

AGILE. EXPERIENCED. COLLABORATIVE.

CAPABILITY STATEMENT: POWER & ENERGY

Civil engineering consultancy specialising
in Power & Energy projects that contribute
to the Net Zero transition.



WHITFIELD
CONSULTING
SERVICES

CIVIL ENGINEERING FOR POWER & ENERGY INFRASTRUCTURE

CONTEXT

The global transition to more renewable sources of energy requires ambitious expansion of generation, transmission, distribution and storage capacity infrastructure – all delivered safely, efficiently, and sustainably.

At WCS, we provide robust and practical design solutions that support safe, coordinated construction, and efficient project delivery, across multiple disciplines.

WCS AT A GLANCE

- Clients include Hitachi Energy, Murphy, SSEN, Aureos, OCU, UK Power Networks Services, Linxon and M Group
- Major projects include Hornsea 3, London Power Tunnels 2, Monk Fyston BESS, and Eccles substation extension
- 300+ infrastructure projects delivered
- ISO 9001, 14001, and 45001 accredited

OUR VALUES IN ACTION

Agile. Fast, flexible responses to site constraints and operational demands.

Experienced. Proven delivery across complex energy infrastructure projects.

Collaborative. Effective integration with clients, contractors, utilities, suppliers and stakeholders.



“

WCS engineers have had plenty of site experience, which gives a better appreciation of what the construction team will eventually face. We don't often get that with designers. That's one of the strong points that WCS offers.

”

William Ross,
Project Director, Murphy

CORE SERVICES & OUR APPROACH

OUR CORE SECTOR EXPERIENCE

Our experience covers the design and delivery of civil engineering components for Power & Energy infrastructure, including:

- Grid & DNO projects
- Transmission & Distribution substations
- Grid stability projects
- Synchronous Condensers
- Static Synchronous Compensators (STATCOM)
- Gas Insulated Switchgear (GIS) buildings & structures
- Solar energy installations
- Battery Energy Storage Systems (BESS)
- Cable routes
- Waste heat integration
- Sector specific distribution networks: airports, ports, nuclear, and defence
- Electric vehicle charging infrastructure

SPOTLIGHT: SME COLLABORATION & CO-ORDINATION

We provide comprehensive support for our clients by drawing on a trusted network of partner organisations. Together, we can deliver a full multidisciplinary design service, while also providing the depth of expertise that only specialists can offer. Our clients benefit from our collective knowledge, experience, and integrated collaboration - enabling innovative, sustainable, and cost-effective project outcomes.

OUR SERVICES

- Front-End Engineering Design (FEED), feasibility & concept design
- Detailed civil and structural engineering design
- Temporary works design and Temporary Works Coordinator role during construction
- Design assurance
- Tender assistance and bid support
- Advanced CAD & BIM packages
- Survey support
- Construction support
- Multi-disciplinary design with trusted partners
- Principal Designer role
- Contractor Design Approval Engineer (CDAE) Substation Civil for National Grid schemes

OUR APPROACH

- Support from feasibility through detailed design and delivery.
- Tailored services to suit project and client requirements.
- Safety and constructability considered at every stage.
- Seamless integration with contractors, utilities, and operators.
- Sustainability embedded across all projects.

WHY CLIENTS CHOOSE WCS

- We pride ourselves on delivering creative and practical engineering solutions
- Detailed understanding of technical and regulatory demands
- Capability in both temporary and permanent works across multiple infrastructure environments
- The ability to respond quickly and solve problems efficiently
- Deep knowledge of integration between civils and electrical including extensive site knowledge and constructability
- Understanding other specialists and the needs of contractors

CASE STUDIES

We help deliver the infrastructure that supports the transition to Net Zero and a more resilient grid, ensuring a sustainable and secure energy future today and for future generations.

MONK FRYSTON BESS – POWERING 533,000 HOMES

Client: M Group Energy Services | End Client: SSE Renewables

In North Yorkshire, the 320 MW Monk Fryston Battery Energy Storage System (BESS) is one of the UK's largest, providing enough power for 533,000 homes for up to two hours. The scheme plays a key role in balancing renewable generation and demand, supporting a more stable and resilient grid.



