



part of the **Natural Power** group



# DEVELOPMENT SUPPORT

**We provide full desktop and field-based studies for site evaluation. This includes site visits from our expert team skilled in construction, wind analysis and ecology to assess major issues relating to permitting, wind engineering, access and construction.**

Our services include:

- **DETAILED FEASIBILITY STUDIES**
- **LAYOUT DESIGN & OPTIMISATION**
- **ECOLOGY SERVICES**
- **HYDROLOGY SERVICES**
- **GRID CONNECTION STUDIES**
- **GIS MAPPING**
- **ACCESS STUDIES**
- **PRELIMINARY CIVIL & ELECTRICAL DESIGN**
- **CONSTRUCTABILITY STUDIES**
- **PRELIMINARY GEOTECHNICAL STUDIES**
- **PHOTOMONTAGES & WIREFRAMES**



# OUR QUALITY OF WORK AND SYMPATHETIC DEVELOPMENT PROCESS IS DEMONSTRATED BY OUR UNRIVALLED CONSENTING RECORD ON MORE THAN **2000** MW OF CLIENT PROJECTS BOTH ONSHORE & OFFSHORE



Robin Rigg Wind Farm | E.ON UK

## DETAILED FEASIBILITY STUDIES

We provide a detailed assessment of relevant issues and further reporting on:

- Site topography and potential development area
- Ecological designations (Nature Reserves, National Stakeholder Sensitivity Mapping, RSPB Important Bird Areas etc.)
- National & local designations
- Civil and MoD air traffic & radar constraints
- Historic designations
- Potential neighbour constraints (Noise Sensitivity)
- Other Regional Constraints
- Infrastructure
- Local and Regional Planning Policy Review
- National Policy Review
- Local Politics and Competitor Activity
- Ecology / Hydrology
- Potential Site Design & Capacity
- Visuals, including review of Zone of Theoretical Visibility Maps and preparation of key View Point wirelines
- Initial wind resource and energy yield modelling
- Grid capacity and availability
- Access & Construction requirements
- Land and legal requirements
- Screening and preparation of Scoping Exercise
- Site infrastructure layout, optimisation and ground truthing
- Recommendations for progression to ES submission and determination of planning

## LAYOUT DESIGN & OPTIMISATION

Natural Power have a proven track record in designing realistic wind farm layouts that optimise the balance between a wide range of technical, environmental and physical constraints and parameters, typically including the following design aims:

- Maximise wind turbine energy yield
- Minimise cost of energy (all project costs)
- Minimise wind flow quality issues
- Minimise environmental impact (ecology, noise, visuals etc.)
- Recognise ground slope and soil conditions to optimise construction activities
- Avoid infrastructure conflicts (pipeline, microwaves etc.)
- Consider future asset management activities and health & safety issues



Our ultimate aim is to deliver realistic wind farm layouts that are consentable, buildable, financable and operable.

We apply our skills throughout the project lifecycle including:

- Conceptual layout studies to inform early project feasibility
- Intermediate designs, iterating through the development cycle
- Optimised final designs for consenting, financing and construction

We have designed over 800MW of consented wind farms onshore, and 1200MW offshore.

## ECOLOGY SERVICES

The choice of Ecology Services is highly dependent on the needs of a particular site both onshore and offshore. Natural Power have extensive experience determining a Client's specific needs and designing a portfolio of services tailored to the site or zone in question. This custom approach assures that the necessary assessment is made in detail with experience, knowledge and a pragmatic approach.

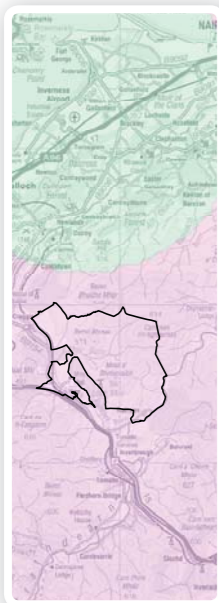
Our ecologists work closely with in-house wind analysts, construction engineers and development project managers to ensure that ecological constraints are mitigated or built into project design from the earliest stage to reduce any impact on the environment through construction or operation. Natural Power mitigation measures and strategies have been instrumental in developing sites with positive conservation gain in mind for both developers and regulators alike.

An Ecological Impact Assessment (EclA) forms a significant part of an Environmental Impact Assessment (EIA) which is obligatory for most renewable projects. For small-scale developments not requiring a formal EIA, a more targeted approach to EclA is usually required. We can handle whichever assessment is most appropriate for your proposed project.

