Engineering Geologists and Environmental Specialists



25 YEARS

Ashton Bennett

North: Bridge Mills, Huddersfield Road,
West Yorkshire, Holmfirth HD9 3TW

South: Blomfield Road, London W9

email: geoenviro@ashton-bennett.co.uk
fabennett@ashton-bennett.co.uk
www.ashton-bennett.com

Association of Geotechnical and
Geoenvironmental Specialists (AGS)
Institute of Materials, Minerals and Mining (IOM3)
Chartered Institution of Water and
Environmental Management (CIWEM)
Institute of Geological Sciences (IGS)
The Geological Society

Contents

Environmental

Monitoring of Controlled Waters

Contaminated Land

All land may be contaminated thereby placing constraints on its potential for development. Under existing UK and EU legislation the owner of the land is held responsible for the effects of any resultant contamination or pollution. Current planning laws require any possible contamination to be identified before redevelopment takes place and if necessary remediated or prevented from causing harm to sensitive receptors including humans, the environment and controlled waters.

Contaminated land can be profitable, provided that adequate environmental investigation is undertaken prior to purchase or development. Our investigative and advisory services are designed to assist in assessing and optimising the commercial potential of a site.

Phase 1 – Pre Acquisition and Planning Surveys

Thorough and accurate professional investigation of a site prior to purchase provides protection against potentially limited liability, by identifying potential sources of contamination and enabling recommendations to be made for prevention and the rectification procedures to satisfy the Environment Agency and assist development.

A Phase 1 Conceptual Site Model is drawn up in line with the Environment Agency and planning requirements to assess the source of any potential contamination, the potential pathways for its migration and the potential sensitive receptors which the contamination could affect detrimentally.

Every planning application for a new house or larger development has to consider the possibility of contamination on or beneath the site and the threats this may pose to human health, the environment and controlled waters. Often the Phase 1 will economically demonstrate that there is no contamination issue, but if the site has been previously developed or is close to developed land an intrusive investigation may be required and a Phase 2 Report submitted to planning.

Drilling in carpet factory in Ulster for contamination assessment

Eradication of Japanese Knotweed

Phase 2 – Risk Assessment

If a potential contamination or pollution risk is identified in the Phase 1, Ashton Bennett design and implement a Phase 2 intrusive investigation to determine the extent and level of the risk. This enables design of remediation/mitigation measures to reduce the contamination source, curtail pathways for migration and reduce risk to sensitive receptors to ensure the site is fit for its proposed purpose and to prevent damage to human health, the environment and controlled waters.

Assessment of test results to identify contamination levels and risk is undertaken in accordance with CLEA guidelines using Tier 1 Generic Assessment, Tier 2 Site Specific Assessment and Tier 3 Detailed Quantitative Risk Assessment. Ashton Bennett use in house and Environment Agency compliant software to interpret the environmental conceptual model from the contamination source to the sensitive receptors and to compile acceptable concentrations of compounds detected for the proposed site use.

Use is made of:

- CLEA and LQM/CIEH S4ULS (2014) to model effects on human health from contaminated soil.
- RISC to model the effect on human health from contaminated soil and groundwater and vapours.
- EA R&D P60 to determine risk of contamination detrimentally affecting controlled waters.

Remediation and Validation

Contaminated land can be profitably exploited for development by undertaking appropriate site reclamation in which risks are identified and solutions provided for remediation of contaminated land, clean up of water pollution, restoration of mines, quarries, mineral workings and reclamation of industrial land. Ashton Bennett design site remediation, supervise and validate the work and present a suitable Validation Report to planning to release planning conditions.

Environmental Impact Assessment (EIA)

Legislation dictates that any major development may only be considered for planning permission after a professional environmental impact assessment has been undertaken. This looks at the effects of the construction and subsequent use of developed land on humans and the environment, which extends beyond the boundaries of the site. Ashton Bennett work closely with planning officers in order to achieve a comprehensive yet sufficient EIA report.

Environmental Management

Profit results from environmental harmony. Ever increasing UK and European legislation dictates that business must take environmental issues into consideration at all stages, from design and planning of a major development, through to day-to-day business practices. Failure to comply with legislation can result in heavy penalties. Our range of environmental management services is designed to assist businesses in complying with all current legislation.

