



**Independent Integrity Testing,
Validation and Verification of
Construction Protection Systems**





The evolution of GeoShield is a story of drive, passion, determination, focus and teamwork. Our teams of Engineers and Verification Officers are headed by a Management Team with decades worth of experience in the Validation, Verification & Integrity Testing and on-site Quality Assurance Programs.

The founding team members of GeoShield came together in 2015, from their varied projects throughout the UK and around the globe.

Independent 3rd Party Validation & Verification was established in 2015 in the updated version of the British Standard Code of practice for the design of protective measures for Methane and Carbon Dioxide ground gases for new buildings BS 8485:2015. This was a major leap forward in reducing human error in design, material choice, application & Quality Management record reporting.

Other Design Guidance focused on protecting new builds against other hazardous ground gases, ground & rainwater ingress and stormwater containment soon followed suit.

Many major warranty providers now insist on 3rd party validation, verification & integrity testing before issuing their insurances & guarantees.

GeoShield are founder members of The British Verification Council, individuals from our team, with decades worth of experience, have implemented some of the largest and most complex on-site hazardous ground gas & waterproofing protection Quality Assurance Programs across the globe.

GeoShield are ISO accredited 9001 & 14001, Constructionline Gold Members, a supporter member of CL:AIRE and Premium Partners of Environment Analyst's Brownfield & Regeneration Network.

It is acknowledged internationally that when human error occurs in product choice, application or design, partnered with climate variations, geological changes and alterations to water courses, the results can be devastating.

GeoShield's unique approach to on-site Quality Assurance Programming is proven globally at reducing the negative effects of human error.

This approach starts from project conception and continues through to building completion and occupancy.



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Pre-Verification Planning – All Systems

(Prior to commencement of on-site works, the local authority and warranty provider would require a Pre Verification plan to be approved)

At GeoShield we realise the importance of Pre-Verification Planning and being prepared in advance for the varying installations that require integrity testing.

- ✓ Geoshield's Pre-Verification Plan sets out the requirements in demonstrating where verification meets the criteria and objectives for a given project.
- ✓ This document essentially tells you what is in the project and the general contents of a Pre-Verification Plan would contain important details of the project and relevant information to provide guidance to the verifier before attending the initial site visit or pre-contract meeting.
- ✓ The content covers the site details, building type, the site investigation report identifying the gas risk, ground gas design, engineer's drawings and the site-specific risk assessment and method statement.
- ✓ The document records all the parties' details who have an influence in the protection systems performance, including those of the client and applicator. The Pre-Verification Plan notes the applicators current competence level and the qualifications relevant to the protection systems installation techniques in accordance with the construction design.
- ✓ The Pre-Verification Plan risk assessment tells the verifier the site-specific circumstances relating to the design, experience of workforce, gas regime, installation conditions and the site-specific gas design.
- ✓ The Pre-Verification Plan method statement would then estimate the number of expected operational visits, the chosen testing procedures, the intensity of reporting and how the protection measures comply to the relevant design guidance for the validated system & application.



Integrity Testing, Verification Reporting and the Completion of Quality Management Records

Validation: the action of checking that the choice of design, materials, application techniques and procedures will provide, in theory, the required result and meet the chosen construction guidance and regulations.

Verification: the confirmation by examination and provision of objective evidence that the specified requirements made during the validation process have been correctly fulfilled.

Integrity Testing: carrying out inspections to identify the chosen system is performing as required, that it has been correctly applied, is not damaged, weathered or destroyed and still meets the set building standards & requirements.

NB: Verification process may not take into account the possible damage inflicted by follow-on trades after the applied system has been inspected, for example rebar placement & cutting, destructive foot traffic, masonry placement, inclement weather. The GeoShield Pre-Verification Plan will recognise these possibilities & factor them in before application begins.

Verification Report:

The Geoshield Verification Report is a user-friendly document that can be published in hard copy, cloud link, on instant email & flash drive. The final report is a concise document that relates to the history of the Protection Systems' application process.