We provide complete end-to-end ecology services including:

- Site design due to ecological constraints
- Baseline, construction and post-construction Habitat & Wildlife Surveys
- Ecological Mitigation
- Ecology Management of survey schedules, specialist sub-contractors and large-scale projects
- Habitat Management Plans





## HYDROLOGY SERVICES

Natural Power hydrologists have considerable experience in the following:

- Hydrology, hydrogeology and geology assessments for wind farm EIAs
- Peat stability risk assessments in conjunction with in-house geotechnical specialists
- Peat restoration in conjunction with in-house ecologists
- Surface and groundwater monitoring programmes in conjunction with in-house ecologists
- Water table measurements
- Rainfall monitoring
- Water management plans
- Pollution prevention plans and environmental management plans
- Input into construction method statements
- Assessment of watercourse crossings
- Site drainage advice in line with the principals of Sustainable Urban Drainage Systems (SUDS)
- Flood risk assessments
- Private water supply risk assessments and subsequent protection plans
- Advice to developers on the requirements of the Water Framework Directive 2000/60/EC (WFD)
- The Water Environment and Water Services (Scotland) Act 2003
- The Water Environment (Controlled Activities) (Scotland) Regulations 2005

Our hydrologists also have extensive experience in discharging planning conditions required for consent and have acted in an advisory role prior to and during construction to ensure that the development does not have an impact on the surface and groundwater environment.

## GRID CONNECTION STUDIES

We routinely provide grid connection studies for wind farms as part of our construction and development services, ranging from single turbine connections or wind farms under 5MW, through to multi-megawatt onshore and offshore wind farms. These studies typically coincide with initial site selection and production studies. Grid connection studies are undertaken to identify the main equipment ratings using loadflow and fault level analysis, through to full grid code compliance studies requiring detailed transient and harmonic analysis.

## GIS MAPPING

Natural Power have an experienced GIS department that provide integrated services to our clients. These include ArcGIS and Autocad. In addition we also provide offshore GIS services:

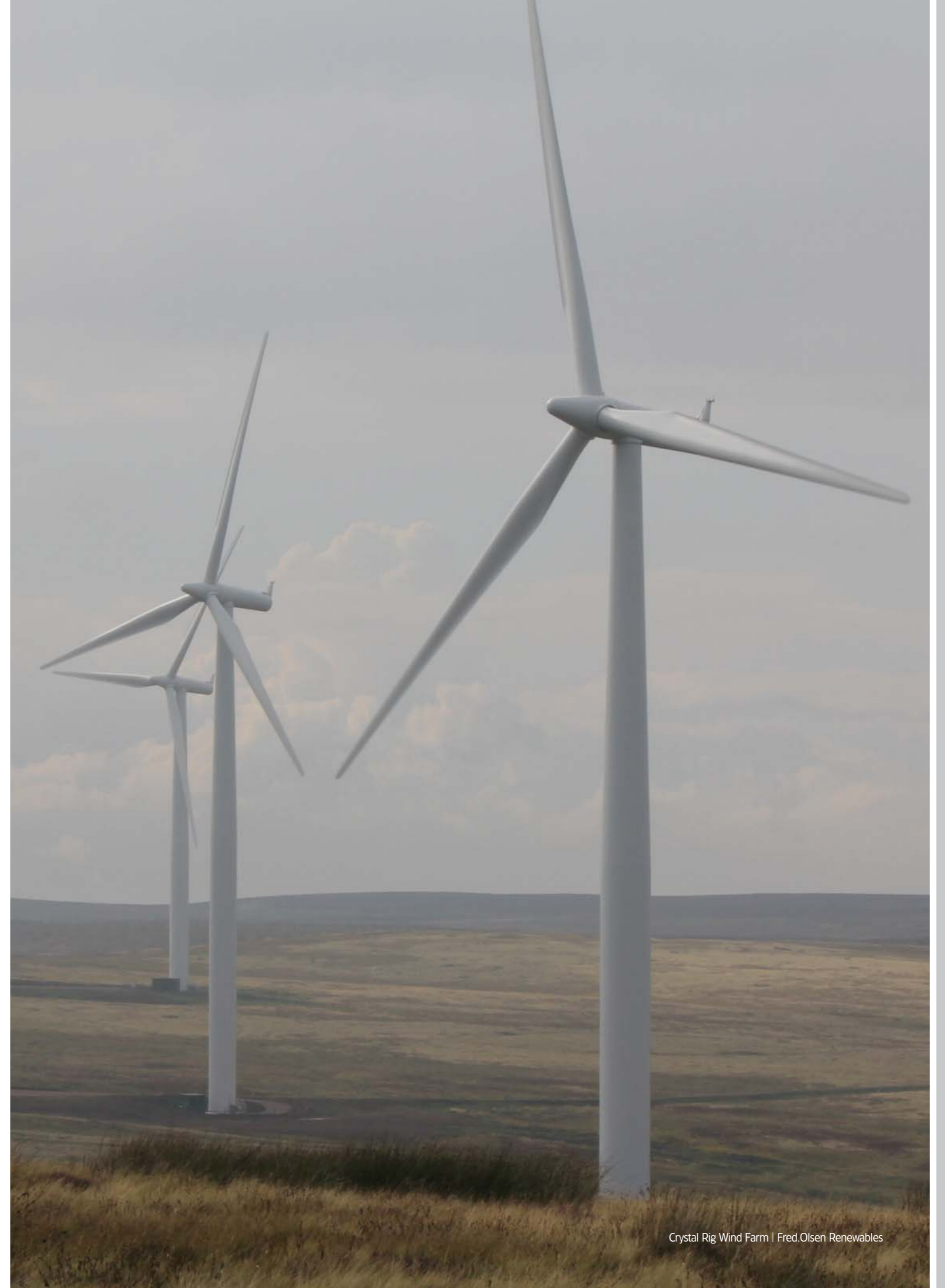
**SeaPlanner GIS Server** – a hosted server utilising industry leading technology that allows users to manage and edit GIS databases from multiple locations.

