

## HyNet Hydrogen Production Plant 1 – Technical Note

### EPR Response 14c - Specification of WWTP-MBR Reliability

#### Summary

Describe whether / how you have taken into account high reliability requirements in the design specification of the wastewater treatment plant (MBR).

#### Response

##### 1. Reliability and Availability

A high level availability review was carried out, detailed in document no. 805459-0001-I-40-TNT-0050. This was intended as a high level availability calculation which assessed the system availability performance based on the design at block flow diagram (5194812-000-49DG03-4-0001-01) level. This review acts as a precursor to a detailed P&ID level RAM (Reliability, Availability & Maintenance) study to be carried out during the execution phase of the project.

Equipment sparing, for wastewater treatment plant shall be confirmed after the completion of RAM study. Meanwhile, in the existing high level review, the wastewater treatment availability is 99.9% from SNC historical project data. This implies high reliability for the Membrane Bioreactor-MBR (10-BAG-U-001) since it is a sub-system of this unit. Per the Equipment Datasheet – Water Treatment Packages (5194812-000-45ED-4-0001, Rev. 03), equipment in this plant, including MBR, shall be designed to give highest availability, target of 2 weeks shutdown every 4 years.

All pumps in wastewater treatment systems are spared. They will be 1 working + 1 standby in Phase-1. They would operate as 3 working + 1 standby after installation of additional pumps in Phase-2. Small pumps are spared as 1 working + 1 standby for both Phase 1 and 2.

The tanks are not spared. Large tanks maintenance which cannot be completed in standard 30-day period will have space earmarked for additional tank to be constructed in future.

##### 2. Sparing and Flexibility (Operation and Maintenance)

The MBR is a packaged equipment. Per Basis of Design Pre-FID Phase (5194812-000-30EA-2-0001, Rev. 08), it shall have its own in-built redundancy philosophy to meet the specified availability criteria.

The MBR feeds the Clarified Water Tank (10-BAF-T-004). Water from this tank, after passing through Dual Media Filtration Plant (10-BAF-U-003), is stored in Filtered Water Tank (10-BAK-T-001). Water from here is then pumped to Water Demineralisation Plant (10-BAB-U-001). If MBR is down, feed to Water Demineralisation Plant will not stop. River Dee water is also pumped to Clarified Water Tank. Additionally, the buffer storage volumes in Clarified Water Tank and in Filtered Water Tank will ensure constant feed to the Water Demineralisation Plant.

The two main sources of wastewater to the MBR are De-Oiled Water Sump (10-BAG-Z-001) and Wastewater Blending Tank (10-BAG-T-001). At low liquid levels, these can serve as buffer storages for wastewater being generated in the plant (approximate buffers of 4.5 hr for De-Oiled Water Sump and 9.6 hr for Wastewater Blending Tank). Additionally, Sludge Blending Tank (10-BAG-T-002) feeding Wastewater Blending Tank also has potential buffer of approximately 3 hr. Hence, in case of a temporary outage of MBR, the wastewater treatment plant system tanks and sumps have buffer storage to keep the process plant running. Refer EPR Response 14d (5194812-000-4EER-4-0051), for detailed calculations of the buffer capacities.

## References:

1. UFD - Closed Drains Drum and Wastewater Blending Tank (5194812-000-49DG02-4-0006-01, Rev. 06)
2. UFD - Membrane Bioreactor (5194812-000-49DG02-4-0006-02, Rev. 01)
3. Water Balance (5194812-300-49EL-4-0002, Rev. 03)
4. Equipment Datasheet – Water Treatment Packages (5194812-000-45ED-4-0001, Rev. 03)
5. High Level Availability Review (805459-0001-I-40-TNT-0050)
6. BFD (5194812-000-49DG03-4-0001-01, Rev. 04)
7. Basis of Design Pre-FID Phase (5194812-000-30EA-2-0001, Rev. 08)
8. Process Description - U300 Water System (5194812-300-49EL-4-0003, Rev. 03)