie access to top of wall not possible from ground level. Additionally mesh has been included at the bridge gate to prevent access at that limited location.	4- High (75-90%)	1- Low (0-30%)	4	Low	Assumed Construction Methods	Residual risk would be where the mesh at bridge gate would be removed or damaged. No risk should remain.

Thank you.

