

# CONSTRUCTION FOR THE ENVIRONMENT

HBPW   
CONSULTING  
LIMITED



HBPW has worked on several major wind farms and has extended its considerable expertise in designing dynamic foundations (foundations for structures which 'move', as wind turbines do).

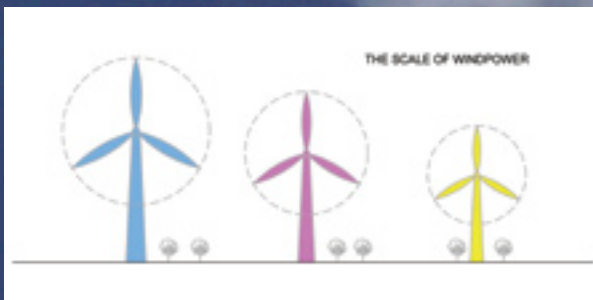
**Ranson Moor Wind Farm, Cambridgeshire:** HBPW experience indicates that land based wind farms are frequently situated on ground that provides challenges to the civil engineer in the design of the foundations.

The ground conditions at Ranson Moor Wind Farm were no exception comprising a thin stiff crust of clay over a great depth of very soft clay which had a consistency best described as 'toothpaste'. HBPW assessed the dynamic response properties of the subsoils and designed piled foundations to support the turbines which extended to a height of 120 metres to the tip of the blades. A significant design consideration was also the capacity of the subsoils to support the weight of cranes erecting the windmills.

# wind turbines

With industrialised countries under pressure to reduce carbon emissions as part of the Kyoto Protocol, increasing the use of renewable energy should help the UK Government achieve its own individual targets.

With the electricity industry being encouraged to supply 10% of electricity from renewables by 2010 – the figure is currently 0.8% - wind power is likely to be a popular choice in Europe's windiest country; it is clean, sustainable, does not create pollution and will never run out!

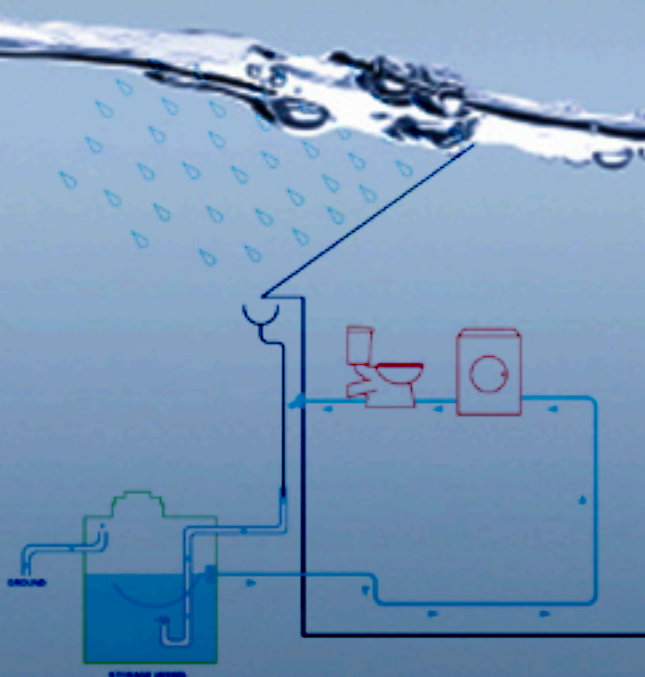




In the UK, as in many parts of the world, the balance between water supply and water demand is becoming a more vital issue. Rainwater harvesting serves two purposes: it allows stormwater to be channelled away from sewers or rivers, thereby easing the risk of flooding; and it enables this water to be stored and used for 'grey' purposes such as flushing the toilet and road cleaning. HBPW uses rainwater forecasts to determine the amount of rain that may fall on a site and then designs a rainwater harvesting scheme to capture it.

For commercial enterprises the uses can be many and varied. For example, at York Council Depot HBPW designed a rainwater harvesting scheme to wash refuse collection lorries. Although the cost of installing such infrastructure is not always low, end users benefit from reduced mains water supply costs and recycling of a natural free product.

# rainwater harvesting



**Precast Concrete Unit Manufacturer - Nottinghamshire:** Considerable volumes of water are used for manufacturing precast concrete units for the construction industry, a large proportion being used for washing down; it is then discarded. Taking advantage of modernising their prestressing plant, a precast concrete manufacturer in the East Midlands installed a system to recycle water from their process, supplementing it with a rainwater harvesting system.



### **Bidston Moss Recycling Facility, Merseyside:**

This integrated waste management centre is one of the largest of its kind in the UK. The poor ground presented its first challenge to HBPW as the facility, which can hold tens of thousands of tonnes of waste every year, is built on a former waste incinerator site. The Household Waste Recycling Centre provides the general public with an area for recycling and disposal of waste and materials, as well as an educational facility for local schools. The Materials Reclamation Facility sorts and separates 30,000 tonnes of dry recyclable materials each year, while the In-Vessel Composting Facility handles 10,400 tonnes of biodegradable kitchen and garden waste.

