

## Swansea Bay WwTW Wind Turbine Swansea, Wales

Skanska, Arup and Dwr Cymru Welsh Water (DCWW)

**BIG Biodiversity Challenge Award category:** Small Scale Permanent Award

### Project overview

Swansea Bay Wind Turbine is a Civil Engineering project delivered by Skanska and Arup for Dwr Cymru Welsh Water (DCWW). With a target of reducing emissions by 50% by 2035 (2007 baseline) and reducing reliance on grid electricity, DCWW is pursuing measures to generate its own power from renewable sources. One of these measures, the Swansea Bay Wind Turbine, is a single onshore 900KWp turbine erected at Swansea Bay Waste water Treatment Works (WwTW), on the outskirts of Swansea. The 77m tall turbine is capable of generating 1,922 megawatt hours per year, enough to meet 27% of the energy the treatment works needs to operate, or enough electricity to power 589 households a year.

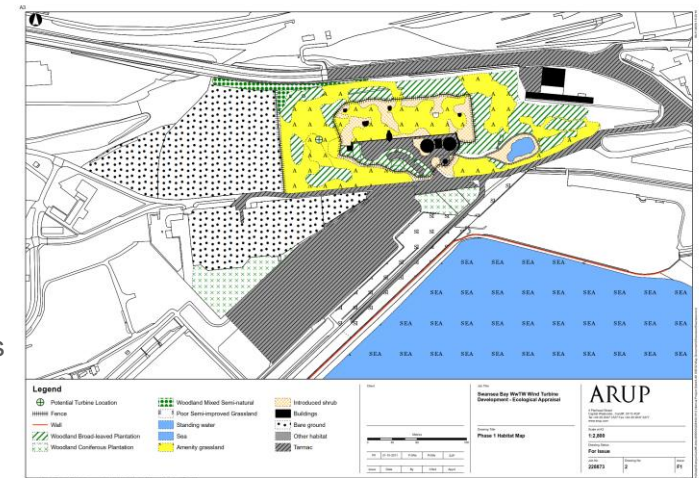
The £3.3 million project involved 110 people from DCWW, Skanska and Arup and was completed in October 2016. The turbine is expected to save around £323,448 annually through reduced power costs and Feed in Tariff income.

### What were the biodiversity conditions on site, prior to the enhancement?

An Extended Phase 1 Habitat survey of the site boundary and adjacent land concluded that the site comprised regularly mown amenity grassland along with islands of planted trees and shrubs created as part of the landscaping during the construction of the adjacent Waste water Treatment Works in 1998

### Were there any specific reasons that led to this project?

A planning condition required that the project should identify opportunities to enhance local biodiversity. The design team were keen to devise a valuable outcome for local and native biodiversity as part of the work and to ensure that the best solution for the site was introduced. The output of this was bat mitigation to encourage any commuting bats away from the turbine, as described in the Ecological Appraisal, and wider landscaping was proposed to minimise effects on wider receptors.



Swansea Bay WwTW Wind Turbine: Phase 1 Habitat Map.



Swansea Bay WwTW Wind Turbine: Ground Investigation Site Visit, in front of islands of planted trees, shrubs and amenity grassland.

## What were the biodiversity measures taken?

The mitigation hierarchy was applied in the design phase ensuring minimum possible biodiversity loss – and where it was removed, it would be replaced with more appropriate biodiversity. To summarise:

- Area of planting lost to facilitate the construction of the turbine: 3000m<sup>2</sup>;
- Area of amenity grassland lost to facilitate the construction of the turbine: 5040m<sup>2</sup>;
- Area of planting lost to facilitate the construction of the turbine but replaced with the wildflower meadow: 4932m<sup>2</sup>;
- Area of planting lost to facilitate the construction of the turbine but replaced with mixed native tree and shrub planting: 1680m<sup>2</sup>

These measures included:

