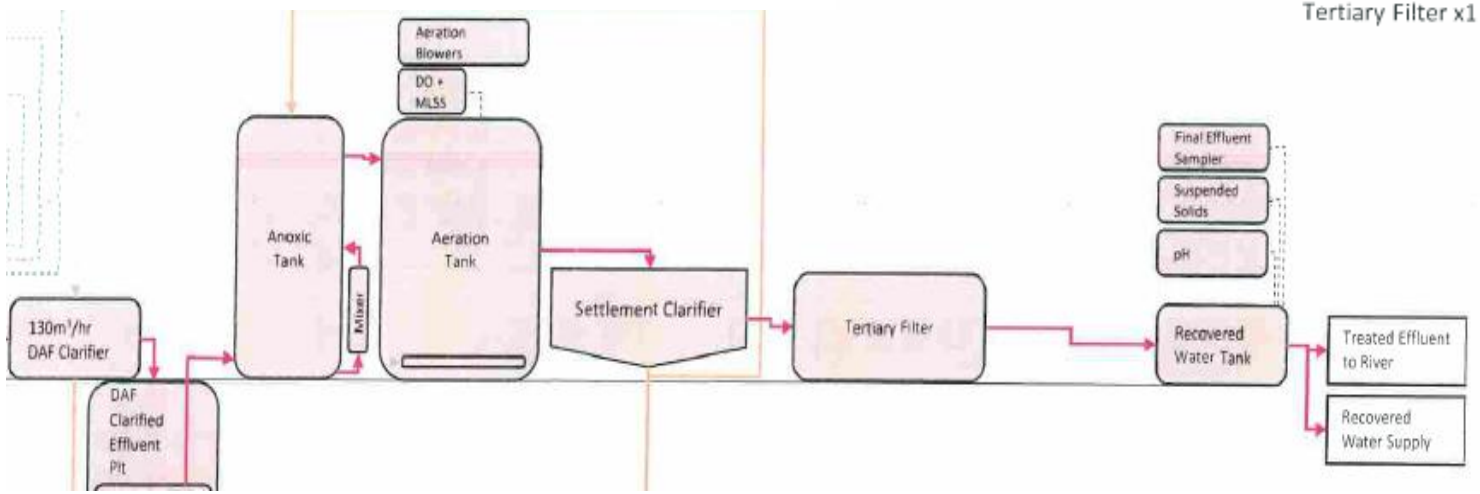
Appendix 7a
Assessment of WWTP Options for Phase 2 & MBR Design Specification