All non-recyclable waste is held in the vast Waste Transfer Station for transportation to landfill sites.

Besides designing a superstructure and retaining walls that are able to withstand the impact of loading

# composting/ waste management

Household recycling has tripled in the UK since 1996 and this is likely to increase as local authorities work hard to meet EU landfill diversion targets, as well as recommendations in national and regional waste strategies.

Many authorities are adopting a co-ordinated approach to effective waste disposal by dealing with recycling, composting and waste transfer under one roof and HBPW has the necessary experience in designing the sophisticated, large-scale enclosed facilities and associated infrastructure to facilitate this.

# recycling



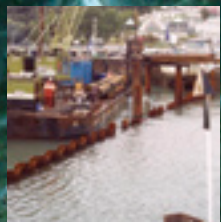
shovels and densely packed waste materials, the facility also had to provide separate routes of access for the general public for reasons of health and safety.



Water is both a friend and an enemy but particularly an enemy when, in the form of floods, it causes disruption to infrastructure and widespread damage to buildings and property.

## flood protection

The world, and in particular the UK, is becoming more prone to the effects of flooding due to rising sea levels resulting from global warming, and also due to the “concreting” over of more and more of the water permeable countryside. With increasing pressure on land for development more buildings are being constructed on the former flood plains to rivers. The consequence is that during heavy storms the rainwater which used to soak harmlessly away into the ground, has nowhere to go but into already overloaded sewers. The result is increasing frequency of flooding.



HBPW has worked on a considerable number of projects with major developers, the Environment Agency and local water authorities, to design schemes to “attenuate” the storm water flows from large developments in flood sensitive areas. HBPW has carried out flood risk assessments and carefully followed the design principle of the Sustainable Urban Drainage Systems Hierarchy (SUDS).

Major schemes undertaken by HBPW involving assessments for flood protection include the Radstone Technology development, Hancock Tyres and Barrett Steel.

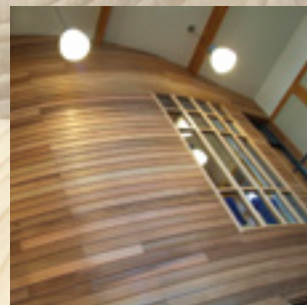


**York Eco Depot:** A number of sustainable design principles now ensure that the largest strawbale office block in Europe uses much less energy than standard buildings of a similar size. HBPW worked closely with a specialist architect to incorporate the engineering detail necessary to give the depot 'eco-credibility.' The building has a timber frame and strawbale cladding, whilst its concrete floor, which modulates temperature, absorbs heat in the daytime and releases it at night. Although the building is constructed on a former waste tip, HBPW designed out the need for piles in the foundation and 'floated' the building on a stiff raft foundation, which eliminated the possibility of contamination of the underlying aquifer and reduced construction costs and programme. The building incorporates solar cells and a wind turbine to produce energy for the day to day running of the depot. Surplus energy is sold back to the National Grid.

# eco builds

Currently, a significant percentage of all carbon emissions in the UK come from buildings, and it has now become a priority for both individuals and industry to use the world's natural resources in a more economical and sustainable way.

An eco build should not be evaluated solely on its use of sustainable materials but also on its energy-efficiency over the long term. HBPW has been called upon to make an overall assessment of the structural use of sustainable materials.





As the race to find viable energy alternatives to fossil fuels intensifies, the potential for biomass – biological material derived from wood chips, energy crops or food waste – is enormous. Biomass takes carbon out of the atmosphere when growing and returns it when burnt, maintaining a ‘closed’ carbon cycle.

# biomass storage

However, unlike oil or gas, biomass cannot be piped directly into buildings on demand so an efficient reserve of biomass fuel, which also has a lower energy density than fossil fuels, has to be stored and then delivered to the point of usage.

Biomass presents a number of challenges. For example the storage facility has to be well ventilated and dry as biomass is biodegradable and absorbs water if exposed. The material may also have to be loaded onto a delivery vehicle for transportation entirely within the confines of a building.



HBPW has developed considerable expertise in the design and detailing of buildings to store bulk materials and, in particular, biomass materials. The impact force of front loading shovels with the concrete walls of such buildings is also very difficult to assess, but HBPW now has a long track record in developing buildings which can withstand this and that have performed satisfactorily

**HBPW**  
**CONSULTING**

Civil & Structural Engineering Services

**HBPW Consulting Ltd**  
**43 Bridgegate**  
**Retford**  
**Nottinghamshire**  
**DN22 7UX**

**Tel: 01777 869 896**

**Fax: 01777 862 491**

**[www.hbpw.co.uk](http://www.hbpw.co.uk)**

**Email: [mail@hbpwconsulting.co.uk](mailto:mail@hbpwconsulting.co.uk)**

