INSTALLATION OF WIND PUMP AT RSPB EDDERTHORPE FLASH

3. Description of the Proposal

Please describe the proposed development, including any change of use:

Summary

- Edderthorpe Flash is managed as a nature reserve but historic subsidence has left the ground level below that of the adjacent River Dearne.
- This now retains water year round, reducing the amount of habitat available for breeding wading birds – a management priority and local Biodiversity priority.
- Water can flow out of the site until it is level with the river. To move more water off site would require a pump.
- We therefore wish to install a 4m high wind pump to take water off site and create 3.5 hectares of additional wet grassland habitat.
- The impact on flood management will be to increase the capacity of the washland by 1% - thus reducing the flood risk elsewhere.
- The turbine will sit in an open area, but will be sited below the flood bank, resulting in a very limited visual impact.
- It will be relatively small and unobtrusive and only visible to the public from a distance.
- The proposals do not involve a change of use.

Summary of Benefits

- No need to install a costly power supply
- Zero Carbon Emissions – estimated at minimum 500 kg per year compared to an electric pump
- Zero running costs
- Cheap to Maintain
- Increases Flood Capacity of the Washland by 4,550 m^3
- Increases lowland wet grassland habitat by 3.5 hectares
- Increases populations of important breeding lowland wader species and Water Voles.

Proposed Development

The Royal Society for the Protection of Birds (RSPB) would like to install a 4 metre high mast with turbine to power a wind pump, designed to move water from Edderthorpe Flash in to the River Dearne (see figures 1 and 2).

Edderthorpe Flash lies between the A6195 and the River Dearne at OS grid reference SE 41108 07184. It is owned and managed by the RSPB but acts as an Environment Agency Washland for the Dearne Valley. It was created by subsidence from old coal shafts deep underground. It is now stable but the subsidence created an area of water and wet grassland that the RSPB purchased from UK Coal in order to manage it as a nature reserve.

The site is low lying with its base below river level. The site is embanked on all sides and a reinforced spillway at the north western edge of the site allows water to flow into the area during flood. A drainage channel runs between the dismantled railway line and the site on its northern edge. Along the southern side of the site there is a penstock control gate which can be used to release stored water. There is also a culverted pipe of 0.6 m diameter in the South West corner which allows water off the site.

Structure Elevations
Spillway 27.52 m AOD
Penstock invert 26.50 m AOD
Pipe invert 25.53 m AOD

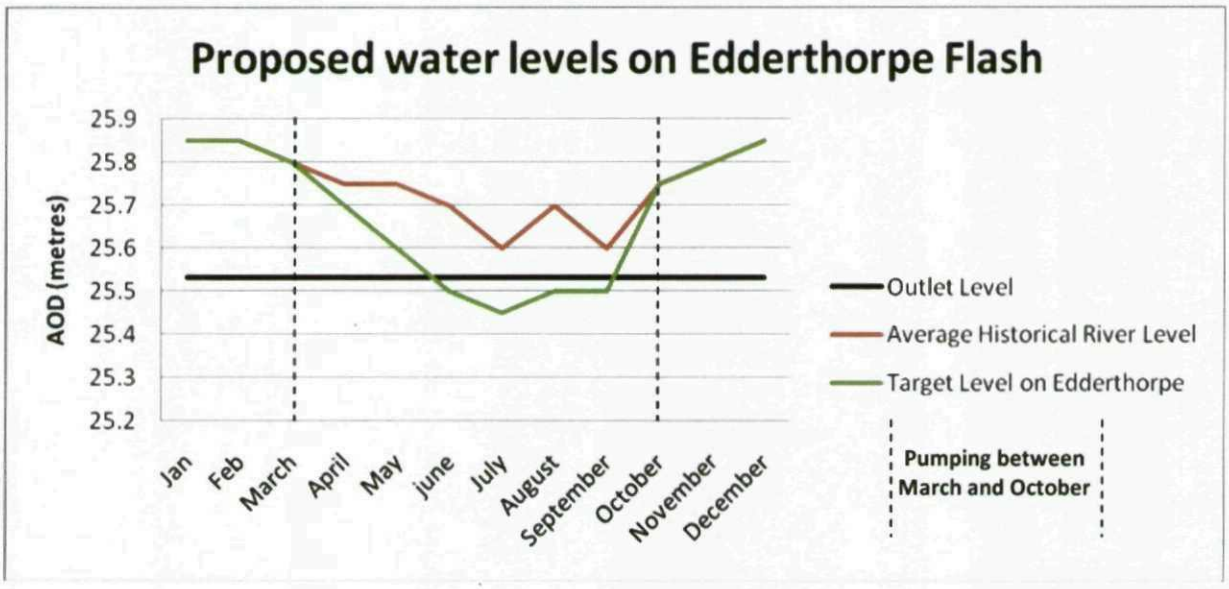
AOD = Above Ordinance Datum

In total, Edderthorpe has a flood storage capacity of 334,000 cubic metres of water, a significant part of the 4.7 million m^3 in this area. The site takes about 6-8 days to drain following a flood event, depending on how quickly and how far the river drops.