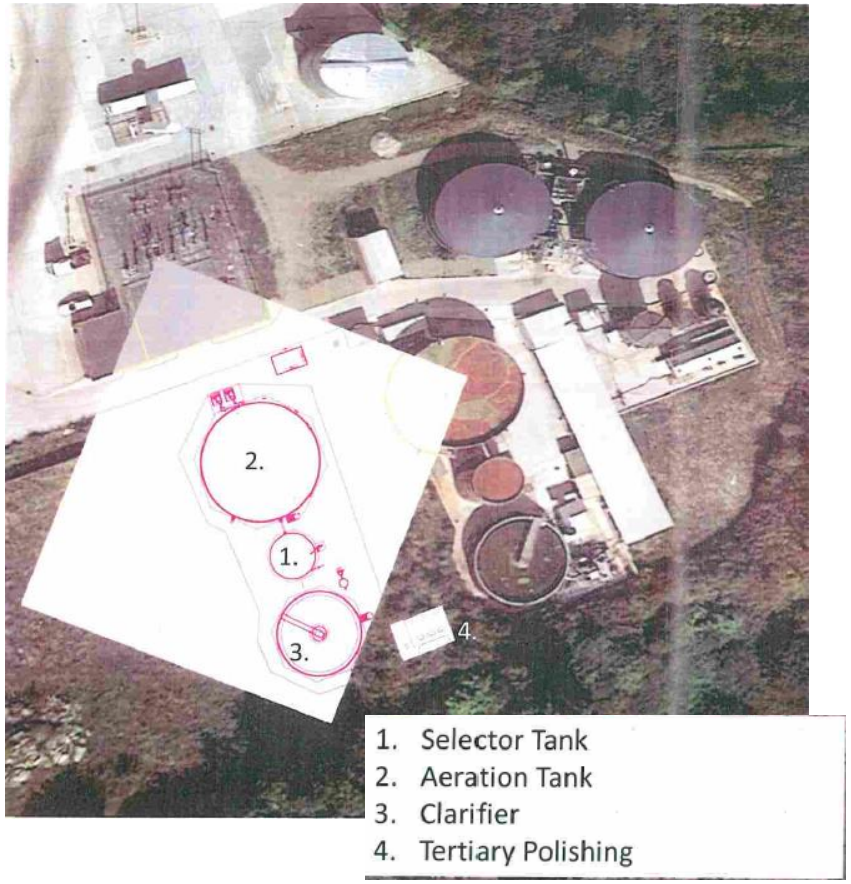
February 2023

Current Treatment Solution

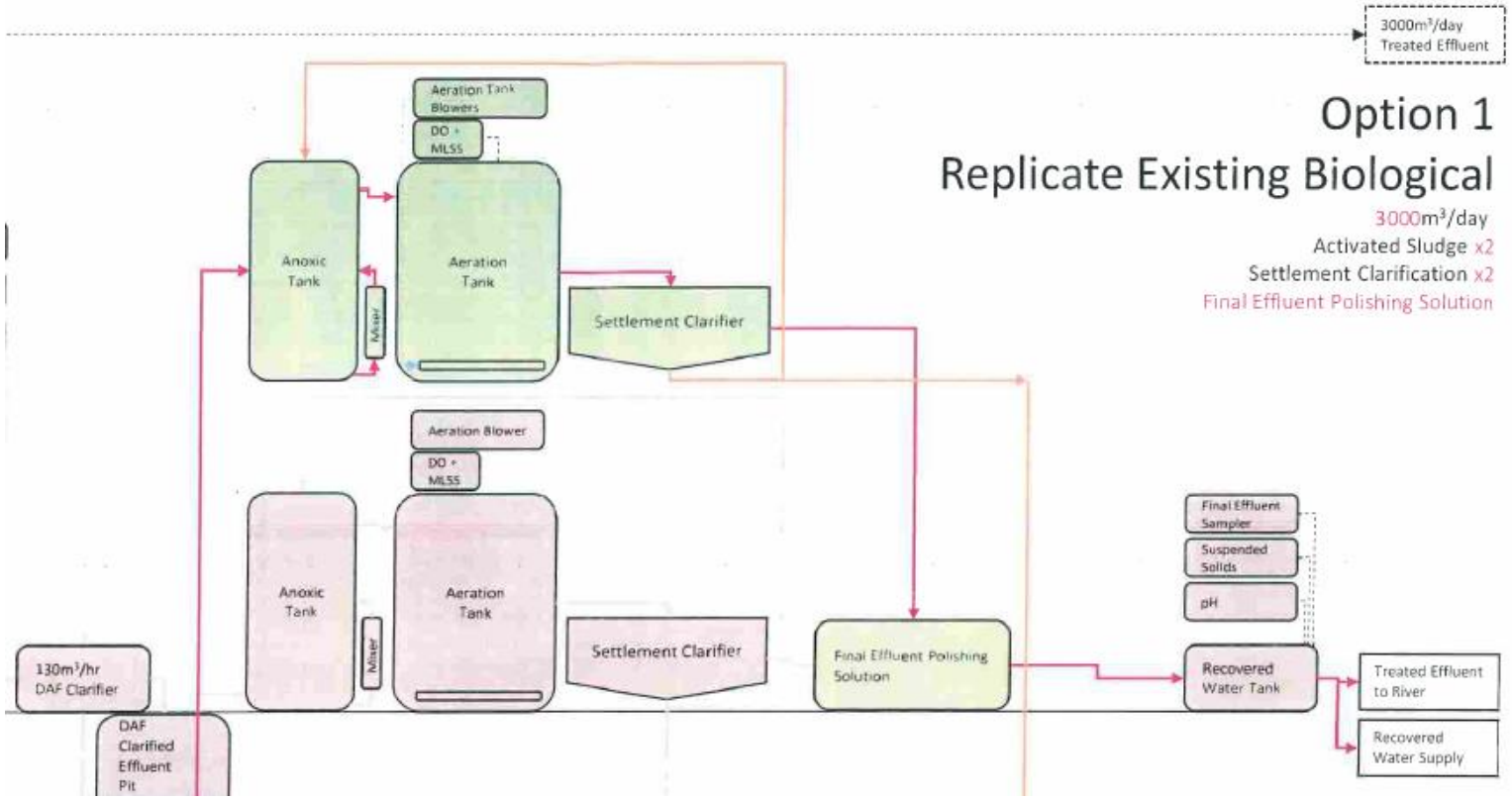
1500m³/day
Activated Sludge x1
Settlement Clarification x1
Tertiary Filter x1



Current WWTP Process



1. Selector Tank
2. Aeration Tank
3. Clarifier
4. Tertiary Polishing



Option 1 – Original plan for Phase 2

Overview of Process

- Plan was to replicate the existing plant to double the capacity, moving from 1500m³ to 3000m³ per day
- Install an improved system for the final filtration to ensure consistent results on suspended solids

