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Overview

The UK is a world leader in the regeneration and management of industrial land, offering a wide range of technologies, systems and ideas to clients both at home and overseas.

The UK's expertise in land remediation has been borne out of necessity. As the first industrialised country in the world, the UK has over 400,000 hectares of contaminated land, much of it a legacy of the Industrial

Revolution. Stimulated by economic drivers, world-class regulation and a determination to regenerate the physical business environment, the UK has made the clean-up of this land a key priority.

Gaining invaluable experience and expertise along the way - capability that it exports across the globe.



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Overview

UK firms have over five decades of experience in land remediation, making them well positioned to help others around the world.



The UK's diversity of contamination problems and sites, coupled with a scarcity of available development land, has led to the growth of a range of niche specialists.

These specialists include multidisciplinary consultancies, technology providers, contractors, equipment suppliers and laboratories. In turn, these organisations can call upon a large pool of well-educated and highly skilled professionals to work efficiently and safely in solving industrial problems.

They are complemented by expert legal, financial and insurance firms, and a network of high-quality academic institutions and industry bodies that deliver first-class research and professional development.

UK companies take a leading role in the development of innovative solutions to the clean-up and regeneration of contaminated land, with sustainability at the heart of their approach. They are backed by a vigorous and practical risk-based regulatory system that is firmly based on the principles of sustainable development,

“UK companies take a leading role in the development of innovative solutions to the clean-up and regeneration of contaminated land”

with sites cleaned up so that they are suitable for their intended use rather than back to their natural state. This ‘fit for purpose’ strategy saves times and money, while still protecting public health and the environment.

UK firms have gained considerable expertise through undertaking major, often iconic, urban regeneration projects across the UK, helping to breathe new life into the country's towns and cities. All of these initiatives have turned previously developed and derelict land into new mixed-use developments, helping to deliver renewed economic prosperity.

Such capability extends into other areas, with the UK also being a world-leading centre of excellence for spill response and environmental due diligence, helping corporate clients to understand and manage their environmental liabilities in relation to mergers and acquisitions.

Experienced, knowledgeable and pioneering, the UK is the ideal partner for land remediation projects around the world.

Case study Olympic achievement

UK companies were at the forefront of the clean-up of a 350-hectare area of East London and its transformation into the London 2012 Olympic Park.

Atkins was involved in the regeneration of the land, which included 2,200 separate land interests and a diverse range of contaminant sources. The enabling works included over 3,500 sampling locations, creating more than five million chemical test results. In total, 2.2 million sq metres of soil was excavated, of which 764,000 sq metres was treated by soil washing, chemical stabilisation, bioremediation or sorting. Eighty percent of the excavated material was reused on site as engineering fill, while 2,500 litres of free product (hydrocarbon) was removed and 235,000 sq metres of contaminated groundwater pumped and treated.

Host of a highly successful Olympic and Paralympic Games, the site has, as part of the post-2012 legacy, become the largest new urban park in Europe, with 100 hectares of open land and 45 hectares of new habitat. Some 2,800 new residents have started to move into the Athletes' Village to enjoy this phenomenal new green space.

atkinsglobal.com



Industry expertise



Sector specialists

Many clean up projects follow a four-stage framework. The UK excels at each of the stages, boasting a highly successful record of returning sites to a valuable and reusable state in the most sustainable and economic manner possible.

Stage 1: Preliminary site investigation

Extensive desk research to understand the history of the site and its geographical/geological content.

Stage 2: Intrusive on-site investigation

Borehole drilling, sample collections and laboratory testing.

A thorough risk assessment to identify all sources of contamination, the receptors (ie human health, water resources, ecosystems) that may be damaged and the pathways between them, evaluating whether linkages constitute significant risk and setting appropriate targets.

Stage 3: Remediation works

An options appraisal to select the best technology, balancing the costs and benefits of clean-up and the sustainability of options. This informs the implementation plan, which sets out how the objectives will be met.

Stage 4: Verification and validation

Monitoring to assess whether all the objectives have been achieved, with the relevant evidence duly presented.