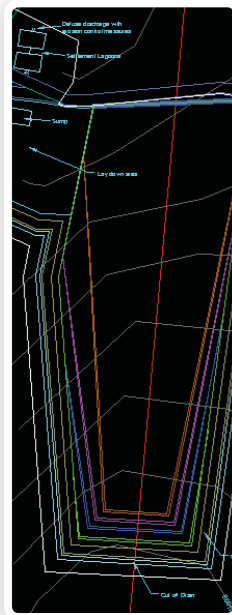
**SeaPlanner WebGIS** – a web mapping service to publish and host GIS data as a multi-layered web map with simple GIS tools suitable for sharing GIS data with project teams and contractors.

**SeaPlanner Data Catalogue** – a GIS data portal that allows suppliers to submit compliant data and metadata and users to search and query data layers, metadata and users to search and query data layers, meta data, suppliers and published maps.



Offshore these services are provided in partnership with SeaRoc, part of the Natural Power group





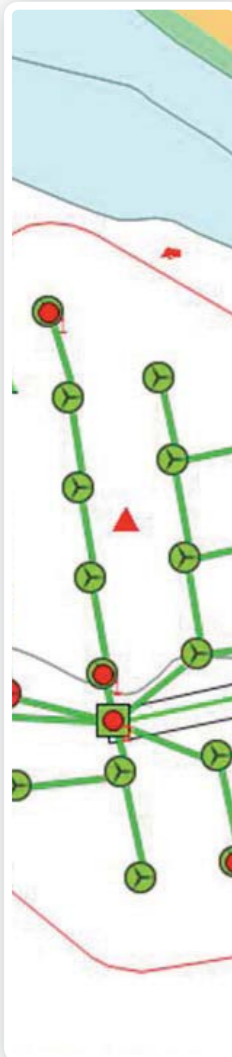
## ACCESS STUDIES

Natural Power carry out detailed desk based and on-site investigations to determine the feasibility of public access for large scale wind turbine components and other associated abnormal loads. Factors considered include:

- Road alignment
- Weight restrictions
- Vertical clearance
- Other factors that may restrict delivery to site
- Identifying upgrade to existing infrastructure or third party land that may be required

Software tools for Swept Path Analysis such as AutoTrack and consultations with relevant local authorities are also carried out to highlight any issues and further determine the viability of proposed access routes.

Establishing and resolving access constraints through detailed investigations are vital during the development of a wind farm as failure to consult with relevant local organisations or ascertain the required upgrades can result in project delays and increased project costs.