WCS delivered civil and structural design for both the main BESS compound and the National Grid connection bay. The scope included site layouts, earthworks, drainage and fire-water containment, substructures, temporary works design, fencing and ongoing construction-phase support.

Through 3D terrain modelling and digital coordination, the team optimised designs for safety, sustainability, and programme efficiency.

KEY ACHIEVEMENTS:

- Optimised earthworks and drainage using 3D terrain modelling to reduce material export and cost
- Incorporated soil stabilisation and screw pile foundations, cutting embodied carbon by approximately 30%
- Implemented robust interdisciplinary coordination to prevent interface clashes and rework

LONDON POWER TUNNELS 2 – FUTURE-PROOFING THE CAPITAL'S ELECTRICITY

Client: Linxon | End Client: National Grid

National Grid's £750 million London Power Tunnels 2 (LPT2) programme is a landmark engineering project to modernise and future-proof the capital's electricity network. It will help to accommodate the growth of renewable generation connecting to the grid and enhance network resilience for decades to come. The project involves the construction of 32.5 km of 3m diameter underground tunnels, running beneath London, and connecting four existing and two new substation sites via high-voltage cables that form a critical part of the city's modernised transmission system.

WCS is contributing civil and structural engineering design for several key substation sites along the tunnel route. Using Autodesk Construction Cloud (ACC) Common Data Environment coordination, the team ensures effective integration between disciplines and stakeholders, while supporting safe and efficient construction within dense urban environments.

KEY ACHIEVEMENTS:

- Delivered civil and structural designs within restricted brownfield urban sites in a live substation environment
- Enabled effective real-time collaboration across multi-disciplinary design teams using digital platforms to inform the design process and address interfaces
- Supported safe construction within environments constrained by a multitude of underground services and sensitive infrastructure



HORNSEA 3 – CONNECTING THE WORLD'S LARGEST OFFSHORE WIND FARM

Client: Hitachi Energy | **End Client:** Ørsted

Ørsted's Hornsea 3 is set to be the world's largest offshore wind farm, located 120 km off the Norfolk coast. The £8.5 billion development will generate 2.85 GW of renewable electricity – enough to power over three million UK homes – transmitting to shore via HVDC subsea cables into a new HVDC converter station which in turn connects to Norwich Main Substation.

WCS is partnering with Hitachi Energy to deliver civil engineering design for the substation extension at Norwich Main. Our scope covers high-voltage plant foundation design, portable relay room bases, air insulated switchgear (AIS) and cable containment layouts incorporating precast trenches and ducting routes. The team also supports construction interfaces and technical coordination through to completion.

KEY ACHIEVEMENTS:

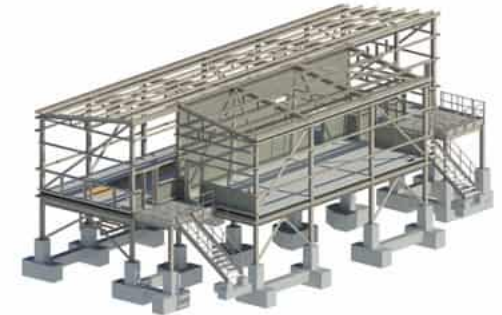
- Delivered foundation designs coordinated with electrical layouts and earthing systems
- Provision of construction support and Temporary Works Coordinator (TWC role) with close collaboration with the site team
- Applied sustainable material solutions and standardised design approach to reduce embodied carbon by up to 25%



DISTRIBUTION NETWORK OPERATORS (DNOs)

Whitfield Consulting Services (WCS) is involved in multiple projects delivering new and upgraded substations for DNOs. WCS's scope includes design works, starting from FEED and feasibility, through to detailed design of permanent as well as temporary works.

Bringing multi-disciplinary expertise through our supply chain, the substation switchroom buildings are designed to accommodate the primary electrical equipment and associated protection, control, and auxiliary systems, and typically comprise elevated steel frames with composite, insulated cladding.



In addition to the different substation building types, we have also designed new concrete bund foundations for transformer replacements, steel cable support structures, bespoke troughing and foundations for high voltage equipment. The civils scope also includes the provision of optimised earthworks design using 3D cut and fill assessments, and the detailed design of supporting infrastructure including new roads, fencing, foul and surface water drainage.