Case study Soil analysis

UK company Parsons Brinkerhoff has developed a pioneering laboratory method for assessing the risks to people from toxic soil found in urban sites in former coal-mining areas. This test, coupled with better exposure models, can be used to ensure that any risks are not over-estimated, thus saving significant unnecessary clean-up costs. This UK innovation has global application and has been recognised by numerous industry awards.

pbworld.com

Case study Treatment technology

Arvia's patented technology has already been successfully proven to treat radioactive oils. As part of its contract with the US Department of Energy, the efficiency of the process to treat radioactive wastes containing furans and dioxins will be demonstrated. These wastes currently have no treatment option.

arviatechnology.com

Case study Accurate appraisal

UK remediation specialists Soilutions identified remedial solutions for hydrocarbon contaminated soil and groundwater on a site in Aberdeen intended for housing.

In-situ soil mixing using a chemical oxidant with lime as a combined activator and soil stabiliser was identified as the best solution for the site. Ongoing sampling and testing was carried out to further refine the treatment design and monitor the treatment works. A site laboratory was set up to carry out assessment of organic contamination and to calculate pH amendments required for each treatment area.

Throughout the contract, health and safety around strongly oxidising substances was carefully managed, while a treatment grid was used to allow accurate dosing of soils. Clean overburden was removed to expose soils for treatment and calculated doses of klorur persulphate and lime were added and thoroughly mixed with the soil and groundwater using a specialist mixing head.

Site works were completed on schedule and to budget.

soilutions.co.uk



Urban regeneration

The UK is in high demand for its expertise in urban renewal.



Urban regeneration

The UK has impressive experience in urban-renewal projects.

The UK has become a world leader in urban regeneration, where, after careful planning and development of public, private and community partnerships, the physical, social and economic characteristics of run-down urban districts have been revamped as part of a strategic plan to enhance and reenergise the country's towns and cities. UK companies can offer invaluable experience and expertise to urban-renewal programmes taking place overseas.

Former shipyards, oil refineries, major industrial manufacturing areas and more have all provided evidence of the UK's ability to clean up contaminated land and create a fit-for-purpose platform as the basis of an urban-regeneration project, delivering benefits across the board.

“Former shipyards, oil refineries, major industrial manufacturing areas and more have all provided evidence of the UK's ability to clean up contaminated land”

Case study Strategic masterplanning

Leading UK consultancy Atkins was commissioned to prepare an overall strategic masterplan for the 220-hectare White City development project in Baku, Azerbaijan. The initiative represents the largest urban development opportunity in Baku; a city whose population is growing annually by around 0.75 percent.

The White City Masterplan will transform this area of the city into a brand new urban environment, made up of seven identifiable mixed-use urban districts and populated by a community of 50,000 people.



The entire masterplan is integrated and held together by a hierarchy of tree-lined boulevards, and a string of public squares and landscaped parks and gardens. These have been planned to respond directly to the dramatic topographical character of the site. Key civic focal points of commercial activity, retail and leisure are located along a north-south central spine.

atkinsglobal.com





Spill response

The UK has a world-class network of spill-response contractors.





Spill response

The UK offers a first-class spill response capability.

“The UK was the first country internationally to develop an oil-spill response capability”

No matter what health and safety and process management solutions are implemented, accidents happen. The key to dealing with such incidents is to develop and execute a rapid response to mitigate the spread of any pollution and thus lessen its possible impact.

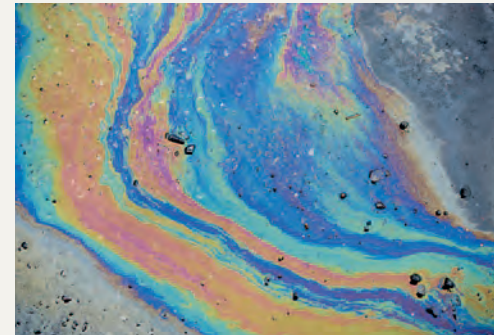
The UK is a world leader in this area, with the UK Spill Association having a network of accredited spill-response contractors available to help prevent the contamination of sites.