The final report will have:

- ✔ A description of the inspection regime
- ✔ A description of the protection system and who validated its choice and design
- ✔ Dates of inspection, the inspection staff present, weather conditions & the adjacent & follow-on trades activity
- ✔ Recognised areas where defects established & the repairs underway, re-testing of the repairs - along sectors & grid lines
- ✔ Areas of limitation: areas unable to be inspected, identified and noted
- ✔ Individual area and plot sign off
- ✔ An on-going log of applicator capabilities, professionalism & experience
- ✔ A presentation of the material specifications
- ✔ Installation photos along sectors & grid lines
- ✔ Areas inspected along sectors and grid lines
- ✔ Live documentation to assist in immediate area sign off for assistance in programming of future works.
- ✔ As good practice, GeoShield supply action sign off sheet for client listing action items ensuring work continuity

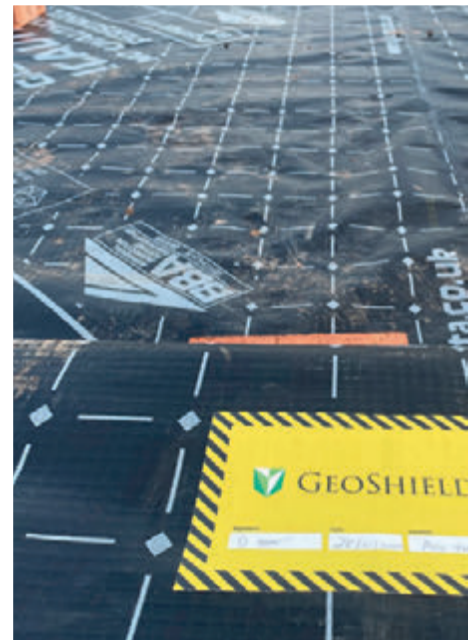
GeoShield provide a certificate of completion at the end of the project. This certificate is only issued when all remediations and areas have been signed off to specification including all information in the Pre-Verification which includes installation to design and manufacturers technical data.

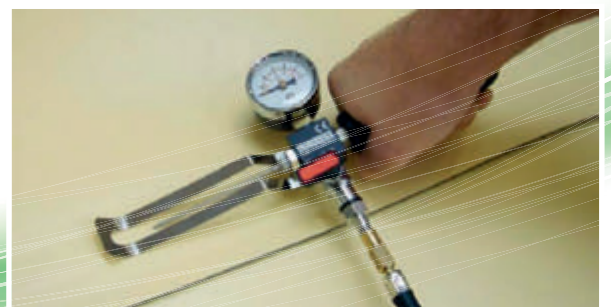
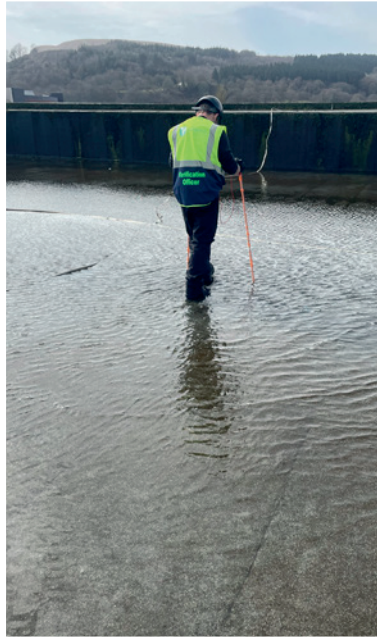
Types of Verification & Integrity Testing

It is recognised that every construction project is unique, whether it involves an existing structure or is brand new build, therefore every program of verification and integrity tests needs to be bespoke to fit each individual sites requirements & conditions. Prior to beginning any testing regime GeoShield will structure a pre-test meeting, involving all associated parties, where the choice & regularity of testing will be made.

Methods of testing often chosen (though not limited to), include:

- ✔ Non-Destructive Probe Inspection
- ✔ Destructive Joint Testing
- ✔ Non-Destructive Compressed Air Lance Testing
- ✔ Twin-weld Sealed Channel Pressure Testing
- ✔ Low Voltage Earth Leakage Testing
- ✔ High Voltage Dielectric Porosity Testing
- ✔ Differential Pressure Vacuum Testing
- ✔ Non-Destructive Smoke Testing
- ✔ Non-Destructive Inert Tracer Gas
- ✔ Infra-red Thermal Imaging
- ✔ Aerial Drone Surveys





Hazardous Ground Gas

Types of Verification & Integrity Testing

Whether your project be a single dwelling (Type A) or a vast super shed (Type D), the GeoShield Integrity Testing Verification team brings a wealth of experience, not only understanding the differences in construction but also the complexities in design & scheduling.

