



HANNAH FRASER

Profession:Hydrogeologist

Position:Director

Years of experience:18

Qualifications:BA (Cantab) MSc FGS CGeol

Hannah Fraser is director of H Fraser Consulting Ltd, delivering high quality contaminated land and hydrogeological consulting services to public and private sector organisations. She has 18 years experience as an environmental consultant, with a broad range of experience in Contaminated Land assessment and remediation, human health and environmental risk assessment, mining and quarrying hydrogeology, and groundwater resource assessment and development. She has worked nationally and internationally on a variety of projects, with her technical roles including project direction, project design and management, regulatory liaison and negotiation, and provision of expert witness services. Hannah's core specialisms can be summarised as follows:

- Hydrogeological expert witness services
- Provision of Qualified Person services for Definition of Waste Code of Practice
- Environmental due diligence for land acquisition
- Contaminated land assessment and remediation
- Contaminant hydrogeology and environmental risk assessment

EDUCATION AND PROFESSIONAL QUALIFICATIONS

1995-1996	Master of Science, Hydrogeology, Birmingham University
1991-1994	Bachelor of Arts (Hons), Natural Sciences (Geology), Cambridge University
1996	Fellow of the Geological Society
2011	Chartered Geologist
2012	Qualified Person for Definition of Waste Development Industry Code of Practice

SUMMARY OF PROFESSIONAL CAREER

MSc Project	Design and implementation of a field testing programme to investigate heterogeneity in the permeability of Sand and Gravel deposits, Hoveringham Quarry, Notts.
1996 to 2000	Hydrogeologist, Steffen Robertson and Kirsten (UK) Ltd <i>Mining and quarrying hydrogeology, hydrogeological impact assessment, EIA, design and supervision of field investigation programmes.</i>
2000 to 2001	Senior Hydrogeologist, WSP Environmental Ltd <i>Contaminated land site investigation, human health and controlled waters risk assessment, due diligence audit, provision of hydrogeological expertise across a range of development and engineering projects.</i>
2001 to 2006	Senior Hydrogeologist, ESI Limited <i>Quarrying hydrogeology, contaminated land assessment and remediation, groundwater modelling, contaminant transport modelling, project management, line management.</i>
2006 to 2007	Principal Hydrogeologist, ESI Limited <i>Project and programme management, line management, provision of expert witness reports for contaminated land and hydrogeology projects.</i>
2007 to 2010	Technical Director, ESI Limited <i>Team management, project management, contaminated land assessment and remediation. Customer Relations Management programme. Development of Local Authority client base with Part 2A site inspection programmes.</i>
2010 – 2011	Director, ESI Ltd <i>Responsible for the Land Group within ESI including business strategy, business development, project delivery, resourcing, line management, group performance in for technical teams covering contaminated land and landfill, provision of expert witness services.</i>
2011 – date	Director, H Fraser Consulting Ltd <i>Director and sole employee of H Fraser Consulting Ltd. Projects include controlled waters risk assessment for land adjacent to a scrapyards, due diligence reporting for petrol station sites, preliminary risk assessments for land development, Part 2A contaminated land assessments, risk assessments for fuel station portfolio, acting as Qualified Person to review Materials Management Plans for development projects, provision of hydrogeological and contaminant transport expert</i>

COMMITTEES

British Standards Committee BS8485 Code of practice for the characterization and remediation of ground gas.
CIRIA RP938 Remediating and mitigating risks from Volatile Organic Compound (VOC) vapours from land affected by contamination. Steering committee.

PROJECT EXPERIENCE – Qualified Person for Materials Management Plans

Provision of Qualified Person services for the review and submission of Materials Management Plans under the CL:AIRE Definition of Waste: Construction Industry Code of Practice for the following sites:

- Kilnwood Vale: Phased project with site of origin scenario with import of clean naturally occurring materials
 - Wootton: Site of origin scenario
 - Wapping Wharf: Site of origin scenario with controlled waters receptors
 - Misterton: Site of origin scenario with naturally occurring arsenic and vanadium
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PROJECT EXPERIENCE – Expert Witness

Buckfastleigh Community Forum. Provision of expert hydrogeological and contaminant transport advice to a community forum defending a decision to refuse planning permission to a processing facility for incinerator bottom ash. The refusal decision was upheld.

