# Case Study

## Hornsea 3 Windfarm, Norfolk

SDS safeguards green energy production from the threat of flooding


### SDS Systems
SDS GEOlight® Attenuation Tank;
SDS Weholite Manholes.

### Client
P.J. Hegarty & Sons.

### End Customer
Ørsted (formerly DONG Energy);
Hitachi Energy.

### Project
Hornsea 3 Wind Farm.

### Purpose
To help UK Government deliver on its commitment to decarbonise power generation through the installation of 50 Gigawatt offshore wind farms by 2030 as part of the British Energy Security Strategy.

### Brief to SDS
To deliver a surface water attenuation system to the onshore electricity processing complex.

### Timing
The main construction phase started in May 2023 and is expected to continue until March 2026.

### Project Background Information
Hornsea 3 is the third in a planned cluster of four Gigawatt-scale offshore wind farms and is located approx. 75 miles off the Norfolk coast and 100 miles off the coast of Yorkshire in the Humber region of the North Sea. Upon completion of Hornsea 4 in 2027 this whole scheme will be the world's single largest offshore wind zone.

These wind farms are a new generation of offshore power stations - further from the coastline than ever before, and at a scale which is a step-change in size from current wind farms.

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The 2.9GW, £8 billion Hornsea 3 wind farm will include around 230 wind turbines, covering an area of 696km$^2$, and generate enough energy to meet the average daily needs of over 3 million homes. It will be operated from Ørsted's operations and maintenance hub in Grimsby and will support, both directly and within the supply chain, up to 5,000 construction jobs, with an additional 1,200 permanent positions anticipated during its anticipated 35 year-long operational phase.

Onshore cables totalling around 150 miles in length will connect the offshore wind farm from the North Norfolk coast at Weybourne to a new, onshore High Voltage Direct Current (HVDC) converter substation, which will, in turn, connect to the Norwich Main National Grid substation, located to the south of Norwich.

The new substation/converter complex, at a site north-west of Mangreen Hall, will consist of a range of equipment for the delivery of power to National Grid such as transformers, reactors and ancillary and supporting equipment.

## Project Objectives

To minimise the impacts on flood risk and hydrology of the construction, operation, maintenance, and decommissioning phases of the new HVDC substation.

## Project Requirements

To ensure that the site, which is located in a Flood Zone 1, can withstand extreme rainfall without risk of flooding and to help protect watercourses, streams, drains and waterbodies downstream of the site from contamination by flood water.

The new development should be constructed in line with the requirements of the National Planning Policy Framework and Planning Policy Guidance ID7 – Flood Risk and Coastal Change, requiring that new developments attenuate surface water runoff where practicable to the greenfield runoff rate through a surface water management plan and/or drainage scheme.

## SDS Product Features

A SDS GEOlight® attenuation tank, with a capacity of circa 4800m$^3$, together with Weholite HDPE manholes, have been installed. A temporary sewer pipe was installed prior to the introduction of the tank and subsequently removed and replaced by the Weholite pipe running through the tank.

## Issues Overcome

The development of the HVDC substation will result in the construction of low permeability surfacing, increasing the rate of surface water runoff from the site. The surface water drainage scheme was required, therefore, to ensure the runoff rates to the surrounding water environment are maintained at pre-development rates.

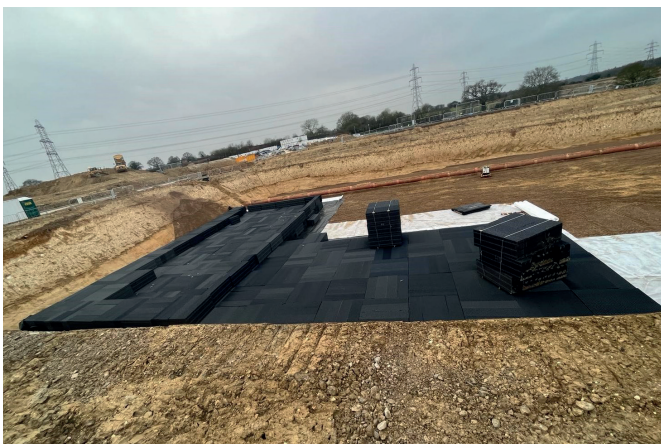
## Results

The detailed design of the surface water drainage scheme has been based on a series of infiltration/soakaway tests carried out on site and the attenuation volumes outlined in supporting Flood Risk Assessments. The tests were undertaken prior to construction and in accordance with the BRE Digest 365 Guidelines.

The adopted strategy will ensure that the current mean annual runoff rate at the HVDC substation is maintained at the current 1 in 1 year runoff rate and will be monitored to ensure that the agreed rate of discharge is maintained.

**Kieran Ryan, Operations Manager, P.J. Hegarty & Sons, said:** *"Hornsea 3 is a major renewables project which will be a significant contributor to the UK's green energy targets as well as demonstrating how a future world can run entirely on renewable energy. The onshore grid connection, located at the Norwich Main National Grid substation, is a fundamental component of this scheme; its future operation is reliant upon a network of trusted suppliers who, like SDS, are each a specialist in their fields of expertise and who ensure that the construction programme proceeds on time, within budget and without compromise."*

Image kindly supplied by Ørsted.



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