A description of the differing types of structure can be found in Table 3 of BS 8485:2015+A1:2019 Code of practice for the design of protective measures for Methane and Carbon Dioxide ground gases for new buildings.

Table 3 - Building types

	Type A	Type B	Type C	Type D
Ownership	Private	Private or commercial / public, possible multiple	Commercial/ public	Commercial/ industrial
Control <i>(change of use, structural alterations, ventilation)</i>	None	Some but not all	Full	Full
Room sizes	Small	Small / medium	Small to large	Large industrial / retail park style



Hazardous Ground Gas - Radon



The UK Health Security Agency (UKHSA) www.ukradon.org inform that Radon produces Radioactive elements that decay and emit radiation. Any exposure to this type of radiation is a risk to health - radiation is a form of energy and can cause damage in living tissues increasing the risk of cancer.

Building Research Establishment document BR211: Guidance on protective measures for new buildings (including supplementary advice for extensions, conversions, and refurbishment projects) as referred to in Building Regulations Document C, has recently been updated in 2023.

The 2023 edition of the BR211 guidance in section 3 'Protective Measures' and throughout the document recommends that the Radon Measures Quality Management Record in section 7 is thoroughly followed.

GeoShield provide the complete third-party inspection process as described in section 7 and assist in the allocation of contractual responsibility as requested in the Radon Protective Measures Quality Management Record. (Refer to page 35 of BR211)

For clarity regarding the guidance contained within BR211 & the correct Allocation of Contractual Responsibility, GeoShield recommend that each client visits www.bre.co.uk to obtain the latest edition of BR211, also to refer to www.ukradon.org, www.hse.gov.uk and to visit & follow the Radon Council at www.radoncouncil.org, the Radon Council readily provide the latest updates regarding all matters Radon.



Founder member



Member since 2016

Hazardous Ground Gas

– Methane/CO²/VOC

Since 2015 construction & design standards in the United Kingdom has been restructured with the aim of reducing all possible failure points that relate to human error. The result is the insistence in design guidance on 3rd party independent validation, verification & integrity testing of the chosen protection system*. The spearhead of these changes was the updated version of the BS 8485:2015 British Standard Code of practice for the design of protective measures for Methane and Carbon Dioxide ground gases for new buildings.

BS 8485:2015+A1:2019 - this supersedes all previous guidance.

*Please refer to your chosen design guidance to establish the exact criteria for your project.

Methane / Carbon Dioxide / Volatile Organic Compounds - Hydrocarbons

CIRIA 735 (2014) states that the verification plan (which includes a risk assessment for the correct number of visits and appropriate

integrity testing) becomes an integral part of the validation of the gas protection system.

As each project is unique in terms of size, construction type, ground gas protection design and applicator experience, it is recommended that a Pre-Verification Plan is in place prior to commencement of works. GeoShield offer full validation of design and specification free of charge.

Geoshield are Founder Members of The British Verification Council

For projects of CS2 & above (British Standards) / Amber 2 (NHBC) an Independent Testing and Verification program is required as an integral part of the project strategy. The Verification Company is usually required to be employed prior to construction. The GeoShield Verification Package is in accordance with all requirements made by the British Verification Council including £2,000,000 PI Insurance that is specific to Verification.



The GeoShield service includes

- ✓ £5 million PI Insurance for verification & buildability design
- ✓ Comprehensive knowledge of the installation requirements including NVQ Level 2 and NVQ Level 4 qualified personnel
- ✓ A thorough understanding of BS 8485:2015+A1:2019 and how the changes from previous British Standard affect current installations
- ✓ Extensive experience of BS 8485:2015+A1:2019 gas remediation strategy
- ✓ A systematic approach to logged reporting
- ✓ Geoshield are fully independent from manufacturers and installers as in accordance with CIRIA 735 (2014)
- ✓ Company owned testing equipment including Inert gas testing, Dielectric testing, and Smoke testing equipment
- ✓ CSSW qualified waterproofing inspectors
- ✓ An in-depth knowledge of CIRIA 735 (2014)



Member since 2016

Hazardous Ground Gas – Retrospective Testing

GeoShield provide a project managing service for retrospective developments. This can cover:

- ✔ Buildings undergoing change of use.
- ✔ Extensions.
- ✔ Projects that have not previously been verified correctly.
- ✔ No gas membrane installed.
- ✔ Projects not meeting planning conditions.