The UK was the first country internationally to develop an oil-spill response capability and is home to the headquarters of the world’s only global oil-spill response provider.

Case study Spill strategists

Leading UK company Soilutions devised a successful remediation strategy after a farm in East Lothian reported that an 1,000-litre red diesel spill was entering the local irrigation channel.

Emergency mitigation measures prevented migration of the red diesel further off-site and absorbent booms were deployed at strategic locations to stop contamination from moving downstream. A containment pond was then excavated to collect contaminated waters, reducing the flow entering the irrigation channel. Mitigation measures were monitored daily, with regular replacement of saturated absorbents.



Remediation works included surfactant scrub of spill location and drainage runs; on-site treatment of some 100,000 litres of impacted waters from the containment pond; excavation of contaminated soils for on-site treatment; and bioremediation of contaminated soils. Regular monitoring of the irrigation channel was carried out for the duration of the project, demonstrating that red diesel was not migrating downstream of the last line of booms. Works were concluded with a scientifically robust verification report.

soilutions.co.uk

Case study Remote response

A system developed by UK company RAW helped to clean up a 600-litre spill of kerosene which had migrated beneath a property on the Scottish island of Lewis, resulting in strong odours and contamination in shallow groundwater and soils.

The remedy was driven by the additional challenges of a remote location, high waste transport costs, with the nearest landfill which could accept the contaminated waste being a 10-hour journey from the site, including a ferry crossing. To minimise costly and time-consuming staff visits to the island, a soil vapour extraction (SVE) system was installed and monitored from RAW’s Inverness office via a remote telemetry logger which recorded the emissions from the SVE system. This innovative approach resulted in a significant cost saving to the client, as well as minimising disruption to the property.

raw-group.com





Monitoring and validation

The UK's monitoring and validation credentials are second to none.





Monitoring and validation

The UK is a global leader in the monitoring and validation of land remediation projects.



The monitoring and validation process is critical to the successful outcome of land regeneration projects. Effective monitoring and validation procedures help assess the clean-up process and allow a change of direction where necessary, while helping validate that contract requirements have been delivered.

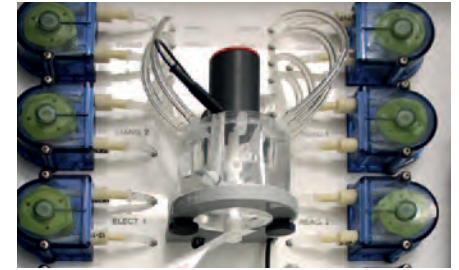
Monitoring is a critical part of working environments, ensuring regulatory limits are being met and helping instigate mitigation measures when targets are not being achieved. Rapid implementation of remedial measures can significantly reduce long-term costs while helping administer corporate brand management.

“Rapid implementation of remedial measures can significantly reduce long-term costs”

UK companies offer world-class equipment and expertise for the monitoring of sites for problems such as gas leaks and water contamination, with their services being used in land clean-up projects across the globe.

The UK has also developed internationally renowned validation protocols. For remediation schemes, the validation process is critical to securing the legal sign-off that the project’s targets have been achieved.

UK organisations such as CL:AIRE have led the way in validating new land remediation technologies for commercial development.



Case study River clean-up

UK firm Modern Water recently completed the installation of three on-line OVA7000 Trace Metal Monitors (above) for a World Bank-funded river clean-up project in Buenos Aires, Argentina. Purchased by the Argentine government, the groundbreaking equipment will monitor levels of the chemical compound hexavalent chromium as part of the extensive Matanza-Riachuelo initiative, which will restore this river to a site of natural beauty.

A further two OVA trace metal monitors are being used to monitor a new reverse osmosis water treatment plant that was installed in December 2013 to remove naturally occurring arsenic from the Matanza-Riachuelo river. The innovative products continuously ensure that water quality meets World Health Organisation standards.

modernwater.com

A photograph of a business meeting in a high-rise office. Several people in business attire are silhouetted against a large window overlooking a city skyline. Two men in the foreground are shaking hands. The scene is bathed in a warm, golden light, suggesting sunrise or sunset.