KEY ACHIEVEMENTS:

- Proven delivery of complex substation projects with strong knowledge of the DNO & Grid standards and requirements
- Ability to lead from early stage (FEED & feasibility) to detailed design
- Strong coordination across civil and electrical disciplines
- Experience working within live substation environments
- Established, standardised design processes and QA procedures which can be adopted immediately on new projects and frameworks

CASE STUDIES: POWER & ENERGY

UXBRIDGE MOOR 400KV/132KV SUBSTATION - SUPPORTING NETWORK RESILIENCE

Client: Murphy | End client: National Grid

The Uxbridge Moor Substation is a nationally significant infrastructure project in West London, supporting National Grid's programme to strengthen the UK's high-voltage transmission network.

Located within a constrained floodplain and former quarry environment, the site presented complex ground conditions, existing utilities, overhead transmission lines and the existing River Alder Bourne. WCS was appointed by Murphy to provide civil and structural design services from feasibility through to construction-phase support.

In detail, WCS delivered the permanent works design for 1.2 km of new access road and a 250 m operations road, together with the design of a new 26 m single-span bridge crossing the River Alder Bourne. The infrastructure forms the primary route for construction and long-term maintenance traffic into the substation site, including 220t transformer abnormal loads. The scope also encompassed the full highway and drainage design, flood relief structures, and a suite of utility protection and road safety measures.

A key challenge was designing the new access road for 220-tonne transformer deliveries across flood-prone terrain. The bridge was developed as a weathering steel and reinforced concrete composite structure, coordinated with hydraulic clearance and overhead line restrictions. WCS provided the permanent works design, and assisted development of the installation strategy, which included rolling pairs of steel girders into position, underneath existing overhead power lines.

KEY ACHIEVEMENTS:

- Delivered civil and structural design for major National Grid infrastructure.
- Designed access roads for 220-tonne transformer deliveries.
- Developed a 26-metre bridge within hydraulic and overhead line constraints
- Agile and collaborative response resulting in coordinated permanent and temporary works for the bridge.



CASE STUDIES: POWER & ENERGY

ECCLES SUBSTATION EXTENSION - INTEGRATING ADVANCED COMPENSATION TECHNOLOGY

Client: Hitachi Energy | **End client:** SP Energy Networks

The Eccles Substation Extension is the UK's first project to combine static and synchronous compensation equipment. Once operational, the site will deliver up to 280 MW, enough to power over 360,000 homes, supporting renewable energy integration and stabilising the grid.

WCS provided civil and structural engineering services, with the scope including design assurance, value engineering, civil tender support, specialist foundation design, and full-time Resident Civil Engineer oversight. We ensured QA compliance, resolved technical queries, and facilitated liaison between contractor and client.

Temporary works were planned and coordinated to support crane and piling platforms, heavy equipment installation, gantry lifting arrangements, and delivery of 200+ tonne synchronous compensator machines. Self-Propelled Modular Transporter (SPMT) transfers and transformer installations were incorporated into site logistics.

KEY ACHIEVEMENTS:

- Designed piled raft foundations for the +300T Synchronous Compensator equipment.
- Optimised structural designs to reduce steel usage while meeting standards.
- Coordinated delivery and installation of 200+ tonne units.
- Provided full-time on-site Resident Civil Engineer support.
- Applied Glass Fibre Reinforced Polymer (GFRP) technology to STATCOM foundations to reduce embodied carbon.



CASE STUDIES: POWER & ENERGY

DOGGER BANK WIND FARM CONNECTIONS - SUPPORTING RENEWABLE ENERGY

Client: Hitachi Energy | **End client:** SSE Renewables, Equinor and Vårgrønn

Dogger Bank Wind Farm is a major renewable energy infrastructure project being delivered in three phases, Dogger Bank A, B and C. Collectively, the three phases form the world's largest offshore wind farm.

WCS completed initial and detailed civil engineering design for activities centred on Creyke Beck Substation, supporting the Dogger Bank A and B connections for Hitachi Energy.

WCS provided civil engineering design for new 400kV Gas Insulated Switchgear (GIS) and Air Insulated Switchgear (AIS) foundations, alongside wider civil and structural design services, temporary works coordination, site inspection and oversight of civils works.

