

Executive Summary: Analysis of the Blending Potential Between Highly Polished Treated Water and Secondary Treated Water

This summary was produced to give the salient points from the in-depth reports by Ing. Marco Cremona, (Sustech Consulting, Malta) and Dr. Simon Judd, (Judd Water and Wastewater Consultants, UK) which contain sensitive data.

Introduction

This study assessed the feasibility of increasing the production of reclaimed water for agricultural irrigation through the blending of highly polished reclaimed water with secondary treated wastewater. The objective was to determine whether blending could expand the availability of reclaimed water while maintaining compliance with irrigation water quality requirements and reducing treatment energy demands. The assessment covered the wastewater treatment facilities at Gozo, Malta North and Malta South.

Approach

The analysis considered the technical limitations and water quality requirements associated with blending. Key factors evaluated included:

- Existing treatment plant capacities.
- Salinity levels.
- Biochemical Oxygen Demand (BOD).
- Total Nitrogen (TN).
- Suspended solids and microbiological quality.
- Energy consumption associated with reclaimed water production.

The assessment was undertaken against the requirements of the EU Water Reuse Regulation for Class A reclaimed water and relevant FAO irrigation water quality guidance.

Key Findings

Treatment Capacity

The existing treatment infrastructure provides sufficient ultrafiltration and advanced oxidation capacity to support significantly higher reclaimed water production through blending. Infrastructure capacity alone would allow substantial increases in reclaimed water output without requiring major upgrades.

Salinity

Salinity was identified as one of the principal constraints on blending.

- Gozo offers the greatest opportunity for blending due to its comparatively lower wastewater salinity.
- Malta North also presents favourable blending potential, although more limited than Gozo.
- Malta South has a significantly higher wastewater salinity, making blending considerably more challenging and restricting achievable increases in reclaimed water production.

Biochemical Oxygen Demand (BOD)

For Gozo and Malta North, BOD emerged as the primary limiting factor under most blending scenarios. While salinity constraints can be managed within acceptable irrigation quality standards, BOD concentrations restrict the proportion of secondary treated water that can be incorporated into the final blend.

Total Nitrogen

Total Nitrogen was generally not found to be a significant constraint. The nutrient content of blended reclaimed water can remain within acceptable ranges while still enabling meaningful increases in reclaimed water production.

Suspended Solids and Microbiological Quality

Suspended solids and microbiological quality were not identified as limiting factors. The use of ultrafiltration followed by advanced oxidation ensures that blended water can maintain high standards of clarity and disinfection suitable for unrestricted agricultural irrigation.

Benefits of Blending

The study identified several advantages associated with blending:

- Increased availability of reclaimed water for agricultural use.
- Improved overall water recovery from treatment facilities.
- Reduced energy consumption per unit of reclaimed water produced.
- Lower reliance on reverse osmosis treatment, leading to reduced operational costs and membrane wear.
- Retention of compliance with irrigation water quality standards.
- Increased nutrient content in reclaimed water, which may provide some fertilisation benefits to agricultural users.

Site-Specific Outcomes

Gozo

Gozo demonstrated the highest potential benefits from blending. The site could achieve substantial increases in reclaimed water production while maintaining compliance with irrigation water quality requirements. The primary limitation is BOD rather than salinity. Further reductions in BOD could unlock significantly greater gains.

Malta North

Malta North also presents clear opportunities for blending, although the achievable increases are more modest than in Gozo. As with Gozo, BOD is the principal factor limiting higher blending ratios.

Malta South

Malta South showed limited benefits under current conditions because of elevated wastewater salinity. Salinity remains the dominant constraint across all blending scenarios. The analysis indicated that reducing salinity at source, for example through the mitigation of seawater intrusion into the sewer network, would significantly improve blending opportunities.

Potential Risks and Considerations

Although blended reclaimed water remains suitable for irrigation, the higher nutrient content may increase the likelihood of algae growth and biofilm formation within distribution systems, storage reservoirs and irrigation infrastructure. This issue should be evaluated further during the implementation of any future blending programme.

Conclusions

The assessment demonstrates that blending represents a practical and beneficial strategy for increasing reclaimed water production while reducing energy consumption. The greatest opportunities exist at the Gozo and Malta North facilities, where treatment capacity is available and water quality constraints are manageable. Malta South currently offers more limited benefits due to high salinity levels, although improvements in influent quality could enhance future blending potential.

Overall, blending can provide a reliable means of increasing reclaimed water availability for agriculture while maintaining compliance with water reuse standards and improving treatment efficiency.