Clean up of contaminated mine water in stream

Bunding fuel tanks against leakage

Remediation of tar tank found beneath former mill

Hydrogeology and Hydrology

Drilling for water supply

Hydrogeology and Hydrology

Our knowledge of hydrogeology has enabled us to resolve our customers problems caused by excessive or insufficient water.

Projects have included:

- Reconnaissance and design of wells.
- Design and commissioning of spring water collection systems.
- Drilling and licensing of boreholes and wells.
- Draining golf courses and sports fields.
- Supplying well water to golf courses.
- Draining ground by dewatering for development.
- Relieving water pressure behind walls and embankments.
- Assessing wind turbine developments.

Our customers include farmers, developers, golf clubs, schools, industry and landowners.

Wells

Ashton Bennett undertake Water Features Surveys to gain a Permit from the Environment Agency to investigate for water, and design and drill the required borehole and ancillary works to provide water for private water supply or industrial use. This includes installation of a submersible pump, undertaking a pump test to confirm sustainability of the required supply and testing the quality of the water and includes obtaining an abstraction licence from the Environment Agency.

Hydrogeological reports for wind turbine construction

Assessment of embankment stability due to leaking canal

Water Pollution

It is an offence to pollute controlled waters including surface water and ground water contained in aquifers. During any development or redevelopment of land it is essential to establish the risk of contamination detrimentally affecting aquifers and surface water. Ashton Bennett investigates potential and actual risk and reduces or manages the risk for clients.

Pollution can be caused by a single incident, an established working practice, or historic use of a site. Our extensive experience enables us to identify the source and design the most expedient method to mitigate the pollution. Ashton Bennett use the Environment Agency recognised P60 software to assess potential pollution to controlled waters from site specific contamination.

Groundwater Control

Accurate assessment of groundwater levels and hydrostatic pressure is essential to ensure reliable geotechnical design. Groundwater investigation includes monitoring of water levels and flow, assessment and prevention of pollution and includes design of any necessary dewatering for groundwater control and pollution control.

Wind Turbine Development

The construction, use and decommissioning of wind turbines can cause disruption to local hydrology and hydrogeology and Ashton Bennett undertake the required investigations and field reconnaissance to determine solutions to any concerns that arise during the investigations.

Hydroelectric Power

Ashton Bennett undertake assessment of watercourses and reservoir spillways for the production of hydro electricity. Work includes desk studies, site assessment, ground investigation and calculations.

Assessment To Enable Ground Source Heating

Increasingly ground source heat is becoming the preferred method of heating homes and offices as it reduces carbon emissions and provides a reliable, economic heat at greatly reduced cost compared to gas/oil/electricity. Ashton Bennett undertake a preliminary hydrogeological survey to design the most suitable method of collecting the heat from the ground and design and undertake drilling to install open loop systems of heat recovery. Ashton Bennett work with sister company Earthtest Energy to install and commission the entire system of ground source heating.

Flood Risk Assessment (FRA)

Flood risk assessment for development in flood risk areas, and for basement impact assessments for planning submission for basement construction.

Fire Water Risk Assessment (FWRA)

Use of fire water in a building storing hazardous materials can cause pollution to controlled waters. Ashton Bennett assess the risks and design mitigating measures to prevent pollution occurring to controlled waters during a fire.

Remediation of contaminated mine water

Harnessing water resources

Hydropower design and installation

Geotechnical

Trial pitting for soil sampling

Site Investigation

Any purchase, ownership or utilisation of land involves risk. This can, however, be minimised by expert interpretation of ground and groundwater conditions. Where the financial viability of a project is in question, our staged approach to investigation can save time and money as well as providing professional solutions to any geotechnical or mining problems and environmental risk.

Phase 1 – Desk Study

The desk study is an essential requisite for planning application and enables preliminary decisions to be made on project viability, and comprises:

Inspection of:

- Geological maps and memoirs.
- Mineral and mining records and plans.
- Borehole, well and water abstraction records.
- Aerial photographs.

And includes:

- Site reconnaissance.
- Assessment of historical site processes and landfill proximity.
- Geological and geomorphological mapping.
- Hydrogeological mapping and river quality assessment.
- Initial report, consultations and assessment of project viability.
- Methane and radon gas risk assessment.
- Development of a Conceptual Site Model.
- Design of a Phase 2 intrusive investigation.