Corporate liability management

The UK has a successful record in assessing levels of contamination risk for corporate clients.



Corporate liability management

The UK works globally with corporate clients to help identify and measure contamination risk.

Through its industrial legacy the UK has been exposed to every conceivable industry and related form of contamination impact to humans, land and water. It has therefore developed robust risk-assessment tools and models to monitor and validate the potential risk exposure from any one site and sector.

At the same time, London is a leading financial capital of the world and home to many of the global mergers and acquisitions (MA) deals. MA activity often demands the assessment and risk profiling of potential corporate environmental liability. Thus, the UK's internationally renowned expertise in contaminated

land fulfils a critical role in protecting corporate clients by readily identifying and quantifying levels of contamination risk. The UK's world-leading insurance sector can then help clients to manage these risks.

The UK works globally with clients to assist them in understanding their environmental legacy, as well as preventing contamination from occurring in the first place. UK skills and expertise are regularly called upon by international industrial companies who see the benefit of a strong but pragmatic management of liabilities.



“The UK’s internationally renowned expertise in contaminated land ensures that the country fulfils a critical role in protecting corporate clients”

Case study Liability analysis

Leading sustainability consultancy ERM was contracted to evaluate the liability at a former coal tar processing facility, part of a former manufactured gas plant (MGP) in Cambridge, Massachusetts, USA. ERM’s assessment was used to allocate costs between the responsible parties.

ERM conducted a detailed analysis of historic activities and operations at the site, discovering that the MGP’s impacts were commingled with a release of jet fuel in part of the site. ERM determined the incremental costs associated with the fuel release and costs associated with the processing



of tar at the site. ERM also evaluated the proposed redevelopment plans and the associated remedial strategy.

ERM’s efforts to categorise and quantify the response costs allowed the client to negotiate a settlement at the site.

www.erm.com



Innovation

A commitment to R&D and sustainability characterises the UK land remediation sector.





Innovation

Innovation is at the heart of the UK land remediation sector, with a commitment to research & development and sustainability driving it forward.

The UK has taken a leading role in developing innovative solutions to the clean-up and regeneration of contaminated land. Such innovation spreads across policy as well as the technical development of solutions to often complex environmental problems.

Sustainable remediation

The UK is at the forefront of providing entry-level guidance to industry on integrating sustainability assessments into site clean-up decision-making for projects of all scales, from large to small. The increasing focus of financial institutions on the sustainable practices of their long-term investments has helped drive this focus.

SuRF-UK is the country's Sustainable Remediation Forum, an initiative set up to progress the UK understanding

of this area. Comprising company representatives, site owners and regulators, SuRF-UK aims to promote sustainability consistently across the remediation sector and has produced the world's first formal framework for assessing the sustainability of clean-up strategies. The SuRF-UK approach has been presented at over 20 international conferences and workshops.

This has led to an international collaboration of sustainable remediation initiatives - including NICOLE (a European network) and national SuRF bodies in Australia, New Zealand, Brazil, Canada, China, Italy, Japan, the Netherlands and Taiwan - which meets quarterly under the secretariat of the UK's CL:AIRE.



Technology development

The UK is increasingly taking a leading role in the research and development of new technologies to deal with difficult-to-treat waste as well as deliver costs savings for more traditional treatment solutions of contaminated land.

Such developments cover land, water and air and all organic, non-organic and nuclear contaminants. Private-sector technology development takes place in conjunction with the UK's world-class universities and research institutes.

Case study Pioneering treatments

UK contractor RAW, a leading specialist in inland oil-spill response and remediation, designed and carried out a field trial for the first treatment of chromate ore processing residues in soil using a chemical stabilisation and solidification technology at a chrome refinery site in China.