There is a weir 1.4km downstream of Edderthorpe at OS grid reference SE41873 05409. The crest of this weir is at a height of 25.53 m AOD and this sets the base river flow level up stream at Edderthorpe and matches the level of the Pipe Invert. From this, it can be seen that the lowest level that the site can be drained to is 25.53 m AOD, regardless of whether the invert pipe is lowered. The site therefore can drain to river base level but no further.

Due to historic subsidence, the base of the site now sits 20 cm below this level and water sits across most of the site for much of the year. By installing a wind pump we can pump additional water out of the site, even though it sits below the level of the invert pipe. This will allow us to reduce the amount of water surface area from 8 hectares to 4.5 hectares.

In order to affect this change, we would need to reduce the average water depth from 10cm to 3cm. This would involve removing 4,550m^3 of water (more would be removed over the course of a summer given the ongoing addition of water through rainfall, but this is the amount that of additional volume added to the Washland Capacity).



The creation of further lowland wet grassland habitat would support numbers of important breeding waders such as Lapwing, Redshank and Snipe – all of local and national conservation concern. It will also support another local and national priority species – Water Vole.

By using a wind pump, we will have a simple, effective, easy to maintain solution that requires little effort to install, is cheap to maintain and is environmentally friendly. There is no cost effective alternative to a wind pump as the site does not have electricity and it would be prohibitively expensive to connect it to the mains grid. A wind pump will also be better able to withstand flooding events when compared to the electric pump alternative. We estimate that a wind turbine will save a minimum of 500kg of CO_2 per year compared to one powered by electricity.

At the same time, the ability to pump water off site will have an added benefit of increasing the washland capacity and thus reducing flood risk in the surrounding areas (see Flood Risk Assessment).

The result of the work would be the creation of 3.5 hectares of additional lowland wet grassland in the Spring and Summer and an additional 4,550 m^3 of capacity in the Washland (see figure 3).

Technical Details and Plans

We have funding from Natural England and Scottish Power's renewable energy fund to install a Bosman modular wind pump. The pump consists of a modular concrete sump unit and a mast with rotary turbine. The sump is sunk into the ground and turbine mast sits on top to a height of 4.33 metres.

Windmill Module	Height 4.33m, Weight 380 kg
Concrete Module	*Height 1530mm, Weight 3200 k*
Pump type:	Bosman 4 metre modular wind pump.
Pump capacity	Variable with wind speed.
Electricity Demand:	0 units per hour
Cost per hour:	£0
Carbon footprint:	0kg

The wind pump would be installed by Aquatic Control Engineering (ACE), a specialist company with a history of similar projects on RSPB and other nature conservation sites. Full diagrammatical details of the pump are shown in figure 4.

The pump will be installed close to the pipe outlet in the South West corner of the site, OS grid reference SE 41450670. A main and a side drainage ditch currently take water from the main flash to this outlet and we would create a new drainage ditch off this to serve the Wind Pump.

Water will be pumped across the wind pump, raising the water level on the other side. Once this reaches a level higher than the adjacent river, water will flow through the pipe outlet and off site.

Water will be prevented from flowing back into the site by the use of two drop board sluices in the existing drainage ditches. This would allow us to remove the drop boards in times of flood to allow a greater volume of water off site following a flood event.

A schematic representation is shown in figure 5.

The land where the pump will be situated is owned by the RSPB.

Visual Impact

The river bank adjacent to where the pump will be installed does not have public access, nor is it in sight of any dwelling or building.

Edderthorpe Flash is overlooked by the A6195 and a public layby. However, this is several hundred metres away and would not impact on the landscape from that distance.

The turbine will be sited at the bottom of the flood bank and as such will be mostly masked by the banking. Figures 6, 7 and 8 give a clear indication of the location of the pump and any potential impact. We would be happy to host a site visit if required to show this more clearly.