This project management service covers design, verification, communication with local authorities and proactive testing methods these include:

- ✔ Radon testing
- ✔ Inert gas testing
- ✔ Live onsite gas testing

GeoShield assisted in creating CIRIA 795 the principal document for retrospective design and risk assessment.

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Regeneration
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GEOSHIELD

**On-Site Quality Assurance Programs
for
Hazardous Ground Gas Protection
Systems
Validation & Verification**



Stormwater Management

– Attenuation Tanks and Soakaways

Are you aiming to comply with the Environment Agency discharge consent but missing to comply with their requests in **Chapter 30 of CIRIA 753 The SuDS Manual**?

'The **verification** should be carried out by a **third party that is independent of the installer** of the barrier (Box 30.2). The Environment Agency has provided clear advice with respect to the level of independence and verification in relation to work on landfill sites (EA, 2010).

The Environment Agency recommends that conflicts of interest in verification should be avoided in the field of contaminated land verification (EA, 2010). The same philosophy should apply to **verification of geomembranes in SuDS.**'



The groundbreaking GeoShield dual security integrity test

Devised and designed by leading stormwater system applicators and verification officers with decades of experience, the GeoShield dual security integrity test not only provides pressurised air testing on all your liner seams but for that added assurance also smoke tests the full box, so you are confident that the lid is sealed watertight too. Geoshield can also provide Electronic Leak Detection to the body of the liner membrane, ensuring that errors made during manufacture are found and possible punctures from follow on trades are identified.



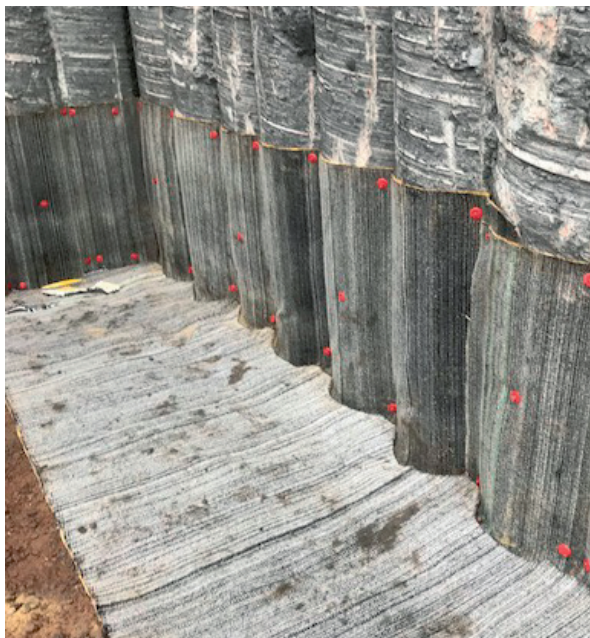
Waterproofing Basement Structures – Combined Waterproofing / Radon Barrier

Should your basements protective membrane, be designed as per British Standards BS 8102 “Protection of below ground structures against water ingress. Code of Practice” be required to also act as a Radon Barrier then the “Quality Management Record” of BR211 will need completion. See page 35 of BR211.

All GeoShield Waterproofing Inspectors hold (CSSW) qualifications; Certified Surveyor in Structural Waterproofing.