The work involved extensive laboratory testing to characterise the properties and variability of the processing residues, leading to development of bespoke reagents. Longer-term leaching from coarser nodules was managed by screening during the trial, but crushing would be carried out for full-scale treatment.



Treatment was carried out as a two-step process: chemical stabilisation (reduction), followed by solidification using bespoke screening and treatment plant with a throughput of up to 400 tonnes/hour. The clean-up process was optimised using particle size management and employing innovative portable x-ray diffraction for field characterisation of chromium content and speciation.

raw-group.com



Industry bodies

The UK land remediation sector is supported by, and works in partnership with, a network of public and private-sector bodies, representing both UK companies active in the industry, as well as landowners and regulators. Experience in the UK shows that such collaboration encourages better practice and the sharing of ideas, reduces potential conflict and, ultimately, secures better results.

Association of British Insurers

Represents the UK's insurance industry, whose expertise includes the provision of environmental liability insurance.

abi.org.uk

Association of Geotechnical and Geo-environmental Specialists (AGS)

Established to improve the profile and quality of geotechnical and geo-environmental engineering in the UK.

ags.org.uk

British Geological Survey

The UK's premier centre for earth science information and expertise.

bgs.ac.uk

CL:AIRE (Contaminated Land: Applications in Real Environments)

Aims to stimulate the regeneration of contaminated land in the UK by raising awareness of, and confidence in, practical sustainable clean-up technologies.

claire.co.uk

Environment Agency

Committed to protecting and improving the environment, and to promoting sustainable development.

environment-agency.gov.uk

Environmental Industries Commission

Aims to promote constructive co-operation between the regulated, the regulators and the UK's environmental technology suppliers who serve them.

eic-uk.co.uk

Environmental Protection UK

Provides expert policy analysis and advice on land and air quality, waste and noise and their effects on people and communities.

environmental-protection.org.uk

Scottish Contaminated Land Forum

Promotes the effective and sustainable reuse of contaminated land in Scotland and elsewhere.

sclf.co.uk

Society of Brownfield Risk Assessment

Aims to improve technical knowledge in risk-based decision-making related to land contamination applications and to enhance the professional status and profile of practitioners.

sobra.org.uk

SuRF-UK

The UK's Sustainable Remediation Forum - an initiative set up to progress national understanding of this key issue.

claire.co.uk/surfuk

Soil & Groundwater Technology Association

The authoritative voice of contaminated land management from a landholder's perspective.

sagta.org.uk

Specialist in Land Condition

Set up to develop and maintain a high-quality unifying qualification for the assessment of the condition and remediation of brownfield sites.

silc.org.uk

UK Environmental Law Association

Works to improve the understanding and awareness of environmental law, and to make the law work for a better environment.

ukela.org

UK Spill Association

The voice of the UK spill industry.

ukspill.org



How UK Trade & Investment can help

UK Trade & Investment

UK Trade & Investment (UKTI) is the Government Department that helps UK-based companies succeed in the global economy. It also helps overseas companies bring their high-quality investment to the UK's dynamic economy acknowledged as Europe's best place from which to succeed in global business.

Visit: [gov.uk/ukti](https://www.gov.uk/ukti)

UK Export Finance

UK Export Finance (UKEF), the UK's export credit agency, is the government department that works with companies, banks and overseas buyers to support financing of UK exports and investments across the world. UKEF provides protection to UK exporters against payment risks and facilitates finance for them through guarantees to banks. It also supports and provides loans to overseas buyers to finance the purchase of capital/semi capital goods and services from the UK.

UK Export Finance is the trading name of the Export Credits Guarantee Department (ECGD).

Visit: [gov.uk/uk-export-finance](https://www.gov.uk/uk-export-finance)

Help from UK Trade & Investment

UKTI has professional advisors both within the UK and across more than 100 international markets.

If you are a UK based company looking to develop your business in overseas markets or an overseas client looking for UK suppliers of world-class products and services, then please contact us for expert advice and practical support.

Email: enquiries@ukti.gsi.gov.uk





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UKTI

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Published March 2015
by UK Trade & Investment
URN UKTI/15/30

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