Links to Partners and other Parties

The project relates to the **Barnsley Local Biodiversity Action Plan** by creating and maintaining habitats, in particular floodplain grazing marsh and reedbed. It also relates to the **Environment Agency's** strategy of achieving good ecological status on the River Dearne by managing associated

wetlands. The project also relates to the **Barnsley Local Development Framework**, which addresses renewable energy and encourages the use of wind power.

Other Permissions

It is worth noting that the RSPB has a planning application for a wind pump at nearby Old Moor Nature Reserve that has been submitted at the same time as this one.

14. Existing Use

Please describe the current use of the site

The RSPB manage a suite of wetland nature reserves in former in the Dearne Valley. At its heart is Old Moor, a significant community resource. The network of reserves covers around 260 hectares across seven sites. Habitats include several national and local biodiversity priorities such as lowland wet grassland, reedbeds and fen swamp. Species that rely on the sites include significant populations of breeding and migrating wading birds, water voles, farmland birds such as Tree Sparrow and wetland specialists such as Bittern and Water Rail.

The Dearne Valley is prone to floods and it was particularly badly affected in 2007. Our management of the reserves involves working with the Environment Agency to create Washlands to hold water in times of high river levels - which helps to mitigate against the dangers and effects of flooding.

Edderthorpe Flash was created by subsidence from mining shafts deep underground which created an area of water and lowland wet grassland. The RSPB subsequently purchased the site from British Coal in order as a nature reserve. Further subsidence has caused the site to drop further and now, most of the site is submerged for the nearly all of the year albeit in places to a depth of only 10-30 centimetres. Surveys have shown that the site is now stable and unlikely to subside further.

Water enters the site from the River Dearne via a spillway when the river is high. The RSPB, who own the site, have worked with the Environment Agency to manage Edderthorpe as an active flood washland to reduce the risk of flooding to homes downstream. It is the most northerly of the Washlands and therefore has the lowest spillway, making it the most frequently flooded site. A penstock (sluice) at the southern end of the site and a storm valve allow water to drain back into the River Dearne once it starts to drop.

Breeding snipe have now returned to the site for the first time since the 1980's and the site supports a good population of Redshank and Lapwing. In 2011, Avocet bred for the first time ever.

There is no visitor access to the site at the moment but it can be watched from a public layby on the A6195. In time, we hope to create access and a viewing area. It is close to Cudworth Common and Park Springs. Both are managed by the Forestry Commission and have public access.

The use of the site will not change as a result of the proposed work; it will simply enhance the value of the site for wildlife and conservation.

FLOOD RISK ASSESSMENT

Edderthorpe Flash lies between the A6195 and the River Dearne at OS grid reference SE 41108 07184. It is owned and managed by the RSPB but acts as an Environment Agency Washland for the Dearne Valley.

In times of high water in the River, it is the first of the Washlands in the Valley to activate and helps to protect the area from flooding. Other Barnsley area Washlands along the Dearne are:

Environment Agency Washlands in the Dearne Valley – Barnsley Area	Capacity (m³)
Edderthorpe Flash. Owned and Managed by RSPB	334,000
Houghton Environment Agency (EA) Owned with tenant farmers	758,000
Wombwell. EA Owned. Leased to and managed by RSPB	396,000
Old Moor. EA and Barnsley Council owned. Leased to and managed by RSPB	991,000
Bolton Ings. EA Owned. Leased to and managed by RSPB	934,000
Adwick. EA Owned. Leased to and managed by RSPB	1,302,000
Total Washland Capacity	**4,715,000**

The River Dearne at this point receives water from a largely urban and post industrial area, having towns and new industrial developments in the catchment. This is tends to make the river 'flashy' with rapid run-off causing short duration flood flows. Edderthorpe Flash, with a capacity of 334,000 m^3 forms a significant part of the 4.7 million m^3 flood storage capacity that helps to mitigate against the threat of flooding.

By installing a wind pump, we will reduce the area of open water to 4.5 hectares. In order to affect this change, we would need to reduce the average water depth from 10cm to 3cm. This would involve removing 4,550m^3 of water.

From a flood risk management perspective, this is beneficial for the wider area as it increases the flood storage capacity by the same amount – around 1% - taking the overall capacity to up to 338,550 m^3.

In times of flood we can disengage the turbine and it will not be affected by having flood water sitting on the site. Once water levels in the river drop, we can open the sluices and allow the water to drain away and then begin pumping again.

In short, the addition of a wind pump on Edderthorpe would allow a degree of control over water levels to both create additional habitat for wildlife and increase the flood storage capacity of the Washland.