Geological map interpretation

Geotechnical design for construction

Phase 2 – Ground Investigation

Having established the likely success of a project, ground investigation enables us to determine the extent and level of any identified problems and provides the information necessary to design the optimum economic solutions for development.

Procedures typically included are:

- Pitting, in-situ testing and instrumentation.
- Soft and hard rock drilling and sampling.
- Assessing slope stability.
- Monitoring of toxic gasses, vapours and groundwater levels.
- Geotechnical laboratory testing.
- Engineering report with geotechnical recommendations and foundation design.
- Site reclamation & engineering design.

The geological nature and engineering properties of land significantly affects the behaviour, safety, design, cost and risks of any development. Specialist investigative techniques and experience are, therefore, essential in the acquisition and interpretation of data and its subsequent application to safe, economic design and construction.

Our combined geological and engineering service, based on over 40 years experience in professional assessment and interpretation of all ground and groundwater conditions will help to minimise risk.

Initial site investigation is followed by advice and recommendation relating to site acquisition, reclamation and stabilisation, foundation design and waste control for safe and economic construction.

Phase 3 – Remedial Work & Geotechnical Design

In order to assist in eliminating the hazards of existing or potential subsidence, our specialist investigation and advisory services reduce risk, improve safety and optimise costs for:

- Ground stabilisation.
- Soil and rock slope stability.
- Earthworks.
- Ground and rock anchors.
- Foundation settlement.
- Underpinning unstable buildings.

Design of safe economic foundations for engineering structures is determined through expert interpretation and application of investigative data including the design of:

- Foundation options for development.
- Safe bearing capacity to prevent settlement.
- Piling through soft ground.
- Vibrocompaction to strengthen ground.
- Chemical attack prevention.

Drilling for development at John Smith's Stadium

Design & construction of contiguous piled wall in Scarborough Spa

Vibrocompaction to stabilise ground

Mining

Stabilising mine workings beneath a school

Mining has taken place in areas now scheduled for development. Whereas ground subsidence from modern mining is predictable in time and location, ground subsidence from older mining is unpredictable and may occur hundreds of years later, due to the pillar and stall method of roof support, where the pillars eventually decay and collapse. Coal Authority records are not always available for mining which took place in the early 19th Century and expert knowledge of mined seams and appropriate investigation is essential to reduce risk of developing over unstable mined ground. Our expertise covers coal mining, salt mining and brine extraction, sand mining, tin mining, stone mining and mineral extractions throughout the UK.

Techniques employed to prevent ground subsidence and collapse include:

- Investigation of past, present and future mining.
- Rotary drilling to check for voids in shallow mined seams.
- Grouting of former mineral workings.
- Stabilisation and capping of disused mine shafts.
- Calculation and prediction of ground subsidence.
- Recommendations for foundation design for development over mined areas.
- Coal Mining Risk Assessment (CMRA) for planning.

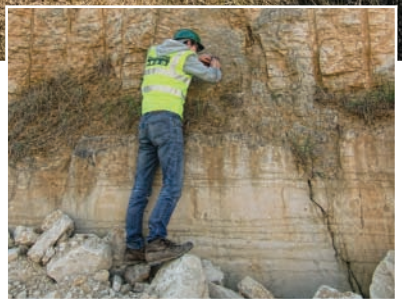
Shallow mining can often only be predicted by experience and expert knowledge of coal seams, mines, and mining history and advice should be sought from Ashton Bennett early in a project to avoid stabilisation of ground by drilling and grouting beneath a building partly constructed or a completed building.

Mine shaft collapse in house garden

Construction of a concrete cap to a mine shaft

Quarrying

Assessment of sand and gravel reserves



Measuring rock joints in a quarry for geotechnical assessment

Ashton Bennett undertake Geotechnical Inspections of working quarries to comply with the Mines and Quarries Act to ensure stability of cut faces and quarry spoil tips, undertake assessment of the quality and quantity of suitable stone for quarry operation and expansion by investigation with rotary core drilling and logging.

Projects include:

- Calculation of quarry reserves.
- Assessment of mineral quality.
- Assessment of mineral reserves.
- Assessment of suitable stone for listed buildings repairs
- Hydrogeological assessment for quarry design.
- Geotechnical assessment of quarry walls.
- Geotechnical assessment of slope angles.