Confidential Planning appeal. Provision of hydrogeological expert's written statement to a planning appeal case.

PROJECT EXPERIENCE – Basement Impact Assessments

Numerous Basement Impact Assessments. London Borough of Camden has stringent requirements for planning applications to develop basements within the Borough, which are now being adopted by other London Planning Authorities. A Chartered hydrogeologist is required to complete the reports to accompany a planning application, and Hannah Fraser has undertaken several such reports for architects, structural engineers, and geotechnical contractors.

PROJECT EXPERIENCE - Contaminated Land and contaminant hydrogeology projects

Due diligence for a scrapyards portfolio. Project director for environmental due diligence for acquisition of operational scrapyards sites, including site investigation, risk assessment and recommendations as to the potential liabilities identified by the investigations.

Due diligence audits for a food manufacturing portfolio. Desk study, site visits and environmental audit for the acquisition of a portfolio of food manufacturing sites in order to identify potential environmental issues that may adversely affect the land value and present ongoing environmental liabilities.

Due diligence audits for a portfolio of garden centre sites. Desk study, site investigation and risk assessment for the acquisition of a portfolio of garden centre sites, including recommendations to manage ongoing environmental liabilities.

Part 2A Investigations into a former lead mill, North East Derbyshire District Council. Project director, manager and consultant for a site inspection into lead in soils at a former red lead mill, now a family home and equestrian centre.

Prioritisation of sites, North East Derbyshire District Council Project director for the development of a database and ranking system for potentially contaminated land sites to allow North East Derbyshire Council to prioritise their strategic inspections under Part 2A.

Part 2A Inspection of Mill Lane Gasworks, North East Derbyshire District Council. Project director for a Part 2A inspection into a former gasworks, now a residential property adjacent to a river.

Part 2A human health assessment for arsenic, Halton Borough Council. Risk assessment for a local authority client to derive assessment criteria for arsenic concentrations in superficial soils at a golf course, with statistical analysis to assess uncertainty associated with estimates of average arsenic concentrations across zones of the site.

Human health assessment of background concentrations of lead, London Borough of Camden. Management of a project for a local authority client to assess whether background concentrations of lead in soils from Victorian housing stock presented a significant possibility of significant harm to human health.

Support to Part IIA investigations, Mole Valley District Council. Management of risk assessment and statistical analysis support to site investigations by a local authority on a former brick pit, now a residential estate. An inspection strategy was devised that allowed the council to minimise sampling whilst providing robust evidence to support a decision not to determine the site.

Part 2A Inspections, Cheltenham Borough Council. Project director for several Part 2A site investigation and risk assessment projects into former landfill sites, now variously used as playing fields, children's play areas, open space and recreation grounds.

Part 2A Inspections, Stroud District Council. Project director for Part 2A Inspections into former domestic landfills, including site investigation, risk assessment, landfill gas emissions assessment and reporting.

Ludlow Gasworks Part 2A Inspection, Shropshire Council. Project director for a Part 2A inspection of a former gasworks, now variously used for housing, car sales, waste transfer and car maintenance.

Riverside Sewage Treatment works. Project Director for a controlled waters risk assessment in support of a planning application for development at a sewage treatment works.

Long Reach Sewage Treatment works. Project Director for a contaminated land assessment in support of a planning application for development at a sewage treatment works.

Remediation cost estimation at a former laundry. Review of existing site investigation and risk assessment reports for a recently acquired former laundry with a known history of solvent contamination impacting a locally important aquifer. Potential risks to local residential properties due to vapour migration of vinyl chloride were identified. Cost modelling was undertaken to examine the uncertainty associated with likely remediation costs, and to support the subsequent sale of the site.

Peer review, gasworks and metal manufacturing site. Peer review for a Local Authority of site investigation and risk assessment work supporting planning applications for open-cast mining followed by residential development of site that had previously been used for coal mining, gas-works, brick-works, and metal manufacturing.

