# PFAS Hydrogeological Study

## **Phase 2 Report -** Hydrogeological Risk Assessment and Remediation Optioneering

## Non-Technical Summary

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### Background and Objectives

The historical use of firefighting foams at Jersey Airport has resulted in detections of Per- and Polyfluoroalkyl Substances (PFAS) within the St Ouen's Bay and Pont Marquet drinking water catchments, causing impacts to drinking water supplies and concerns regarding potential impacts to human health and the environment.

In 2021, the Government of Jersey (GoJ) engaged Arcadis Consulting (UK) Ltd (Arcadis) to undertake a hydrogeological study to assess PFAS distribution and potential risks as well as identify potential remediation options. Phase 1 of the study (reported in June 2023) developed an initial understanding of PFAS contamination using historical data, and Phase 2 (summarised here) involved Further Assessment and Monitoring, hydrogeological studies (Hydrogeological Conceptual Model), Risk Assessment, remediation optioneering (High Level Remediation Options Appraisal (ROA)) and support for the development of any future PFAS-specific Waste Acceptance Criteria for La Collette landfill.

### Further Assessment and Monitoring

Four quarterly monitoring visits were undertaken (between July 2023 and May 2024) which included the sampling of groundwater, surface water and airport drainage outfalls to assess PFAS levels with a range of other water quality and aquifer property testing also being undertaken. Three additional groundwater boreholes were also installed and the extent of the previous perfluorooctane sulphonate (PFOS) plume area in St Ouen's Bay was updated.

Key findings included:

- PFAS associated with older, PFOS-based firefighting foams were identified beneath the Fire Training Ground (FTG) and across St Ouen's Bay. PFAS from more modern foams were detected in a different area of the airport as well as outside the airport at the head of the Creepy Valley;
- Significant PFAS contamination remains beneath the FTG and is likely present in the ground both above and within the groundwater;
- The PFAS plume appears to be influenced by the presence of the Simon Sand Pit which may provide a preferential route for groundwater (and PFAS) movement in a more south westerly direction;
- Rainfall events (and potentially airport de-icing events) were found to increase PFAS concentrations within certain streams and drainage outfalls.

### Hydrogeological Conceptual Model

The hydrogeological conceptual model has improved the understanding of groundwater and surface water flow and interaction which is relevant for PFAS movement. While groundwater flows predominantly westwards in the St Ouen's catchment, flow direction may be influenced by Simon Sand Pit (especially in the summer months) and, historically, pumping at the Jersey Water well field. Evidence suggests a connection between groundwater and surface water in the upper reaches of La Plat Douet stream but a limited interaction in the Pont Marquet stream.

### Risk Assessment

PFAS concentrations were compared to UK and EU drinking water guidelines and environmental quality standards (screening criteria), and following modelling and detailed assessment it was considered that:

- PFAS concentrations exceeded screening criteria in both groundwater and surface water. The exceedances were widespread and regular across both catchments, including within the Jersey Water well field and the Pont Marquet abstraction point;
- The greatest amount (mass flux) of PFAS entering the environment, by a significant margin, was estimated to be via groundwater from the FTG. With regards to inputs to streams, the South Outfall and South Southwest airport Outfalls indicated the greatest amount of PFAS released;
- The estimated time for PFAS to travel to the Jersey Water well field and reach stable concentrations ranged from 20 – 60 years.

**High Level Remediation Options Appraisal (ROA)**

Arcadis evaluated and shortlisted potential remediation options to reduce PFAS mass and transport within the environment, aiming to protect drinking water and the environment in a pragmatic and sustainable manner. The high-level ROA is the first stage in a phased process with further assessment required to support decision making. Key findings from the high-level ROA include:

- A combination of approaches is likely required, focussing on FTG and source area remediation alongside continued assessment of water treatment and supply management options by Jersey Water;
- A 'Do Nothing Scenario' estimated it could take until between 2050 and 2082 for PFAS levels to reduce to within EU drinking water criteria, without intervention;
- In relation to the FTG, shortlisted options included shallow excavation and capping of surrounding bund soils with groundwater pumping to remove and contain PFAS;
- Plume-wide remediation is often cost prohibitive, however, an option involving the restoration of Simon Sand Pit employing amended backfill was outlined;
- A package of measures to reduce PFAS being discharged to streams via airport outfalls was outlined which could be attempted ahead of more expensive, on-going water treatment;
- FTG remediation could take decades to significantly lower contamination levels at the Jersey Water well field but would reduce PFAS across the plume. Addressing PFAS from airport outfalls to Pont Marquet would likely provide more rapid PFAS reductions at the Jersey Water stream abstraction.

**Waste Management and Soil Reuse**

Arcadis undertook liaison with GoJ to support the development of PFAS-specific Waste Acceptance Criteria (WAC) for La Collette landfill. This involved providing a summary of waste regulations and generic WAC from other jurisdictions, outlining the wider context of waste flows and how updated WAC could be integrated with existing processes. Generic soil reuse criteria were also provided to support future Government waste policy for redevelopment projects in St Ouen's Bay.

**Recommendations**

A range of recommendations were provided to support continued PFAS management activity, address data gaps and focus next steps. The broad theme was for this study to be reviewed by GoJ, in continued collaboration with relevant stakeholders, to agree a structured process and schedule for further assessment, including the development of a remediation strategy.