

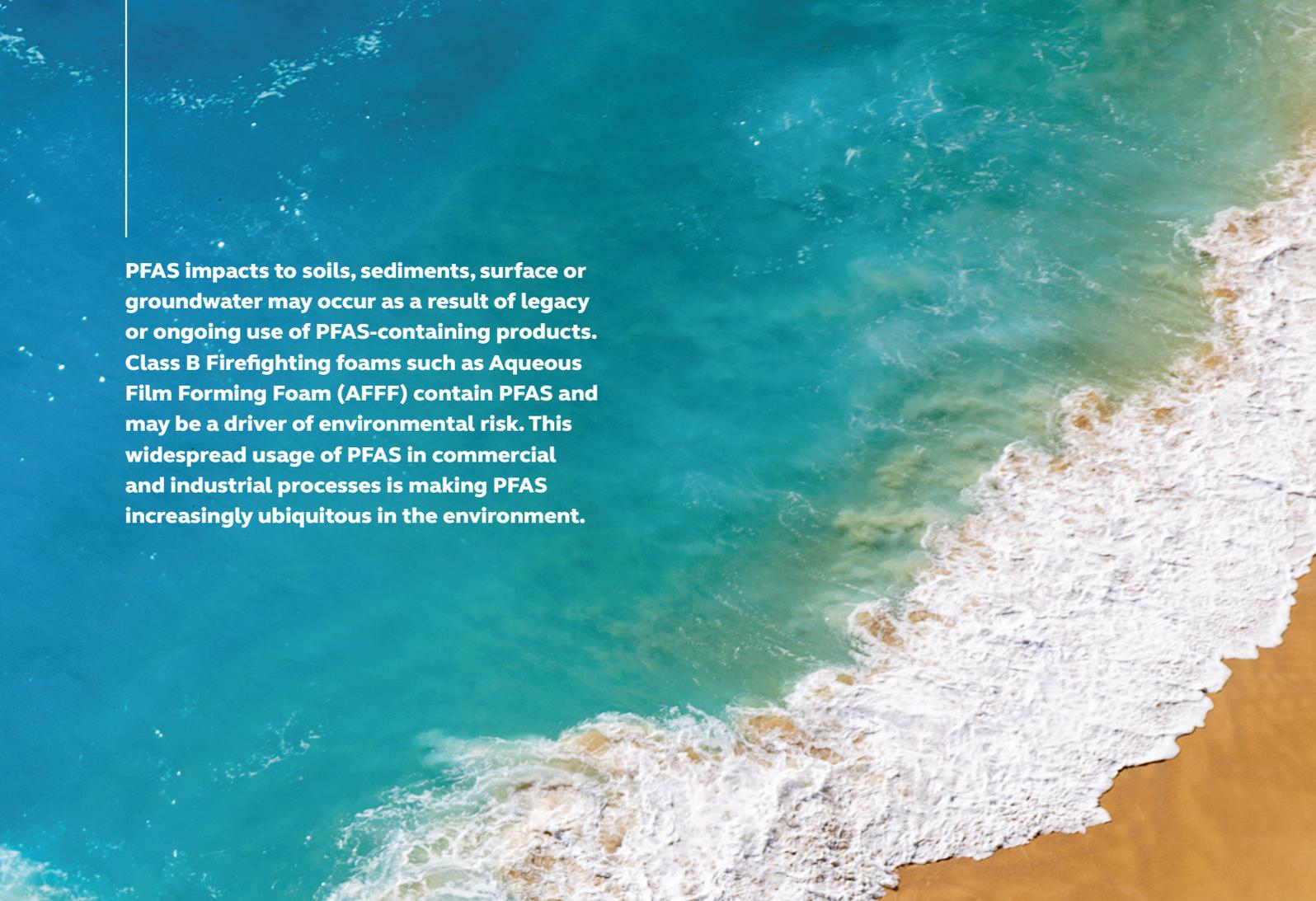
WATER



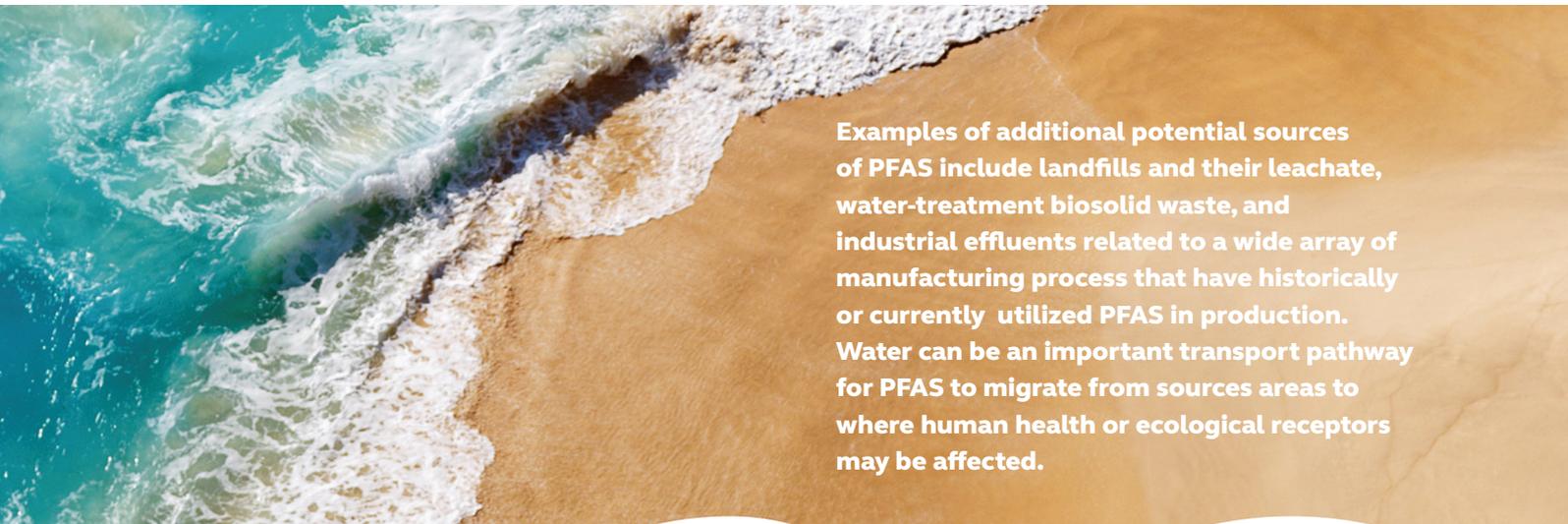
PFAS

IN WATER

The commercial use of PFAS compounds for multiple applications, combined with their high mobility and persistent nature, have led to widespread distribution in both surface and groundwater in the environment.



PFAS impacts to soils, sediments, surface or groundwater may occur as a result of legacy or ongoing use of PFAS-containing products. Class B Firefighting foams such as Aqueous Film Forming Foam (AFFF) contain PFAS and may be a driver of environmental risk. This widespread usage of PFAS in commercial and industrial processes is making PFAS increasingly ubiquitous in the environment.



Examples of additional potential sources of PFAS include landfills and their leachate, water-treatment biosolid waste, and industrial effluents related to a wide array of manufacturing process that have historically or currently utilized PFAS in production. Water can be an important transport pathway for PFAS to migrate from sources areas to where human health or ecological receptors may be affected.



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— OUR SOLUTIONS

Arcadis has significant global experience in the treatment of PFAS-impacted groundwater, surface water and drinking water.

Our team of experts has designed and installed approximately 30 large-scale water treatment systems in six countries using a variety of technologies.

Potential water treatment options that Arcadis can employ include:

ADSORPTION

Adsorption techniques work by using an adsorptive media, such as granular activated carbon (GAC) or ion exchange resins (IX), to attract and capture PFAS compounds from water onto the surface of the adsorptive media. Adsorption technologies are commercially available and widely deployed, but they often require significant pretreatment to address co-contaminants and geochemical factors that reduce efficiency and increase cost. However, a selection of the most appropriate adsorbents require consideration of a wide range of site-specific factors. Arcadis has multiple U.S. Defense-funded research projects to develop and commercialize new adsorbents, including superfine activated carbon and modified-silica based adsorbents. Arcadis' efforts on emerging adsorbents are identifying alternatives that provide better longevity and selectivity, which can reduce cost and improve treatment performance. Wastes generated by the treatment process also may require separate management and remediation.

FOAM FRACTIONATION