Statistics calculator. Project Director for the development of an excel-based spreadsheet tool for the Chartered Institute of Environmental Health to support their joint publication with CL:AIRE: 'Guidance on comparing soil contamination data with a critical concentration.' The spreadsheet tool was distributed to all Local Authority Contaminated Land Officers.

Dagenham Docks cost modelling and remediation. Site investigation, risk assessment and remediation to support site divestment. Clear delineation of background land quality issues and more recent issues arising from the site tenancy, and an open book approach, allowed the client to divest themselves of potential legacy liabilities. Remediation cost modelling provided support to the agreed sale price of the site.

Rapid phase 2 site investigations. Development of a rapid site investigation service, aligning data management tools, subcontractor networks and project teams to deliver fast-turnaround site investigation results for due diligence. Several projects have been successfully completed, with results delivered within 8 working days of instruction.

Strategic advice on brownfield land development. Direction and management of a series of site investigations and risk assessments for a range of former and proposed land uses, in support of divestment and acquisition, resulting on advice regarding remediation options and costs, potential liabilities and waste management issues.

Radiological assessment at a former fertilizer factory. Low level radiological activity was identified at a former fertilizer factory, and human health risk assessment undertaken to evaluate risks under current and future site use. The RCLEA approach and methodology was used to demonstrate that predicted doses were significantly below guideline values, and human health risks therefore deemed to be low.

Remediation assessment for volcanic soil gas. Identification and assessment of options for remediation measures to mitigate elevated carbon dioxide, hydrogen sulphide, and radon gas fluxes to residential properties in the Albany Hills, Italy.

Site investigations at a legacy manufacturing site. Design and project-management of site investigations and risk screening on a site comprising 111ha, with historical land use as a chemicals and fibres production facility. A large team of technical staff was employed to investigate residential and industrial areas, including disused landfill and waste ground. Implementation of the highest standards of chain of custody procedures, data management and QA/QC were paramount in managing and effectively utilizing the large volume of data generated.

Groundwater risk assessment at a former pumping station. Site investigation and controlled waters risk assessment to discharge planning conditions for a former pumping station adjacent to the River Severn.

Chemicals storage facility site investigation and risk assessment. Project management of site investigation, risk assessment and remediation strategy optimization for a disused chemicals storage facility adjacent to a residential development. Investigations into residential properties were undertaken, with public liaison forming a key part of the project brief.

Risk mitigation strategy for petrol station leak within an SPZ1. Groundwater modelling was undertaken to support the design of hydraulic containment systems for a petrol spill in the Chalk Aquifer. The site is in the catchment of a

public water supply (PWS), and site investigation data identified a complex distribution of free phase and dissolved phase contamination. A 3-layered numerical groundwater model was constructed and used to predict the effectiveness of a proposed hydraulic control system, to optimise the system and to quantify the risks of system failure.

Remedial strategy development, crude oil pipeline leak, UK. Site investigation and risk assessment to inform remedial strategy development for a crude oil pipeline leak in an ecologically sensitive coastal location. The project included conceptualization of a dual aquifer system with a strong tidal signature, delineation of free product and dissolved phase contamination, optimization of short term remediation measures and design of a monitored natural attenuation programme.

Oxfordshire petrol station remediation. Risk assessment and remediation strategy development for a petrol station site in Oxfordshire to enable residential development. Risks to human health and controlled water receptors were assessed and remediation targets developed. Remedial options were subject to significant commercial constraints and strategies were developed to minimise waste generation and engineering requirements. The site was successfully remediated and planning conditions for construction of residential property discharged.

CS2 risk assessment. Risk assessment for an industrial site contaminated primarily with carbon disulphide and carbon tetrachloride. Carbon disulphide is a dense non-aqueous phase liquid (DNAPL) which was present at depth below a former storage area, perched on a relatively impermeable Glacial Till. The project involved the provision of technical support to ongoing field investigations, characterisation of contaminant sources, groundwater and human health risk assessment, and development of remedial options. The risk assessment supported a successful planning application for remediation and redevelopment of the site.

