

Future Trend: Groundwater Level and Quality Changes

Trend definition and relevance to DWMP

Climate change is altering seasonal rainfall patterns, leading to increased variability in groundwater levels, with more frequent periods of unusually high and low levels as the climate becomes more volatile. Elevated groundwater levels can enter sewers through infiltration, placing significant pressure on sewer networks and, consequently, sewage treatment works. This reduces the capacity otherwise available for foul flows and can result in a range of capacity-related issues.

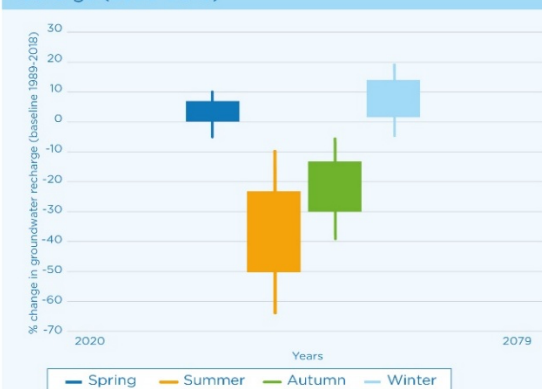
Conversely, low groundwater levels can reduce baseflows in rivers, limiting the dilution available for effluent and increasing the risk of deteriorating river water quality - an effect also outlined in the 'Low river flows' trend. In addition, dry ground conditions may also contribute to sewer structural degradation and failures, increasing the risk of pollution incidents.

Responding to the trend within the DWMP is likely to require increased investment in improving the watertightness of sewerage systems, alongside the provision of additional network and treatment capacity. There may also be opportunities to introduce innovative nature-based solutions, such as the use of constructed wetlands to treat infiltration-impacted overflow spills. Constructed wetlands may provide nutrient reduction and wider environmental benefits, building on UK trials and Defra initiatives.

Stage of DWMP used	
Risk assessment	✓
Plan development	✗
Impact/Importance	
Short term (2035)	Medium
Medium term (2045)	Medium
Long term (2055)	High
Example PIs affected by this trend	
	Groundwater infiltration
	Storm overflow performance
	Treatment works compliance (dry weather flow)

Trend description, uncertainty and potential impact on our region

Seasonal predictions for changes in groundwater recharge (2020-2079)¹



- A shift towards wetter winters is expected to drive earlier, more rapid groundwater recharge, resulting in higher groundwater levels and prolonged periods of elevated levels.
- In contrast, extended dry periods and droughts during the summer months are likely to significantly limit groundwater recharge levels.
- As illustrated in the figure, winter groundwater recharge is projected to increase by up to 13.75% by 2079 relative to the current baseline, while summer recharge could be up to 50% lower than current levels¹.
- Higher groundwater levels and more extensive periods of saturated ground may increase sewer infiltration. Conversely, lower groundwater levels and desiccated ground conditions may result in differential ground movements, affecting the structural integrity and condition of sewers and increasing the risk of exfiltration.

¹Hydrological projections for the UK, based on UK Climate Projections 2018 (UKCP18) data, from the Enhanced Future Flows and Groundwater (eFLaG) project. NERC EDS Environmental Information Data Centre. doi.org/10.5285/1bb90673-ad37-4679-90b9-0126109639a (Accessed: March 2023).