Member since 2016

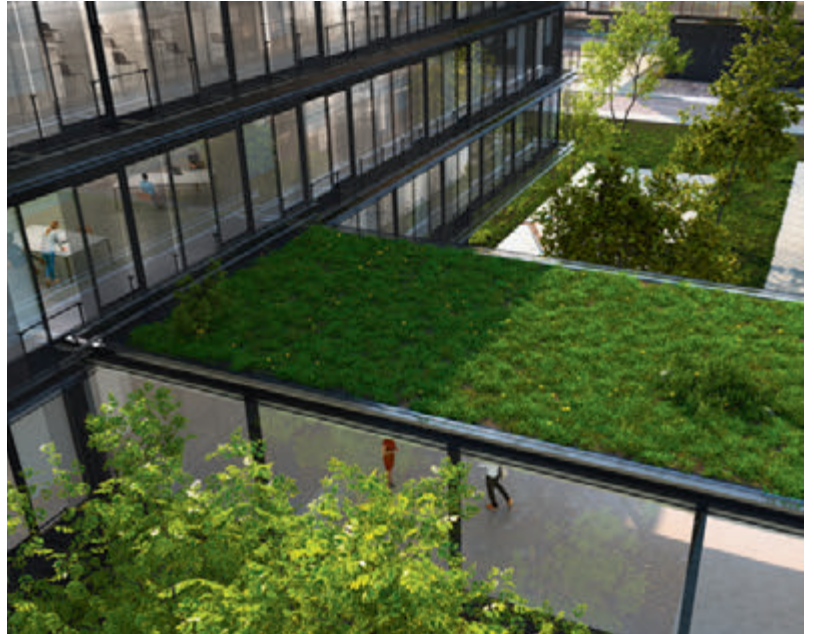


New Build: 3rd Party Assessment ELD Green Roof/Blue Roof/ Buried & Podium Decks – Latent Defects Policy Support

Where a new building is to be insured under a Latent Defects Policy, Developers and Builders will also need to comply with the functional requirements of the Warranty Providers Technical Manual.

The Warranty Functional Requirements are intended to minimise the risk of specified defects and damage to the building to be able to provide a Latent Defects Warranty cover.

Companies such as LABC, Premier, NHBC and many others insist on 3rd party independent assessment of the waterproofing layer of green roofs, blue roofs & buried decks prior to the issuing of any cover.



Premier Guarantee

(MD Insurance Services Ltd 2023)

Flat Roofs: Testing, approved installer, and periodic inspection requirements

'If testing to demonstrate waterproofing integrity is required it should be undertaken by a suitably qualified and experienced **third-party** who is independent of the roofing contractor.'

11.6.14, page 335



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New Build: 3rd Party Assessment ELD Green Roof/Blue Roof/Buried & Podium Decks – Latent Defects Policy Support



Integrity testing of the waterproofing layer

'The waterproofing layer should be inspected for defects after installation. Any defects are to be repaired and retested and left in a satisfactory condition. '

'Guidance on electronic test methods and their application can be found on the 'Roofing and Waterproofing Test Association' website.'

A test report containing the test results and photographic record of the roof should be made available to NHBC.

Chapter 7.1 page 21
(NHBC Standards effective 2023)

Blue Roofs

'Blue roofs should: include waterproofing layer suitable for use in the blue roof system and subject to independent **third-party** assessment'

Chapter 7.1.13 Blue Roofs page 24
(NHBC Standards effective 2023)

GeoShield are proud members of the Confederation of Roofing Contractors and the Roofing and Waterproofing Association (as referred to in sectioned in NHBC section 7.1 for guidance) and Associate Members of the renowned Green Roof Organization.



Existing Structures

ELD Integrity Testing for Existing Flat Roofs

Independent Visual Inspections, Electronic Integrity Testing, Pressure Vacuum Testing & Drone Surveys

GeoShield are members of both the Roofing and Waterproofing Test Association (RAWTA) and the Confederation of Roofing Contractors (CORC).

The NHBC Standards advise that guidance can be sought on electronic test methods by visiting the RAWTA website (*NHBC page 21 Chapter 7.1*).

GeoShield use the latest innovations by Buckleys UVRAL, the world leaders in flat roof electronic leak detection (ELD) apparatus

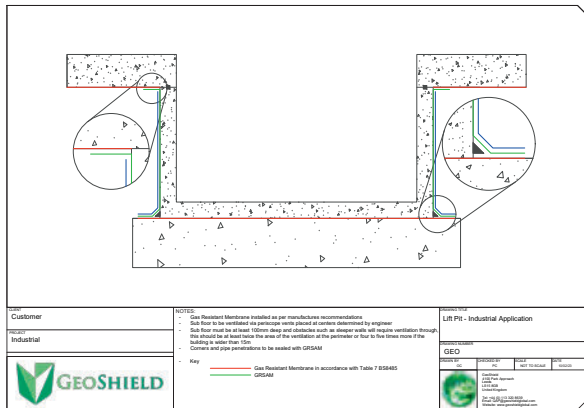
on all our roof deck health surveys and assessments, to pinpoint the exact point of water ingress and track how the destructive water is penetrating through your existing waterproofing roof protection.