CS2 remediation support. Provision of technical support to the remediation team for a site contaminated primarily with carbon disulphide and carbon tetrachloride. Project activities included design and implementation of a pilot test of the remedial method, technical review of PRB modelling and design, specification of remediation validation testing, specification of long term PRB monitoring programme, validation reporting, risk assessment to define screening values for placement of backfill materials, revision and editorial review of technical documents, regulatory liaison and negotiation, client liaison.

CS2 pilot test. Design and implementation of a field scale pilot test for a proposed remedial strategy, comprising the stabilisation and excavation of soils contaminated with the DNAPL, carbon disulphide. The trial was designed to demonstrate the safety and practicability of the remediation technique, assess operational impacts such as noise and odour, and quantify likely long term behaviour of the excavated and stabilised material in a landfill environment.

CS2 remediation validation. Specification and Independent Validation of remediation works for a site contaminated with carbon disulphide DNAPL.

TCE DNAPL investigation. Further to site investigation works by our client and groundwater contaminant modelling of a site contaminated with TCE, further investigation was required to determine the locations of DNAPL sources, to assess likely product degradation and to quantify hydrogeological parameters. On the basis of site investigation data, it was concluded that DNAPL was likely to be present in weathered mudstones, below an alluvial shallow aquifer and above unweathered Mercia Mudstones. The work concluded that removal of DNAPL would be difficult to achieve and allowed appropriate remediation techniques to be considered.

Northwest foot and mouth. Assessment of the impact of the Foot and Mouth disposals to the groundwater of the North West Region, comprising and review of the hydrogeological settings in which carcass and ash disposals were made, and the development of a methodology by which the impacts to the local groundwater environment around any disposal site may be ascertained. Project activities included classification of sites according to hydrogeological and disposal type categories; risk screening using a customised version of a spreadsheet based risk assessment model; reclassification of sites according to risk; and development of a GIS tool to allow rapid identification and prioritisation of sites.

Trident Alloys IPPC. IPPC Baseline investigation and reporting for a zinc foundry in the West Midlands.

Beacon Hill brickworks. Hydrogeological and hydrochemical investigation and assessment of a brickworks site to determine sources of alkalinity to groundwater and assess risk to an adjacent acid heath.

Woolwich arsenal. Quantification of risks to controlled waters due to soil and groundwater contamination arising from munitions and metal workings, including three tiers of assessment of organic and inorganic soil and groundwater contaminants, for a property developer.

Ashford QRA. Quantitative risk assessment of organic contamination for a housing development on an infilled clay pit.

Miscellaneous.

Quantitative risk assessment of human health and groundwater risk due to metals contamination in soils for a stadium extension.

Quantitative risk assessment of metals and organic soil and groundwater contamination for a proposed development on a disused power generation site.

Geo-environmental assessment and qualitative contaminated land risk assessments for supermarket development sites in Brigg and Grimsby.

Geo-environmental assessment and qualitative contaminated land risk assessments for land transactions in the West Midlands.

Human health and environmental risk assessment of leaking underground storage tanks at a petrol station.

Development of sampling protocols for environmental monitoring and contaminated land investigations.

Site investigation into a diesel spill in Slough RBCA methodology to assess the requirements for clean-up and to implement appropriate risk minimisation strategies.

Flow and transport modelling of pollution plumes from a chemical plant in Johannesburg, South Africa. employing environmental monitoring and contaminated land investigations

PROJECT EXPERIENCE – Hydrogeological Impact Assessments

Oakmoor quarry. Development of a water management plan to fulfil the planning conditions for a quarry extension. Dewatering had the potential to impact flows in three streams. A relationship between quarterly baseflow volumes and antecedent quarterly rainfall was developed that allowed the stream baseflow to be predicted, and any derogation to be identified. This relationship was used to define a pragmatic stream augmentation methodology which was presented as a Water Management Plan for the quarry.

Variably saturated flow modelling. A two dimensional vertical section variably saturated numerical model was used to reduce uncertainty and increase understanding of the nature of water flow in the unsaturated zone in heterogeneous materials and determine the conditions under which perched groundwater may occur.

Torcoed quarry. Development of a monitoring data database and implementation of reporting system for a quarry in the karstic Carboniferous Limestone of South Wales. Assessment of the potential impact of recent quarrying activities on the flow in a local spring, which feeds a fish farm lake, and design of a pilot scale test to augment the spring by pumping quarry discharge to a sinkhole known to be connected to the spring.