Ashton Bennett undertook an assessment of the viability of quarrying large reserves of gypsum in Armenia for the European Regional Development Bank, the viability of which was hampered by the thick capping of alluvial deposits and basalt.

Assessment of gypsum reserves beneath Yerevan, Armenia for ERDB

Ground Stabilisation

Stabilising mine workings

Ground Stabilisation

Unstable ground can take the form of obvious concerns such as soil and rock slopes, earthworks both temporary and permanent, but can also comprise less obvious ground instability caused by soft or loose ground, mining voids, loose infilled material, geological faults, brine extraction, mineral extraction, underground fractures and other factors. Early identification of the problem, detailed investigation and design of suitable stabilising remediation or special ground treatment or special foundations are essential to reduce risk, to provide ground suitable for development or to incorporate design to mitigate difficult ground conditions.

Stabilisation may take the form of:

- Regrading steep slopes
- Rock anchoring slopes
- Soil nailing
- Underpinning buildings.
- Stabilising mine workings and mine shafts.
- Capping mine shafts.
- Vibrocompaction to strengthen the ground.
- Dynamic compaction to increase bearing capacity.

Or designing foundations to accommodate difficult ground conditions, including:

- Design of special foundations.
- Underpinning buildings.
- Piling through soft ground.
- Reinforced raft foundations

Rock anchoring for slope stability

Stabilisation of landslide in paper waste by excavation, windrowing and composting

Slope Stability

Slope stability assessment for quarry safety

Slope Stability

Slope stability is essential for development and general safety of the public. Ashton Bennett undertake investigation and assessment of soil and rock slopes to determine stresses in the ground and to determine the mechanism for slope failure. Ground investigation techniques include pore water pressure measurements, inclinometer installation and measurement, magnetic extensometer and monitoring of settlement. Use is made of computer software to determine the Factor of Safety and to design safe slopes.

Slope stabilisation techniques are designed and implemented and may comprise rock anchors, soil nails, regrading the slope or other structural engineering techniques.

Where slope regrading involves removal of waste, landfilling is avoided by use of composting and other recycling techniques.

Stabilisation may take the form of:

- Instrumentation to monitor slope movement.
- Reprofiling.
- Adding weight to the slope toe.
- Relieving water pressure.
- Soil nailing.
- Ground and rock anchoring.
- Construction of gabion walls.
- Rock bolts or other slope stabilisation techniques.
- Mixing waste to form a commodity such as compost

Landslip assessment at Knipe Point, Scarborough

Monitoring slope movements with instrumentation in deep boreholes

Basement Impact Assessment

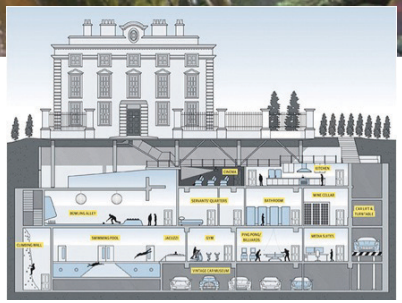
Structural damage to house due to basement excavation next door

Basement Impact Assessments (BIAs) are becoming increasingly mandatory particularly in London to meet planning requirements for development of sub-surface space. Ashton Bennett's qualified and experienced geologists and hydrogeologists undertake Basement Impact Assessments including screening, scoping, desk study and ground investigation. A detailed impact assessment is followed by a site review to present all findings and to make recommendations for mitigating measures and foundation design. When submitting applications for basement developments, the level of technical information will vary according to the type of the development, and the planning authority and is likely to include:

1. Site specific screening and scoping of existing geological, hydrological and hydrogeological conditions of the site and the wider area in order to identify areas susceptible to instability from ground and/or water movement, localised flooding and lost rivers.
2. Detailed intrusive investigation to assess local ground and ground water conditions, including, through the use of boreholes, potential impacts on water movements and on adjoining/nearby properties.
3. Identification of suitable temporary and permanent construction methods and mitigation measures for safe basement developments including monitoring of adjacent properties.
4. Devising a method for monitoring local ground conditions, water movement, subsidence and drainage.
5. Ground movement calculations according to CIRIA to assess potential ground movement in line with Burland's scale of damage.

All technical reports have to be prepared by a suitably qualified chartered engineer, chartered water and environmental manager and chartered geologist, who is a member of the relevant professional body. Geologists and engineers at Ashton Bennett meet the qualification requirements.