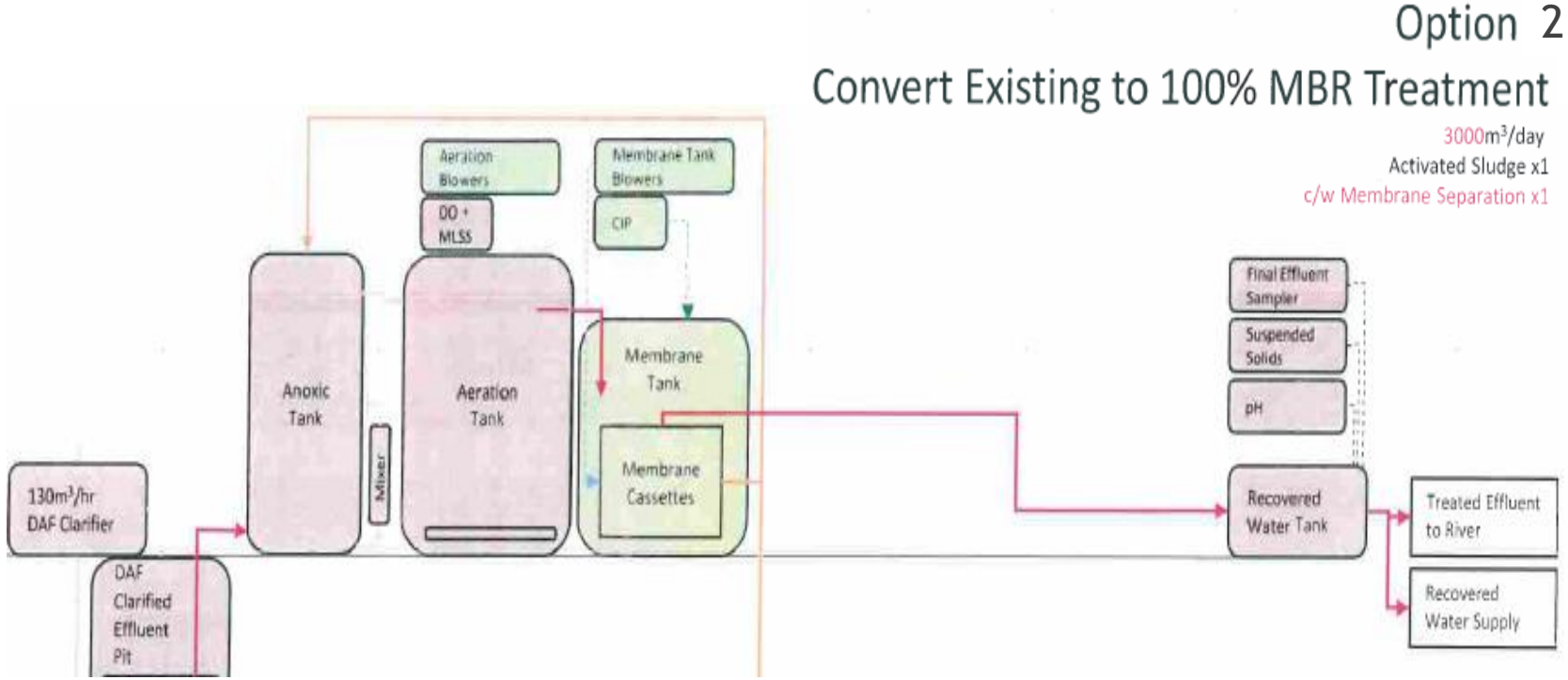
Maximum Emission Limit Values (50% of Phase 1 levels)

Phosphate – 1.25mg/l	Suspended Solids – 15mg/l
Ammonia – 2.5mg/l	BOD – 10mg/l

Pros/Cons

- Having 2 WWTP plants would give contingency to process wastewater at 50% capacity during outages on 1 plant
- Excellent existing performance - we achieve levels 50% of the existing permit ELVs
- Extensive groundwork required for this option
- NRW expect an improvement to offset deteriorating Total P quality in the River Dee upstream, i.e. no increase in pollutant loading or better.

Option 1 – Original plan for Phase 2



Option 2 - Membrane plant technology

Option 2 - Membrane plant technology

Overview of Process

- As the existing plant has the infrastructure to deal with 165m³/hr with regards to DAF and pumps, then this option is to install a membrane tank
- Remove the clarifier and final filter