- The turbine being sited at the lowest risk location for biodiversity within the site, being the farthest distance from the pond and the densest woodland and scrub to minimise the impact relating to the commuting and foraging route for local bats, including the Natterer's bat (*Myotis nattereri*), noctule (*Nyctalus noctula*) and whiskered bat (*Myotis mystacinus*);
- The measures were chosen to enhance the existing features and character of the site, rather than focus on creating new habitats from scratch.
- Mitigation planting comprises a mix of native trees and shrubs, including hawthorn (*Crataegus monogyna*), Wild cherry (*Prunus avium*) and dog rose (*Rosa canina*) has enhanced the tree corridor to the north where bats enter the site, creating a primary linear corridor that encourages bats towards the pond and foraging areas and away from the turbine
- Buffer planning of native trees and shrubs in the north and east of the site are proposed to reach 20-30m in height to provide screening of the base of the turbine;
- The species diversity of the grassland in the east of the site was enhanced to create a wildflower grassland, providing foraging habitat adjacent to the existing pond
- The wildflower mix is specifically designed to provide maximum food resource for pollinators and other insects, and to provide a prolonged flowering period from Spring to Autumn. Species include wild marjoram (*Origanum vulgare*), wild carrot (*Daucus carota*) and small scabious (*Scabiosa columbaria*). This measure was designed to support the Welsh Government's Action Plan for Pollinators in Wales (2013) to halt and reverse pollinator decline in Wales;



Swansea Bay WwTW Wind Turbine: Landscape Layout

## What were the biodiversity measures taken?

- A habitat creation plan and collision monitoring plan for birds and bats were produced to ensure the impact of the turbine on birds and bats is recorded and kept to a minimum;
- Education of all site personnel in biodiversity, ecological and ornithological issues to enable them to identify additional ecological risks that may have arisen through the project works;
- An environmental advisor was available throughout the construction phase to oversee management and provide guidance relating to biodiversity, ecological and ornithological issues and maintain communication with the Local Planning Authority.

## How would you best describe the project?

An enhancement

### Further information

Many utility assets from the 1960s onwards are quite species poor, consisting of amenity grassland and the standard suite of landscape planting to hide the asset over time. The Swansea Bay Wind Turbine project was a good opportunity to bring added value to this area by restoring the planting islands with native shrubs and trees, and enhancing areas of amenity grassland to a wildflower meadow. The learning from the creation of the wildflower meadow in Swansea has been carried forward onto Nash Bay wind turbine project where a wildflower meadow will be sown later this year.

The planted trees will be surveyed annually for the first five years, noting species composition and health. Management of the enhanced grasslands will include first year management through mowing to minimise competition and weed seed production. As the grassland matures and becomes more complex in composition, the cutting regime will be determined by the condition of the sward which will be monitored on an annual basis for the first five years following standard techniques such as the NVC survey methodology. The need for further monitoring of all newly planted areas will be reviewed following the survey in year five.

Bat and bird collision monitoring and vantage point surveys are being conducted in years 1, 3, 4, and 10, along with a collision register held at the adjacent waste water treatment plant for ongoing recordings, and a risk reduction strategy for the turbine will be devised if the impact on local fauna is significant.

The construction of the wind turbine at Swansea, and DCWW's aspiration for more energy to power its assets from renewables brings biodiversity benefits not just to the local site, but across the wider region. It will mean that the National Grid will not have to build more assets that will encroach upon green field sites and impact upon the biodiversity present in those areas, because of future energy demand by DCWW.



*Swansea Bay WwTW Wind Turbine: Phase 1 of the Biodiversity measures in place.*

## What was your personal motivation for carrying out the enhancement?

Swansea is one of the most ecologically rich counties in the UK, with nearly 70% of habitats and 20% of species identified as being a priority for biodiversity conservation in the UK are present in the county. Its natural environment makes it an excellent place to work and the project was a great opportunity to support enhancements of the local wildlife within the context of the wider landscape.