A Basement Impact Assessment was undertaken for a prestigious client in Richmond who needed planning consent for a basement that had a large - and famous - action group against the development. The planning officer stated that Ashton Bennett's Basement Impact Assessment was more than comprehensive and was the most thorough basement application ever put into Richmond. As a result the planning committee voted for planning approval.



Basements are increasing in size

House collapse during basement excavation. A basement impact assessment was not undertaken.

Ashton Bennett undertake Basement Impact Assessments (BIA) for properties throughout the UK, and particularly in the London Boroughs including Camden, RBKC, Westminster, Islington, Hackney, Greenwich, Haringey, Hammersmith, Fulham, Merton, Richmond, Kingston Upon Thames and others. Our BIAs follow the guidelines produced by the various Borough Councils. The requirements generally include some or all of the information below:

Drilling for basement construction in London

Screening and Scoping Stage

Collection and assessment of:

- Archival Maps
- Geology and hydrogeology
- Hydrology and lost rivers
- Flood Risk from rivers/canals/reservoirs/groundwater
- Critical Drainage Areas
- Environmental data
- Landfill and Mining Data
- Site Inspection and walk over survey
- Review of adjacent buildings
- Checking for signs of subsidence
- Checking for underground services

Impact Assessment Stage

Ground Investigation

- Undertaking boreholes and/or trial pits for ground investigation
- Collecting soil samples for geotechnical/environmental testing
- Installing standpipes for monitoring groundwater and/or gas levels

Ground Movement Calculations

Ensuring that the scheme will maintain structural stability of the building and neighbouring properties. Calculating, according to CIRIA guidelines, levels of any potential ground movements that may affect adjacent properties, according to Burland's scale of damage.

Structural Design

- Structural Method Statement
- Construction Method Statement
- Design of temporary and permanent support for excavation
- Design for monitoring buildings during construction

Flood Risk Assessment

Site specific flood risk assessment if necessary

BIA Impact Assessment Report

- Assessment of any increase in surface water runoff
- Assessing impact of basement on hydrology and hydrogeology
- Assessing impact of basement on groundwater, groundwater flows and levels
- Assessing impact of basement on geology and slope stability
- Collation and Interpretation of all other work, as described above
- Recommendations for foundation design and temporary and permanent support
- Recommendations for any mitigating measures required for construction
- Reporting in full BIA Report

New basement extending under house and into rear garden.

Waste

Assessing Muir Hill tractor site for housing development

Mixing and windrowing waste to compost for use on estate land

Management and surrender of waste recovery site, infilling railway cutting

Waste Disposal

Site Waste Management Plans

In 2008 the Site Waste Management Plans (SWMP) came into force for all construction projects exceeding £300,000 and required the site to minimise waste and to describe the waste products produced on site, the type and volume of waste and its recycling or recovery through the life of a construction project. SWMP's encouraged the effective management of materials and ensured waste was considered at all stages of a project - from design through to completion.

The SWMP included:

- The type of waste your site produces
- How you dispose of the waste, e.g reuse, recycle, landfill
- Who your waste carrier is and their registration number
- The address and environmental permit or exemption number of the site where your waste is going

The SWMP were repealed in 2013. However it is good practice for all construction projects to use SWMPs as part of their site management.

Waste Acceptance Criteria Tests

The Landfill Directive introduced the classifying of waste for disposal as inert, non hazardous and hazardous waste with treatment where necessary to enable waste to be disposed to landfill. The government encourages recycling and sustainable solutions to waste. Waste Acceptance Criteria Tests can be undertaken to determine waste disposal category for appropriate waste disposal.

Landfill Site Design Management and Surrender

Our experts design, manage and report for the surrender of landfill sites including waste recovery, inert or hazardous materials.

Fire Water Risk Assessments

Assessments of dangerous substances

Assessment of chemicals in dye house of mill

Industrial and commercial sites have the potential to cause significant environmental harm and to threaten water supplies and public health by spillages of chemicals, oil and by fire water during and after a fire. The purpose of a Fire Water Risk Assessment (FWRA) is to assess the arrangements in place on the site to deal with water used to fight fire and to assess any detrimental impacts, taking into account the liquids and materials stored on site and the effect of fire water on the environment, controlled waters and land. The FWRA is an assessment of the risk that an industrial facility poses to the environment during a fire that brings firewater into contact with operations or substances that could cause significant pollution.