## CONSTRUCTABILITY STUDIES

Natural Power provides valuable assistance regarding site infrastructure, access options and other construction related issues during the preparation of the Environmental Statement (E.S.) in order to gain planning permission for a wind farm project. We offer:

- Desk based assessments of current data held about the site
- Ground truthing to assess constructability
- Access studies to identify constraints and solutions
- Desk based redesign to take into account the information gained from the above
- Preparation of relevant E.S. sections for incorporation into overall document-
- Detailed project description and construction methods
- Geology, hydrology and hydrogeology
- Traffic and access assessments
- Peat slide assessments (including fieldworks, analysis and reporting)
- Traffic and access assessments

As projects move further offshore a clear and concise installation strategy is vital to save both time and capital, we offer the following offshore services:

- Design and appraise tenders for installation contractors
- Optimise vessel spreads for each activity
- Establish vessel capabilities and compare installation times
- Emergency contingency planning
- Management of offshore operations

Natural Power assists clients in planning of operations at sea to increase the safety and efficiency whilst reducing project cost and risk.



Offshore these services are provided in partnership with SeaRoc, part of the Natural Power group



## PRELIMINARY GEOTECHNICAL STUDIES

Natural Power provides geotechnical desk studies and walkover assessments of engineering geology constraints to development including:

- Geomorphology and terrain
- Aerial photographic interpretation
- Geohazard identification (e.g. mining assessment, slope stability, voids, UXO)
- Peat stability assessment
- Borrow pit identification, investigation, quantification and mineral applications.
- Site infrastructure layout, optimisation and ground truthing
- Hydrogeology
- Swept Path Analysis (SPA)

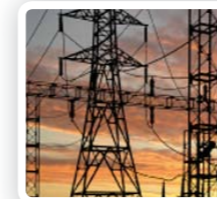
These geotechnical and environmental studies are available both onshore and offshore.



## PHOTOMONTAGES & WIREFRAMES

A Landscape and Visual Impact Assessment (LVIA) is part of the Environmental Statement (ES) and therefore part of the overall planning process. LVIA involves assessing the effects of a wind farm development upon the landscape and the process includes the identification of viewpoints from which the anticipated effects upon both the landscape are assessed for example local villages.

Natural Power provides wireframes and photomontages of the proposed wind farm to illustrate the development from the agreed viewpoints. We have experience across a range of developments including projects in, or close to, sensitive historic and designated landscapes, such as National Parks and Areas of Outstanding Natural Beauty.



## PRELIMINARY CIVIL & ELECTRICAL DESIGN

- Design location of the infrastructure for a wind farm based upon site constraints and agreed turbine locations
- Grid connection routes can be reviewed with options supplied to clients which can be carried out in conjunction with the grid operator

## PROJECT LIST

PROJECT	LOCATION	MW	PROJECT	LOCATION	MW	PROJECT	LOCATION	MW
Crystal Rig 1	Scotland	50MW	Paul's Hill 1A	Scotland	9.2MW	Robin Rig Offshore	Solway Firth	180MW
Bowbeat	Scotland	31.2MW	Mid Hill 1	Scotland	50MW	Rosehall	Scotland	24.7MW
Deucheran Hill	Scotland	15.8MW	Windy Standard 1	Scotland	21.6MW	Brenig	Wales	40MW
Crystal Rig IA	Scotland	12.5MW	Windy Standard 2	Scotland	90MW	Crystal Rig 2A	Scotland	27MW
Crystal Rig 2	Scotland	164MW	Codling Bank	Irish Sea	110MW	Mid Hill 1A	Scotland	75MW
Roths	Scotland	50.6MW	Paul's Hill 1	Scotland	55.2MW	Camster	Scotland	50MW
Roths 2	Scotland	45MW	An Suidhe	Scotland	19.2MW	Pogbie	Scotland	51MW

### ISO CERTIFICATION

Natural Power have established rigorous procedures and work instructions for all aspects of our business. All staff currently work to a list of core procedures for quality & environmental business management. Full details of our integrated QE management system are available on request. The following scopes for ISO 9001:2008 have been achieved, applicable to all our UK operations:

#### Technical Services UK

Resource management, analysis, modelling and design for the pre-construction phases of onshore and offshore renewable energy projects, including the application of tools and the methods of assessing complex flow environments for wind, wave and tidal environments.

#### Development Consultancy Services

Project management, consent management, due diligence and consultancy services including initial site feasibility studies, land agreements, management of the EIA process and planning applications, stakeholder consultations, permitting and discharge of planning conditions of renewable energy projects (onshore & offshore wind, wave, tidal, biomass, PV, hydro and associated infrastructure).

#### Construction & Ecology Management Group

Project management, due diligence and consultancy services (to include pre and post construction phases) for the construction of wind farms and biomass energy projects with associated site investigation services and onshore/offshore ecological services.

#### Asset Management

Wind farm operational site management.