Where ELD testing is deemed inappropriate non-destructive differential pressure vacuum testing will be employed.

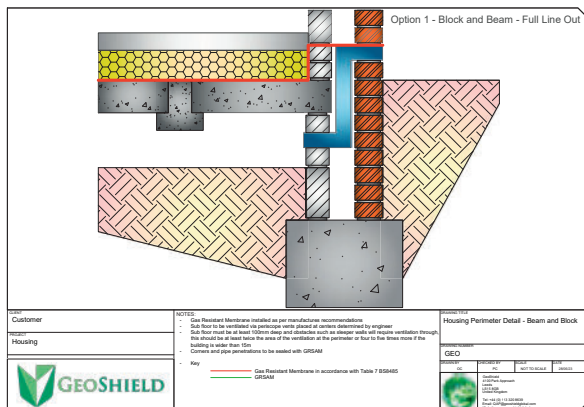
Comprehensive roof condition surveys are completed by the GeoShield Drone Survey team of pilots to provide an accurate plan of where your roof has been compromised, which can be further enhanced via thermal imaging technology.



CAD Design Service

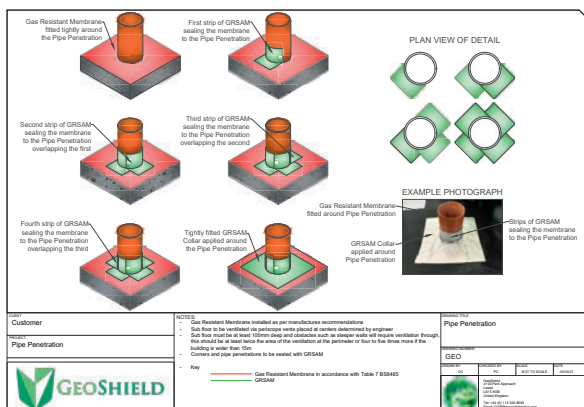


The GeoShield approach to the design of hazardous ground gas protection is unique, bespoke & project specific. With over 30 years of practical knowledge & experience in the construction industry our design team includes qualified NVQ Level 4 designers, engineers who are part of the GPVS CL:AIRE accreditation scheme and further specialists who are Certified Surveyor in Structural Waterproofing (CSSW) .



With this proven level of experience and our extensive knowledge of the hazardous ground gas industry; GeoShield can provide a design service which is fundamentally focused on putting together correctly risk assessed and buildable designs.

GeoShield operate a value engineered approach and provide both schematic and 3 dimensional drawings. In addition, we provide step by step methodology drawings to assist in the clear understanding of more complex applications to assist all parties involved in the process from the quantity surveyor to the installer.



GeoShield have £5,000,000 Professional Indemnity cover for both waterproofing and ground gas design. The advantage with GeoShield undertaking the design is that the installation is verified by officers who are already part of the *project Pre Construction team*

Training Seminars – Project Specific

GeoShield have been members of the CPD certification service since 2017, Providing recognised independent CPD accreditation compatible with global CPD principles. Work with the ground gas industry to educate on the reasons why and how we protect against ground gas. Our program of educational and practical modules are tailored for all tiers of the ground gas strategy.

- ✓ Client
- ✓ Main Contractor
- ✓ House Builder
- ✓ Manufacturer upskilling their team
- ✓ Installer
- ✓ Local Authority

GeoShield also operate an NVQ Level 2 upskilling course which assists installers gaining their NVQ Level 2 in ground gas installation by giving them an understanding

of what is required from them to make the evidence providing process more efficient.

GeoShield also work with the major gas membrane manufacturers providing an approved installer program targeted at primarily installers however there are modules for company management and specialist installers.



EMERGENCY Rapid Response Team

The GeoShield Rapid Response Team is here to assist.



Whether it's hazardous ground gas protection, new or existing roof waterproofing layers or liners for stormwater management, should your project be potentially hindered by delays the GeoShield Rapid Response team is ready to provide the fast, efficient service that you require to get your schedule back on track.



Speak to our
Rapid Response Team
on 0113 320 8828

Geoshield
Rapid Response Team
are available to all
divisions upon request.



Speak to The Geoshield Rapid Response Team on
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