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Our Ref:
D133691_addendum

Your Ref:

Date: 29th September 2010

Dear Michael:

Reeves Hill near Knighton, Herefordshire. Proposed erection and operation of four wind turbines and associated access tracks, hardstanding and sub station building – response to Regulation 19 Request

We are writing to you to provide further information relating to the Hydrological Assessment chapter of the Environmental Statement (ES) for the proposed erection and operation of four wind turbines at Reeves Hill near Knighton, Herefordshire. This additional information is provided in response to the Regulation 19 of the Town and Country Planning Act request (Herefordshire Council reference DMNW/083393/F). In summary the Regulation 19 request asked for clarification on the following:

- Confirmation of the local water features present on the site; including hydrogeological features, springs and watercourses and their relevant catchments;
- Identification of local private water supplies not previously identified;
- Further assessment of the impact of the proposed development on the local water features; and
- Confirmation and clarification of any mitigation measures required to ensure no significant impacts arise on the water environment as a result of the proposed development.

In order to provide a succinct response to the Regulation 19 request, this letter will address the above items as separate sub-headers.

This letter aims to provide further information in response to the above requests by supplementing information included within the original ES Hydrological Assessment chapter as well as our letters sent to Herefordshire Council on the 27th August 2008 and 11th December 2008.

It should be noted that throughout the consulting period for the proposed application, the Environment Agency have not raised an objection to the scheme. However, they have

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requested additional information similar to that requested via the Regulation 19 letter, summarised above.

In addition, we understand that the proposed borrow pits will not be included within the site designs and as such, we have not continued with any further assessment of these features.

Methodology

In order to provide a sufficient response to the Regulation 19 request, we have undertaken the following key activities:

- Site walkover to confirm the various water features at and around the site;
- Identification of local private water supplies via a door knocking exercise;
- Confirmation of potential principal construction/operational site activities that could impact the water environment;
- Confirmation of the potential mitigation measures required to minimise any impact on the water environment.

The site walkover and door knocking exercise was undertaken on 2nd/3rd September 2010. The weather was dry and warm and followed a prolonged period of predominantly dry weather (this observation is based on anecdotal evidence rather than actual rainfall data).

Confirmation of Local Water Features

During the site walkover, the local water features were reconfirmed (when compared to the previous ES report) and have been included on Figure 1, enclosed with this letter. As shown on Figure 1, there are various springs located within the vicinity of the site. The majority of these springs are located outside of the 500m buffer originally applied during the initial ES. As outlined within the original ES Hydrological Assessment chapter, the various springs and small watercourses form tributaries of the Norton Brook or Lingen Brook. Four springs are located within or adjacent to the site boundary. Three of these springs have been fitted with field drainage pipes for collection in a storage tank or well system. The fourth spring, located to the west of the existing plantation on Reeves Hill was not observed, potentially due to the predominantly dry conditions. In addition, on site observations indicated that all of the springs were observed being at a lower topographical level than the ground levels at the proposed turbine crane pad locations, access roads and other hardstanding areas.

With the exception of the spring to the west of the plantation, the springs were all flowing at the time of the site visit. Given the predominately dry conditions during and prior to the visit, it can be concluded that the springs would flow for most of the year. However, the spring line would be likely to migrate up or downslope depending on predominant weather conditions. This migration was evident in the spring and watercourse between Reeves Hill and Stonewall Hill.

In terms of the underlying hydrogeological conditions beneath the site, in the absence of a full geological site investigation or similar, best available data has been used, supplemented by on-site observations. The ES Hydrological Assessment chapter defines the underlying geology as being a non-aquifer based on data available at the time. However, since the completion of the ES chapter and subsequent correspondence in 2008, the Environment Agency has released new Aquifer Designation maps (see http://www.environment-agency.gov.uk/homeandleisure/default.aspx). The data indicates that the site is underlain by a Secondary Aquifer, Type A. This designation means it supplies water at a local scale. Given the

information gathered with respect to private water supplies (see proceeding section of this letter for more details); this data can be verified by on-site observations.

Identification of Private Water Supplies

Our previous correspondence (notably our letter dated 11th December 2008), highlighted our reasoning for using the 500m buffer around the turbine locations as a reasonable area of search. In order to include the majority of dwellings using a private water supply, our area of search was increased to over 1km to include a reasonable proportion of dwellings to inform our conclusions. Therefore we would consider this to be a very thorough assessment of local water supplies, particularly given the relatively small proposed land take of the proposed development in comparison with the total catchment areas contributing to the springs.