The connection works for Dogger Bank A and B were successfully energised in October 2023.

KEY ACHIEVEMENTS:

- Contributed to critical grid connection infrastructure for Dogger Bank A and B, enabling power receipt from the world's largest offshore wind farm.
- Coordinated civil design input across numerous project stakeholders.
- Supported construction delivery through site inspection and civils oversight.
- Design and Temporary Coordination continues on Dogger Bank C.



CASE STUDIES: POWER & ENERGY

VIKING LINK - CONSTRUCTION-PHASE SUPPORT AT BICKER FEN SUBSTATION EXTENSION

Client: Linxon | **End client:** National Grid

Viking Link is a major electricity interconnector project connecting the UK and Denmark. As part of the scheme, Bicker Fen 400/132kV Substation required an extension to support the new connection.

WCS was appointed by Linxon to provide civil engineering consultancy and design support throughout the construction phase, with input provided across equipment base plates, equipment foundations, HV duct and cable trough routes, fencing, pile testing specifications, 3D cut and fill analysis, and bus coupler block house access.

A key project requirement was to respond quickly to client requests and provide timely design solutions, minimising disruption to the construction programme. WCS reviewed available information, assessed options with the client and developed solutions that made effective use of existing works wherever possible.

WCS drew on its experience, knowledge and in-house CAD and BIM capability to respond quickly as each requirement arose.

KEY ACHIEVEMENTS:

- Responded rapidly to construction-stage client requirements across multiple civils elements.
- Developed practical design solutions using existing works wherever possible.
- Mobilised CAD, BIM and civil engineering capability to support timely design coordination.



CASE STUDIES: POWER & ENERGY

BLACKHILLOCK BESS - FEASIBILITY CIVIL & STRUCTURAL DESIGN

Client: Noriker Power Ltd | **DNO:** SSEN

WCS was appointed to provide a feasibility study for a proposed 300MW Battery Energy Storage System (BESS) at the Blackhillock site in Keith, Scotland. The scope included civil and structural feasibility for site layout, earthworks, non-structural earth bunds, stormwater and firewater drainage, substructures for transformers, Gas Insulated Switchgear (GIS) buildings, batteries, and ancillary equipment, retaining structures, acoustic barriers, and internal access roads. This included assessment of constructability, access, and long-term maintainability to support subsequent detailed design stages.

A site visit was carried out to assess existing conditions and potential constraints, supporting detailed evaluation of ground conditions and informing cut-and-fill strategy, foundation approach, and constructability considerations.

KEY ACHIEVEMENTS:

- Proposed feasibility civil and structural designs for all major BESS and GIS substation elements.
- Developed 3D terrain optimisation to reduce material import/export and lower retaining-wall heights.
- Recommended modular green screening and vegetated retaining walls to integrate visual and environmental considerations.
- Defined the drainage strategy to manage stormwater and firewater safely while limiting site impact.



CHIPPENHAM BULK SUPPLY POINT (BSP) SUBSTATION UPGRADE - CIVIL & STRUCTURAL DESIGN

Client: Aureos | **End client:** SSEN

WCS was appointed to deliver civil and structural design services for the Chippenham 132/33kV BSP Bulk Supply Point (BSP) substation upgrade, supporting the scheme from early-stage feasibility through to detailed design.

The civil scope undertaken by WCS comprised the detailed design of the 33kV Gas Insulated Switchgear (GIS) building, 132kV transformer bund, access roads, and perimeter fencing. In addition, WCS developed the civil and structural design for the 132kV AIS compound, including high-voltage steel structures and their foundations, cable containment systems comprising troughs and ducts, and integration with future development layouts.

The project required resolving key substation constraints through coordinated design. This included:

- Extending the substation compound to position the GIS building to a safe distance from high-risk areas, including the transformer fire zone, with corresponding adjustments to the fence line.
- Demolition layouts were developed to identify structures for removal in coordination with the electrical team.
- Special considerations were incorporated for the switchgear delivery and installation, including access routes, landing platforms, and structural criteria, supported by constructability reviews.
- Production of tailored detailed survey specifications to ensure all essential information was captured, including site levels, ground conditions and buried services.

