Investigating the Impact of Recycled water use on soil, groundwater and vegetation at Moranbah, Isaac Region, Qld.

**Abstract**This study investigates the impact of recycled water use on soil, groundwater, and vegetation at Moranbah, located within the Isaac Regional Council (IRC) area, Queensland. Wastewater recycling is a common practice among service providers in Queensland, although reuse rates remain relatively low due to regulatory provisions allowing effluent discharge into natural waterways, which is often more cost-effective. At Moranbah, recycled water is primarily used for irrigation, serving both beneficial reuse purposes—such as supporting vegetation and landscapes—and operational disposal to manage effluent volumes. Monitoring was conducted under a Receiving Environment Monitoring Plan (REMP), which included monthly visual inspections of irrigated sites, six-monthly groundwater analyses, and annual soil assessments. Effluent monitoring showed that treated water quality met all Environmental Authority (EA) requirements, with parameters such as residual chlorine, pH, nutrients, suspended solids, and BOD consistently within acceptable limits. Visual monitoring indicated that recycled water irrigation supports vegetation health, with grasses thriving under irrigation and declining in its absence. Soil analysis results demonstrated neutral to slightly acidic pH, low electrical conductivity, and nitrogen values consistent with duplex soils, with no evidence of heavy metal accumulation. Exchangeable sodium levels were mostly below sodic thresholds, except for isolated elevations at one site (MBH3), which are likely attributable to natural soil heterogeneity rather than irrigation impacts. Groundwater results also indicated no contamination from recycled water. Overall, findings suggest that recycled water use at Moranbah WWTP is environmentally sustainable, with no adverse impacts on soil, groundwater, or vegetation observed over the monitoring period.