Wakefield stream diversion. Assessment of the impact of a housing development and stream culverting activities on a private property, to provide supporting documentation to an expert witness in a legal case.

Salop Sand and Gravel. Hydrogeological impact assessment for a quarry extension and subsequent landfill, including specification of a drilling programme to install groundwater monitoring boreholes, data review and impact assessment. Significant regulatory liaison was required to assess the regulatory requirements in the context of the implementation of the Landfill Directive.

Kings Lynn quarry. Hydrogeological impact assessment for a new quarry in the Leziate Beds, Norfolk. Spreadsheet tools were developed to predict likely inflows to a sand quarry and the potential impacts of dewatering.

Hoddesdon. A groundwater risk assessment was requested by the Environment Agency as part of an application for a PPC licence for this landfill site. A groundwater risk assessment was undertaken to determine the likely risk from the accidental placement of non-inert waste at the site. The results of the risk assessment showed that there are no significant impacts from the inert waste on groundwater receptors, and allowed groundwater control and trigger levels to be derived.

Goodwood groundwater modelling. Extensive site investigation and groundwater modelling to determine the impact of a gravel extraction and subsequent development of a car manufacture plant and design centre on groundwater flooding, and to aid design of sustainable drainage systems.

Ibstock brickworks. Hydrogeological investigation and assessment of a disused landfill as part of a housing development. Test pumping and numerical modelling were used to determine leachate and groundwater flow volumes to gas ventilation and drainage structures.

PROJECT EXPERIENCE - Dewatering and Groundwater Inflow Studies

Channel tunnel rail link. Assessment of the dewatering impacts of tunnelling as part of the construction of the Channel Tunnel Rail Link (CTRL), including groundwater modelling using Groundwater Vistas and MODFLOW, with in-house modifications to the well package to allow the wells to resume pumping after cells go dry.

Penderyn quarry. Hydrogeological investigation and extensive baseline data collection and analysis, to fulfil planning conditions of a quarry extension at a limestone quarry in South Wales, adjacent to a hydrologically sensitive SSSI and PWS borehole.

Lisheen dewatering. Data review, groundwater modelling and well-field pumping analysis to assess dewatering options and later to undertake performance assessment of pre-dewatering strategy for an underground lead-zinc mine in Ireland.

Target Mine salt and water balances. Inflow prediction of saline groundwater to a goldmine extension in South Africa as part of mine water and salt balance study.

Carbones del Cerrejon. Project management, review and technical support concerning water management and geotechnical aspects of a feasibility study for an open cast coal mine in Columbia. Included groundwater modelling of bulk inflows and section piezometry as well as advice on surface water and groundwater management strategies.

Newbury Car Park. Assessment of the flooding of a basement car park including hydraulic testing and analysis, and flow net analysis to determine seepage volumes and enable remedial design.

PROJECT EXPERIENCE - Hydrogeochemistry Projects

Environment Agency metal mines discharges. Surface water flow and quality mapping in North Wales to determine metals loading due to mine water discharges and to prioritise remedial action.

Portugese metal mine. Conceptual modeling, hydrogeochemical investigations and review of water management and water quality aspects of the EIA of a feasibility study for a gold mine in Portugal.

Welford Hill House water quality assessment. Water quality assessment for a domestic potable supply and implementation of water treatment system to improve corrosivity and remove organic and biological contaminants.

PROJECT EXPERIENCE - Groundwater Supply

Feasibility assessments for numerous agricultural groundwater supplies. Hydrogeological investigation, and modelling in support of a licence application for an agricultural groundwater abstraction adjacent to a SSSI.

Dunrobin groundwater supply. Hydrogeological investigation, borehole siting, drilling and construction supervision, test pumping and analysis for groundwater supply from fractured dolomites to an open-pit gold mine in Zambia.

Paragon borehole supply. Feasibility study and provision of specifications for a groundwater supply borehole at the Paragon research and development centre. Including assessment of groundwater resources, groundwater quality and licensing constraints.