KEY ACHIEVEMENTS:

- Delivered detailed civil and structural designs for both 33kV and 132kV elements.
- Successfully managed constrained site conditions and live operations.
- Coordinated across civil and electrical disciplines for installation and compliance.
- Applied standardised design processes and QA procedures aligned with SSEN requirements.
- Supported phased construction while maintaining operational flexibility.



CASE STUDIES: POWER & ENERGY

WILLOWDALE 132/33KV SUBSTATION - TRANSFORMER BLAST STUDY

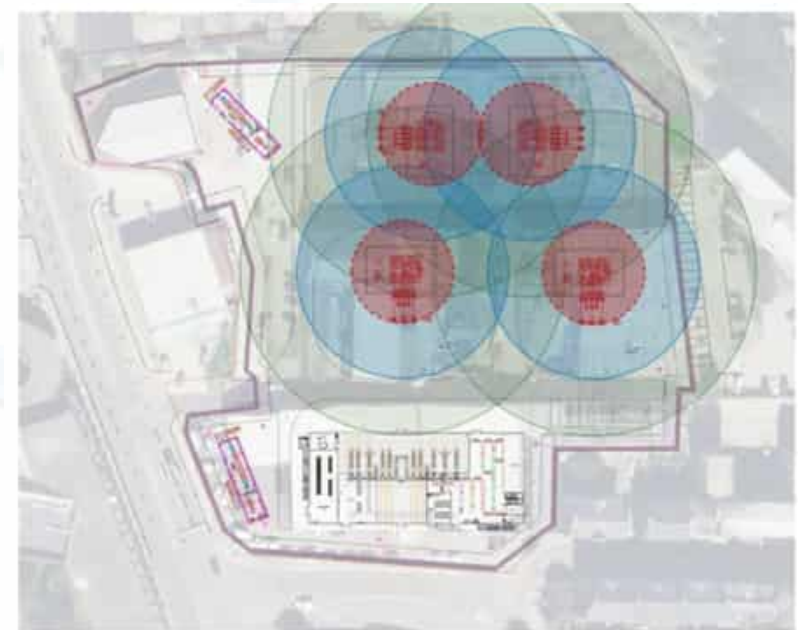
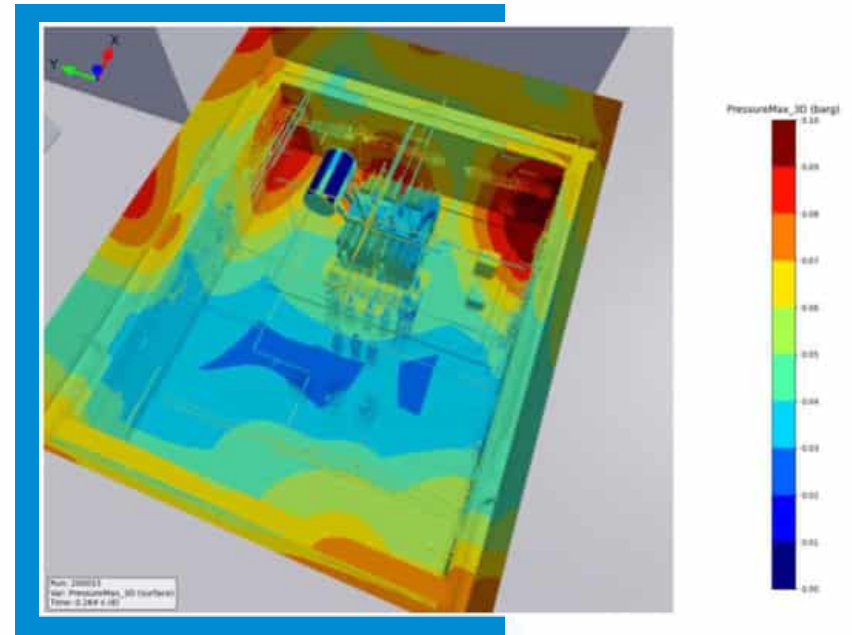
Client: SSEN | End client: SSEN

Whitfield Consulting Services (WCS) was appointed by Scottish and Southern Electricity Networks (SSEN) to deliver a transformer blast assessment for the Willowdale 132/33kV Substation in Aberdeen. Located within a densely populated urban area, the project required a robust structural assessment to ensure the safe integration of four new 120MVA ester-filled grid transformers while protecting nearby residential, commercial and critical infrastructure.

