

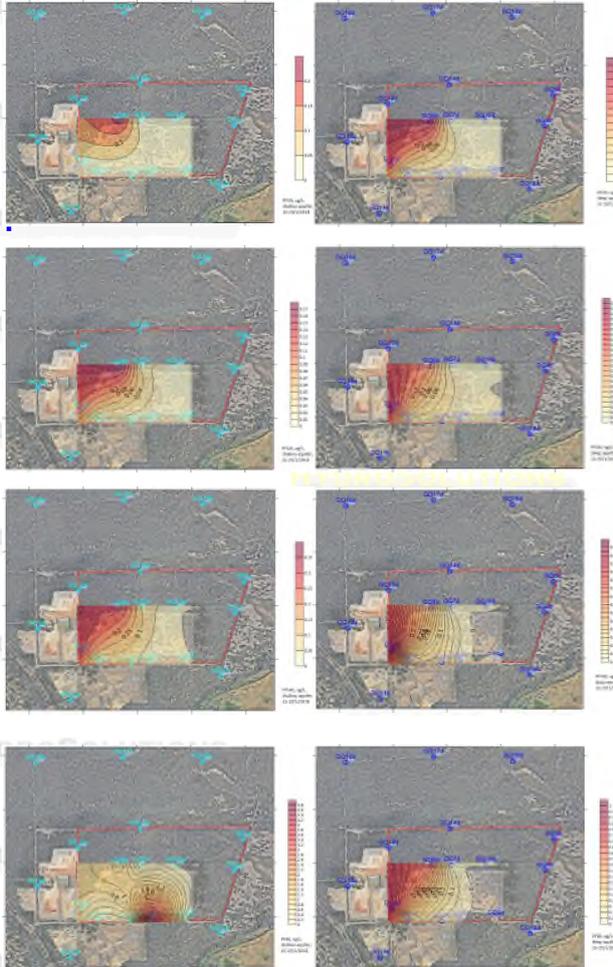


PROJECTS

CONTAMINATED LAND & GROUNDWATER

Contam 23

PFAS (Polyfluoro-alkyl substances) Plume in Groundwater, Southwest WA



The disposal of PFAS containing materials to landfill may result in underlying groundwater contamination by leachate generated from rainfall. There are more than 3000 PFAS compounds, of which between 200-600 occur in Aqueous Fire Fighting Foams (AFFF). PFAS compounds were also used as common fire retardants and stain repellents on material coverings, non-stick coatings and food coverings. In addition, PFAS compounds may also be generated as daughter products from the decomposition of longer-chain polyfluorinated compounds in the natural environment.

PFAS compounds are conservative, long-lasting compounds which may persist in the natural environment. They are moderately soluble, and are mobile contaminants which do not readily absorb onto aquifer matrices. As a consequence, they impact on groundwater quality and spread out to form long contaminant plumes.

PFAS compounds are persistent, bioaccumulative, and toxic, and may biomagnify through the food chain. As a consequence Environmental Guidelines have been established for freshwater ecosystems, human drinking water and food.

DWER issued interim guidance in 2017 to address PFAS in the environment; this was superseded by the PFAS National Environmental Management Plan (NEMP) in 2018. PFAS contamination of the environment may arise from the use or disposal of PFAS compounds. Landfill is a recognised source of PFAS contamination.

DWER issued an investigation notice to an existing landfill site in 2017 which had received PFAS containing materials. In compliance, an investigation of PFAS occurrence within groundwater was undertaken at the site.

The Site is an unlined putrescible landfill within excavated dune sands. Waste has been emplaced above the superficial water table. Groundwater is present within the underlying Bassendean Sand (BSnd) and in the deeper Guildford Formation (GFm). Groundwater flows to the northwest in the BSnds, discharging towards the coast. Deeper groundwater within the underlying GFm flows to the east-southeast under the influence of and discharging to a local river. Groundwater bores are completed within both aquifers.

A detailed Sampling and Analysis Quality Plan (SAQP) was developed for the PFAS investigation, specifying Data Quality Objectives (DQOs), including QA/QC, appropriate materials, handling and decontamination procedures. Groundwater sampling was undertaken using a Micropurge bladder pump incorporating dedicated polyethylene tubing. Sampling occurred via low-flow methods, with continual monitoring of wellhead parameters.

A NATA accredited laboratory undertook the analyses, with an independent (secondary) laboratory undertaking triplicate analysis. The results confirmed that PFAS compounds were present at generally low concentrations in both the upper and lower aquifers.

including in descending concentrations:

- PFBS, PFHxS, PFHxA, PFPeA, PFOA, PFOS, PFHpA, PFBA, and PFNS.
- PFBS comprised 67% of all PFAS in the shallow aquifer, and 36% in the deeper aquifer
- Distribution differences between the shallow & deep aquifers indicate separate sources
- PFAS was broadly consistent with an existing hydrocarbon plume-which may enhance mobility by competitive absorption
- Individual compounds exceeded EFW-99 Interim Screening Level (PFOS & PFOA are bioaccumulative & biomagnify)
- The highest concentrations occur along the northwestern (i.e. downgradient) boundary in the shallow aquifer, implying the potential for off-Site migration to occur
- No fluorotelomer substances (i.e. decay products) were identified
- PFAS compounds identified were consistent with an 'older' landfill leachate
- PFAS compounds were also present at low concentrations in site tap-water, but below human health threshold levels.

The following recommendations were made:

- Notification to the regulator
- Repetition of the sampling exercise to confirm results and assess contaminant mobility
- Further investigation to determine the extent of off-Site migration
- Risk assessment of the results

HydroSolutions Pty Ltd
38 Sheldrake Way
Willetton
Western Australia 6155
Tel: (+61 8) 9457 5448
Fax: (+61 8) 9457 4293
Mob: 0403 021533

E-mail: stuart.jeffries@hydrosolutions.com.au
Website: www.hydrosolutions.com.au