



RO report

Project name: Wellcross Farm (BH1422/AL066)

Date submitted: 15.08.23

The report is designed to provide further information around the general principles of industrial RO operation and the likely outcomes of a system to be installed.

Reverse osmosis removes contaminants and dissolved solids from water when pressure forces it through a semipermeable membrane. The permeate water is the clean water that passes through the membrane and the concentrate is the water unable to pass through the membrane. The Concentrate is washed off the face of the membrane and to drain via pressure and flow from continued pumping. There is a certain amount of water that passes through compared to that which goes to drain. This is anywhere between 70% and 90% permeate and 10% to 30% concentrate.

After water exits the RO membrane, it passes through a postfilter to polish the drinking water before it enters service.

We have passed the flow rates and water quality through to our supplier who has provided the following information based off a 75% permeate rate. You can see a water flow rate of 4m³/h, which means a permeate rate of 3m³/h and concentrate rate of 1m³/h. Making this system 75% efficient.

Overall System

Total permeate flow: 3 m³/hr

Raw water flow: 4 m³/hr

Total concentrate flow: 1 m³/hr

Overall recovery: 75 %

System - Pass1

Permeate flow: 3 m³/hr

RO feed flow: 4 m³/hr

Concentrate flow: 1 m³/hr

Recovery: 75 %

Number of elements: 3

ERD type: None

Recirculation:

The calculation also predicts the efficiency drop off over the course of the year based off of the current known water quality. This was calculated to be 7%.

Water type: <Select Water Type>

Flux loss per year: 7.00%

Salt passage increase: 7.00%

The below table shows the elements in the water and quantities in its raw state. On the right hand side in red shows the expected levels once the water has passed through the semipermeable membrane. You will note that all levels fall within the UK drinking limit.

Water Analysis - Pass1

Species	Raw water	Adjusted feed	Conc. Stage1	Permeate Stage1
Ammonium	0.85	0.85	3.32	0.02
Sodium	606.87	606.87	2,394.65	9.76
Potassium	7.83	7.83	30.92	0.12
Magnesium	0.48	0.48	1.91	0.00
Calcium	6.66	6.66	26.56	0.01
Strontium	0.00	0.00	0.00	0.00
Barium	0.00	0.00	0.00	0.00
Fluoride	3.55	3.55	13.82	0.12
Chloride	618.38	618.38	2,441.23	9.56
Sulfate	40.88	40.88	162.99	0.10
Nitrate	22.49	22.49	86.21	1.20
Carbonate	2.73	2.73	10.84	0.02
Bicarbonate	482.00	482.00	1,870.47	18.26
Boron	0.76	0.76	1.60	0.49
Bromide	0.00	0.00	0.00	0.00
Silica	0.00	0.00	0.00	0.00
CO2	8.67	8.67	8.67	8.67
TDS	1,793.47	1,793.47	7,044.52	39.66
pH	8.00	8.00	8.54	6.63

Post RO, the water will go through a polishing unit to increase PH and add further minerals back into the water.

Based off the maximum licence volume applied for (49.8m³), the concentrate volume would be 10m³ total and permeate 40m³.

The water neutrality report calculates the water demand per day to be 21m³. This means we have plenty of capacity in the system to provide sufficient service water to the residents.

With a permeate rate of 21m³ per day the concentrate would be 7m³ per day and total water abstracted would be 28m³ per day.

Over the course of a year we will see progressive deterioration of the semipermeable membrane. This has been calculated to reduce efficiency by 7% in total over this period therefore increasing concentrate volumes slightly and reducing permeate volumes.