Working alongside our blast specialist, WCS led the structural design assessment using advanced Computational Fluid Dynamics (CFD) simulations in FLACS, to evaluate the effects of potential transformer failures under a range of internal arc fault scenarios. The study compared enclosed transformer buildings with open-air installations, considering varying levels of protection system performance, pressure relief devices and tank rupture events.

The results demonstrated that enclosed transformer buildings experience significantly higher internal overpressures, up to 0.24 bar global and 0.69 bar local in worst-case scenarios, while open-air installations produce much lower external blast loads.

The resulting recommendations informed blast-resistant structural design, ventilation strategies and fire-resilient building solutions, providing SSEN with a robust technical basis for the next stage of design. The project enhanced the resilience, safety and long-term operational reliability considerations of this critical electrical infrastructure while supporting safe development within a constrained urban environment.



CASE STUDIES: POWER & ENERGY

KEITH BESS - DETAILED DESIGN

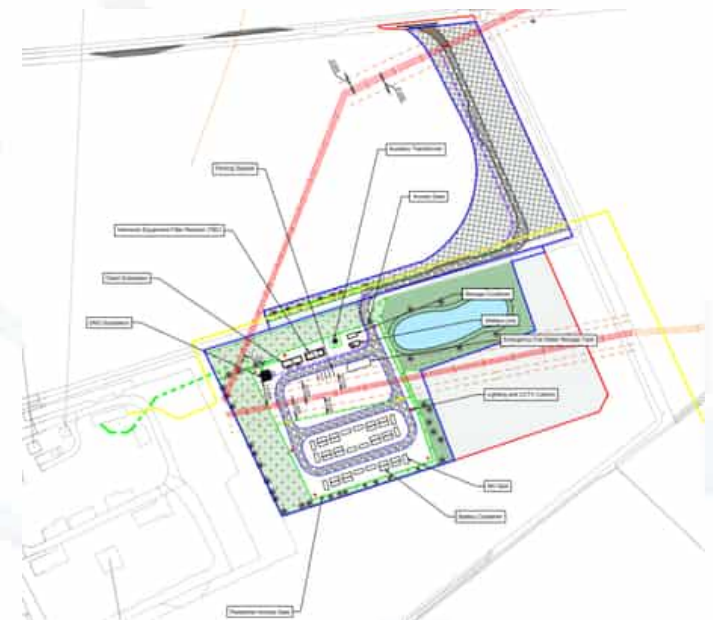
Client: RJ McLeod | **End client:** Field Keith Limited (KFL)

The Keith BESS project comprises a 39 MW, 5-hour battery energy storage facility on greenfield land adjacent to Drum Road, Keith. Whitfield Consulting Services (WCS) were appointed by RJ McLeod as civil and structural designer, covering the site layout, earthworks, access roads, drainage and firewater containment, substructures for all equipment, fencing, cable routing, and construction-phase support.

Key challenges include coordinating with a separately appointed electrical designer, developing compliant stormwater and firewater retention systems on an impermeable site, and delivering accelerated design packages to meet programme pressures. WCS addressed these through structured interdisciplinary coordination, early definition of electrical interfaces, and a clear design responsibility matrix. Early hydrological and hydraulic modelling enabled an optimised, dual-function SUDS basin, while fast-tracking design and early contractor engagement supporting constructability.

Value engineering focused on minimising off-site spoil, reusing in-situ materials, and adopting a ground-bearing foundation strategy aligns with site conditions. Precast foundation options were explored to improve quality, safety, installation speed, and weather resilience.

The outcome was improved civil-electrical integration, reduced interface clashes, and timely release of critical design packages. Optimised foundations and coordinated layouts supports programme certainty and long-term asset stability.



CASE STUDIES: POWER & ENERGY

SEAGREEN ONSHORE WIND FARM SUBSTATION, TEALING (LINXON) - DETAILED GEOTECHNICAL & DRAINAGE FEASIBILITY Client: Linxon | End client: SSE Renewables

Whitfield Consulting Services (WCS) was appointed by Linxon to deliver geotechnical and drainage engineering support for the Seagreen Onshore Wind Farm Substation at Tealing Airfield, Dundee—critical infrastructure enabling one of Scotland's largest offshore wind projects.