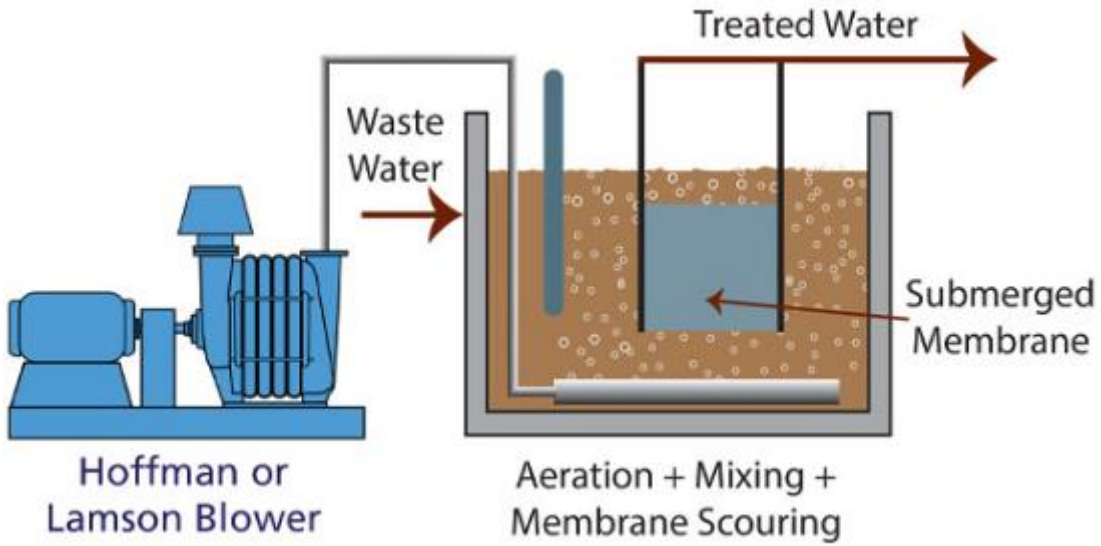
Pros/Cons

- Membrane plants are seen as Best Available Technology
- Based on existing performance, we could achieve levels of around 30 – 50% of the existing permit ELVs
- Discharge levels should address NRW's water quality concerns to enable the granting of a permit variation
- Energy costs similar (clarifier tanks removal offsets MBR energy)
- New technology - extensive commissioning and training onsite

Maximum Emission Limit Values (50% or less than Phase 1 levels)

Phosphate – 1.0mg/l	Suspended Solids – 15mg/l
Ammonia – 2.0mg/l	BOD – 10mg/l

Diagram of a membrane operation



Option 2 - Membrane plant technology

Comparison of ETP design for Maelor Foods

ETP Design Basis	Meadow Foods	*Maelor Foods*
Peak instantaneous flow	200 m^3/hr	*160 m^3/hr*
Design flow through DAF + MBR	100 m^3/hr	*130 m^3/hr*
Design Daily Load	2000 m^3/day	*3000 m^3/day*
MBR peak COD load	5100 kg/day	*3000 kg/day*

Final Treated Effluent	Meadow Foods	*Maelor Foods*
BOD_5	< 5mg/l	*< 10 mg/l*
TSS	< 15mg/l	*< 15 mg/l*
NH_4+	< 2mg/l	*< 2.5 mg/l*
P	< 1mg/l	< 1.25mg/l

Option 2 - Membrane plant technology
Comparison to existing MBR Plant at Meadow Foods, Chester

Summary of Options

- Option 1 gives a known solution but will only provide no increase in pollutant load into the River Dee. Given the concerns on the SAC phosphorus targets in the river this could delay or block the Permit variation determination.
- Option 2 is BAT (Best Available Technology) and will enable a reduction in pollutant load. Providing the water quality modelling proves the river quality targets will be met, it is more likely to be seen as an acceptable option to allow determination of the Permit variation.
- Although this is new technology to Maelor, it is an established system used widely across UK and worldwide food and drink sectors.

	Current Std mg/l	**Option 1** mg/l	**Option 2** mg/l
Phosphates	2.5	1.25	1.0
Ammonia	5.0	2.5	2.0
Suspended Solids	30	15	15
BOD	20	10	10

Summary

- Membrane plant would be capable of treating 165m^3/hr
- Design will be sufficient to enable a part shut down for cleaning and maintenance purposes
- Membrane type will be chosen using existing proven technology which will be suitable for processing Poultry Processing Raw Effluent to achieve the desired parameters stated
- Controls will be linked to the existing WWTP to ensure alarms and automatic stopping of the system if out of consent

WWTP Upgrade Scope

Peak instantaneous flow	160m^3/hr
Design flow through DAF + MBR	130 m^3/hr
Design Daily Load	3000 m^3/day
MBR peak COD load	3000 kg/day
BOD_5	<10mg/l
TSS	<15mg/l
NH_4^+	2mg/l
P	1mg/l

MBR WWTP Design Specifications

Research undertaken

- Reference visits made to Meadow Foods in Chester and ABP Food Group Ellesmere to understand any concerns with this technology at established installations with operational experience.
- Contacted other membrane plant suppliers to compare schemes and budget costs with those of current WWTP supplier
- Reference to pre Final Draft of SA Bref – BAT Conclusions for AELs to water and BAT for wastewater treatment techniques