CASE STUDY

HALLBURN WINDFARM

EARTHING DESIGN

PROJECT

Hallburn Windfarm is a 13.2MW wind farm, consisting of six 2200kW wind turbines sited on an abandoned WWII airstrip at Hallburn Farm, Longtown, Carlisle, CA6 5TW. The Wind Farm is connected via a looped connection to the ENWL 33kV distribution network where both underground 33kV cable circuits terminate onto overhead lines (OHL) at the site boundary.

UCE INVOLVEMENT

UCE were contracted to undertake the earthing system design for the whole Hallburn Windfarm.

PROJECT DATES

Project Start Date:	May 2017
Submission Date:	July 2017

END CLIENT

REG Power Management

PROJECT OUTCOMES

One of the main functions of an earthing system is to ensure personnel safety during earth fault situations.

When an earth fault occurs, the earth return fault current, in conjunction with the resistance to earth of the earthing system, results in an Earth Potential Rise (EPR) at the site. This EPR reflects the voltage rise on the earthing system where hazardous touch, reach-touch and step voltages, can arise due to the voltage differences between the items of plant and the surrounding soil. It is essential that each item of plant is sufficiently earthed and the below ground conductors are effectively arranged so that safety to personnel is ensured.

The project involved designing the earthing system for both the contestable (combined DNO Metering and Customer Substation) and private installations. The respective wind turbines are bonded together via an earthing conductor installed in the HV cable trenches.

Once constructed, UCE measured the site resistance by means of a Fall of Potential (FOP) test, to compare the site resistance against the design. FOP tests were also performed on each of the individual wind turbine units to confirm their standalone resistance.

PERFORMANCE

The soil resistivity measurements were provided by the client as part of the geo technical report.

The results were modelled in the CDEGS-RESAP software suite, to obtain a soil model at each of the turbine locations and an overall soil model for the entire site. This enabled the standalone resistance of each turbine to be modelled, as well as the site as a whole.

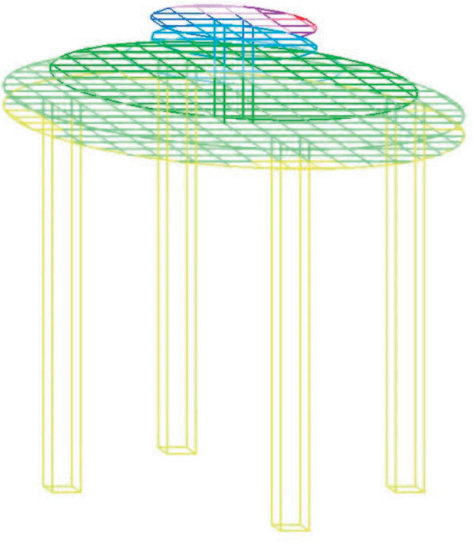
The earthing system was designed to ensure touch and step voltages are safe across the site. This model also included verification of nose to legs and forelegs to hind legs voltage limits for sheep. This confirmed that the area is safe for sheep, so that they can be farmed across the site.

The FOP confirmed that the individual turbine and overall site resistances as a whole, aligned with the designed values. The overall installed site resistance was measured to be lower than the design, therefore confirming the touch and step voltage are safe across the site.

SPECIFIC REQUIREMENTS

It is important consider what the land surrounding the installation will be used for.

The land owner in this instance wanted to ensure that it would be safe to farm sheep across the site. Therefore, the site EPR was controlled so that the nose to legs and forelegs to hind legs voltage limits for sheep were not exceeded.



Modelled Voltage Rise of Earthed Rebar Inside Wind Turbine Foundation

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If you have any issues with your installed earthing system or require a new earthing design, please get in touch with our experts at UCE.

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