Our client needed geotechnical expertise to produce a Ground Investigation Report (GIR) and a Geotechnical Design Report (GDR) following extensive site surveys and investigations for the onshore substation (ONS). WCS produced detailed ground models to ensure compliant and accurate piling design and to address complex earthworks constraints, investigating the use of different soil strengthening strategies to ensure long-term performance.

Following a last-minute change in permissions for the surrounding land use, our expertise was again called on to assess and design a change in the surface water drainage for the substation's main access road. The proposed redirection needed detailed hydraulic modelling for over half the length of the road and the assessment of multiple cases of potential storm events and climate change scenarios to ensure compliance with the client. WCS were able to quickly assess the feasibility of several potential solutions, ultimately providing our client with the most practical and buildable option.

Through collaborative engineering processes and a dynamic, multi-disciplinary approach, WCS provided Linxon with practical, buildable, compliant solutions—supporting safe delivery of a major renewable energy asset aligned with the UK's Net Zero ambitions.



SUSTAINABLE PRACTICES

Sustainability is embedded in the way WCS designs and delivers infrastructure. Our team considers carbon reduction, material efficiency, and asset longevity from the earliest stages of every project.

Sustainable practices include:

- Life-cycle carbon assessments included at feasibility stage.
- Strengthening and reuse prioritised over new-build wherever feasible.
- Specification of sustainable materials and a focus on material efficiency

Project example: National Grid Portable Relay Rooms

WCS led the foundation redesign for four Portable Relay Rooms at a National Grid site. By transitioning from a ground-bearing raft to perimeter strip foundations, we reduced concrete use by over 50%, delivering both material and cost efficiencies. We progressively refine our designs from feasibility through to detailed design to maximise sustainability.

Recognised for leadership in sustainability

Our work has been recognised across the industry, leading to WCS being named winner at the New Civil Engineer Awards in the Environmental, Social and Governance (ESG) Leader category.

“We’re passionate about the critical role civil engineering plays in creating more sustainable infrastructure, and we’re committed to doing our part. We believe our greatest impact lies in the projects we deliver: targeting those that promote sustainability and help to achieve Net Zero goals.”

Asa Whitfield CEng, FICE, FCI Arb,
Managing Director, WCS



GOVERNANCE & ACCREDITATION

Consistent excellence is underpinned by a strong foundation of formal governance and industry-recognised standards.

Our commitment extends to robust internal processes, including document control, use of Common Data Environments (CDEs), and ongoing compliance with evolving industry best practices.

We hold ISO 9001 (Quality Management), ISO 14001 (Environmental Management), and ISO 45001 (Health & Safety Management), alongside Power & Energy accreditations and qualifications such as Contractor Design Approval Engineer (CDAE) Substation Civil for National Grid schemes and National Grid Person (Substation) training.

These accreditations guide our operations and ensure high standards across quality, sustainability, and team wellbeing.



Cert No. 20550



Cert No. 20550



Cert No. 20550



CONTACT DETAILS & LEADERSHIP

With offices in London, Edinburgh and Northern Ireland, we are a dynamic and expanding company built on a clear vision and a committed team. With over 40 high profile clients, WCS has built a reputation for excellence in civil and structural engineering.

Our leadership team includes:

Jeremy Barnes CEng, FStructE, MICE – Technical Director

Nick Lowe BEng(Hons), CEng, MICE – Director

Dr Natalja Petkune BEng, MSc, PhD, AStructE CEng – Director

Kirsty Glover CEng, MICE, MBA, MEng – Associate Director

David Crumley – CAD & BIM Manager

CONTACT US

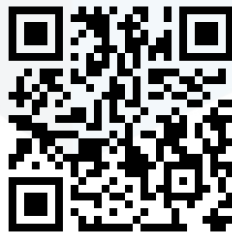
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“ They’re really good, really professional. They do exactly what they say they will in terms of deliverables and they’re really lovely people to work with. ”

Sharon Harrison,
Operations Manager, Hitachi Energy

SOME OF OUR CLIENTS:





WHITFIELD
CONSULTING
SERVICES