The Islanders

Objective: To develop a robust and sustainable water management strategy to safeguard the water resources and the environment on a small remote island.

Challenges:
- Isolated small island (9km²)
- Seasonal variation 80 to 160 PE
- Logistics: minimal use of consumables
- Site of Specific Scientific Interest (SSSI)
- Strict discharge regulations:
  - EU Bathing Water Directive
  - Scottish EPA

Water Management Strategy Options:
- Domestic wastewater
- Wastewater Treatment Plant
- Option 1: Irrigation & reuse
- Option 2:
- Loch Option 3
- Raw water sources:
- Seawater
- Rainwater
- Option 4:
- Water Treatment Plant
- Potable water

Option 4: Direct Potable Reuse

Covered sludge storage
- Low sludge volume 32m³/yr

Brine – for disposal

Rainwater
- Sufficient volume to meet demand 1024 mm/yr (UK Met Office)

EQ
- Prevents downstream shock loads.
- Consistent BOD, solids, TKN and TP.

Screen
- Microscreen Filter (MSF) rotating drum
- Increased TSS & BOD Removal, less wash water

MBR
- Adaptability for fluctuation in population
- Low sludge production (0.43m³/day)

RO
- Removes dissolved solids - high quality permeate
- Carbamazepine removal

Ads
- AMERSORB 560 for micro pollutant removal
- 1,4 dioxane & VOC removal

UV
- 6 log removal of bacteria, viruses & protozoa
- 1 log NDMA removal

Supply
- Residual Chlorine for distribution
- Coliform / Nitrate / Ammonia consents achieved

Conclusions:
- Direct potable reuse with rainwater harvesting was the most suitable strategy for the island.
- An advanced membrane-based WWT process was identified as the most robust and reliable process.
- High quality drinking water with a small footprint
- Fully automated (remotely operated) plant with minimal use of consumables and waste generation.

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