Developed by Evocra in partnership with Arcadis, the process of foam fractionation can remove elevated levels of PFAS present with a variety of other co-contaminants that would otherwise require pre-treatment with conventional approaches. By exploiting the tendency of specific PFAS to partition to the gas-liquid interface, foam fractionation attracts PFAS compounds and concentrates them in a resultant foam. This foam is then separated from the treated water and subjected to secondary treatment to further concentrate the PFAS contaminants. The foam fractionation process can achieve greater than 99.9% removal of PFAS, significantly reducing the volume of contaminated water.



EMERGING TECHNOLOGIES

Arcadis is actively collaborating globally with academics and military agencies to develop and optimise water treatment for a wide range of PFAS. Our water treatment focus on separating or adsorbing PFAS from an impacted water stream into a low volume PFAS waste concentrate that is then destroyed using secondary treatment processes. The treated water can then be safely used or discharged. Our R&D efforts include developing more selective adsorbents that require less pretreatment, separating PFAS from water with foam fractionation, and working on new destructive approaches to treating PFAS-impacted concentrates with electron beam and sonolysis. Multiple innovative approaches may be needed to treat the variety of PFAS encountered on differing sites.





THE ARCADIS STORY

Arcadis has a long history of management and remediation of PFAS impacts, starting over 14 years ago with our first projects in Belgium, Germany and the UK. Arcadis now has **more than 400 projects** in **12 countries**. Our expert team consists of **over 100 innovators**, including chemists, toxicologists, hydrogeologists, geologists, environmental risk assessors and remediation engineers.

Arcadis is the leading global Design & Consultancy organization for natural and built assets, tracing its roots back to the Association for Wasteland Redevelopment in the Netherlands in 1888. Applying our deep market sector insights and collective design, consultancy, engineering, project and management services, **we work to deliver exceptional and sustainable outcomes.**

With over 27,000 people in over 70 countries and a generated €3.3 billion in revenue, Arcadis' rich history lends the perfect foundation for the innovative solutions we have now become renowned for.

27,000

PEOPLE



**WE WORK
TO DELIVER
EXCEPTIONAL
— & —
SUSTAINABLE
OUTCOMES**

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