In order to assess this risk adequately our reports determine:

- The source of releases of dangerous substances in the event of a fire and the potential consequences
- The properties of the substances present on site and their potential for adverse reaction
- The environmental behaviour of the substances and potential to bioaccumulate in the food chain
- Information about the location, inventory and process conditions, with reference to bunding, entry points to storm and foul water drains, protective equipment and routes of water flows
- Information about the type and vulnerability of relevant water sources including river catchments, canals, aquifers, potable water supplies, local boreholes, springs, watercourses and other surface water.
- Information about the type and vulnerability of land such as Sites of Special Scientific Interest (SSSI)

Our methodology follows the Risk Assessment Method recommended by Contaminated Land Environmental Assessment or CLEA and defined in CLR documentation of the source-pathway-receptor. The risk is defined by the nature of the source, the pathways to possible sensitive receptors to the source which could be detrimentally affected. A site requires a Fire Water Risk Assessment (FWRA) if it stores dangerous substances classified under the Risk Phase R50 which is very toxic to aquatic organisms in excess of 1 tonne and / or R51 which is toxic to aquatic organisms in excess of 10 tonnes and / or R52 which is harmful to aquatic organisms in excess of 100 tonnes and / or R53 which may cause long term adverse effects in the aquatic environment in excess of 1000 tonnes. In addition various industrial premises require a FWRA. Our FWRA designs mitigating measures to retain firewater in order to prevent contamination of land and pollution of controlled waters by firewater.

Construction of firewater retention tanks

Expert Witness

Representant on canal wall stability

Experts on ground stability

Expert on mining disputes

Expert on landfill planning enquiries

Ashton Bennett's expert witness team are available for legislative situations where the qualified opinions of an experienced third party matter. It is often impractical to apply a set of general principles and rules to the complexity of a particular site. As a result, an overwhelming number of cases need the expertise of an experienced witness to undertake first-hand investigation and present their findings to the court.

We work with the court and planning inspectors that are reliant on the services of an expert witness. We are also aware that in most cases, an expert's findings are crucial to the case. Our methodologies involve listening carefully to all parties and understanding all aspects to a case.

Our expert witness experience ranges from working with small projects to large multi-site complex investigations, providing evidence on geological, hydrogeological, mining, geotechnical, and environmental aspects of cases and making representation at public enquiries and to the planning inspectorate.

The principal Frances Bennett has over 40 years experience in undertaking investigations and representing clients in court.

Public Enquiries

Wind turbines. Successfully represented a village action group in the Midlands working against the construction of 6 wind turbines in a hydrologically sensitive area.

Waste tip. Successfully represented an action group in West Yorkshire working against planning permission for a waste tip.

Financial compensation

Landslip. Proved that five houses in Whitby were demolished unnecessarily. The owners received £4m.

Water well. Proved that gravel extraction operations in Leicestershire caused wells to run dry. £20,000 compensation to farmer.

Rectification

Leaking canal. Persuaded British Waterways, now Canals and River Trust, to rebuild part of Sowerby Canal wall to prevent leakage flooding public house carpark and potentially damaging buildings.

Leaking drains. Acted to force local water board to rectify drains following a slip that threatened our clients' houses.

Building failure. Proved that a warehouse floor slab failure was caused by construction practices which did not conform to the structural design. This gave the owner the facts to take action against the builder.

Landslip. Working for Crown Estates, proved that a landslip was not caused by river erosion, thus ensuring that house insurance remained valid.

Shallow mining. Represented clients whose consultants had failed to assess shallow mining and Ashton Bennett designed mine stabilisation beneath the completed house.

Ground source heating. Identified the incorrect groundwork construction which resulted in heatpump failure.

Well drilling. Resolved the geotechnical challenges which resulted in a drilling contractor abandoning equipment in a partly drilled well.

Pollution

Controlled waters. Proved that chemical company was not responsible for pollution in adjacent river.

Land contamination. Successfully acted for clients where contaminated material was entering their land from neighbouring land.

Mineral rights.

Coal. Won a dispute regarding coal seam identification for Miller Mining against British Coal (now The Coal Authority).

Expert report for Crown Estate for landslip in Scotland

Won compensation for houses demolished unnecessarily in Whitby