During the site visit in September 2010, we visited a number of farms and residential dwellings on and around Reeves Hill and Stonewall Hill to discuss their private water supplies. As the visit was undertaken midweek, not all residents were available to consult. However, enough residents were available to make the following conclusions:

- The majority of dwellings and farms within the area have a private water supply;
- The water supplies are used for domestic (including potable) and agricultural/horticultural uses;
- The water supplies are mostly taken directly from springs but are also extracted from boreholes and, are not in all cases treated prior to use;
- Anecdotal evidence suggests that although the water supplies become lower during dry months, they rarely dry up completely;

During the door knocking exercise, it was made evident to us that some residents had compiled a thorough list of all residents with a private supply. This list was provided to the Local Planning Authority and despite requesting the list from the LPA; it has not been received to date. However, the locations of the dwellings/farms visited by us are included in Figure 1 and are deemed sufficient to reach the conclusions given above.

Confirmation of Key Impacts during Construction and Operation

Due to the recently gathered information regarding the hydrogeology of the site (in particular, a re-classification of the local aquifer and private water supply information), we can review our original designation of the groundwater resource. Using the methodology provided within the ES Hydrological Assessment chapter (in particular, Table 2 – Derivation of importance of water resources), the groundwater resource beneath the site could be viewed as having a high importance (on account of it being a Secondary Aquifer and providing water to a small population on a local scale). This importance derivation is different from the original ES chapter (which classed groundwater resources as being of low importance) on account of the updated information collected, as outlined above. Table 2 is provided below, for information.

Table 2 from the original ES Hydrological Assessment chapter – Derivation of importance of water resources

Importance	Criteria	Example
Very High	Water resource with a **high** quality and rarity at a **regional or national scale** with limited potential for substitution.	Major Aquifer[1] providing potable water to a large population. Water body identified as an EC designated Salmonoid fishery. A water resource making up a vital component of a protected Special Area of Conservation (SAC) or Special Protected Area (SPA) under the EC Habitats Directive
High	Water resource with a **high** quality and rarity at a **local scale** and limited potential for substitution; or, Water resource with a **medium** quality and rarity at a regional **or national scale** and limited potential for substitution.	A river designated as being of Grade A quality under the Environment Agency's General Quality Assessment (GQA) scheme A water resource (with medium quality) designated or directly linked to a Site of Special Scientific Interest (SSSI), Minor Aquifer providing potable water to a small population. Water body classed as an EC designated Cyprinid fishery. A water body used for international sporting events such regattas or sailing events
Medium	Water resource with a **medium** quality and rarity at a **local scale**; or, Water resource with a **low** quality and rarity at a **regional or national scale**.	A river designated as being of Grade B or C quality under the Environment Agency's General Quality Assessment (GQA) scheme. An Aquifer providing abstraction water for agricultural or industrial use.
Low	Water resource with a **low** quality and rarity at a **local scale**	A river designated as being of Grade D or E quality under the Environment Agency's General Quality Assessment (GQA) scheme A non 'main' river or stream without significant ecological habitat.

[1] Please note, the aquifer classification has been updated by the Environment Agency in April 2010, since the completion of the original ES. Aquifers are now classed as 'Principal Aquifer', Secondary Aquifer, Type A or B, Secondary Undifferentiated and Unproductive Strata

To reiterate the ES Hydrological Assessment chapter but using the latest data collected, the key impacts arising during the site construction would be:

- Excavating the foundations of the turbines leading to release of sediment or pollutants into local groundwaters;
- Construction and use of access tracks leading to increased surface water runoff;
- Construction traffic causing spills of oils, hydrocarbons or other pollutants.

The key impacts arising during site operation would be:

- Leakages of oils or other pollutants either stored on site or within the turbine mechanisms;
- Increased surface water runoff arising from the increased hardstanding on the site;
- Spillages or leakages of oils, hydrocarbons or pollutants from site access vehicles.

Using the methodology provided within the ES Hydrological Assessment chapter and in particular, Table 3 Derivation of magnitude of impact, the significance of these adverse impacts on the groundwater resource beneath the site could be viewed as minor (i.e. causing measurable changes in attribute, but of limited size and/or proportion), which is the same derivation as the previous ES chapter. Table 3 is provided below, for information.

Table 3 from the original ES Hydrological Assessment chapter – Derivation of magnitude of impacts

Magnitude of impact	Criteria	Example
Major	Impact results in a shift in a water body's potential attributes.	Change (positive or adverse) in GQA grade of river reach. Pollution/remediation of potable source of abstraction resulting in failure/recovery above drinking water standards. Potential loss/gain of aquatic ecology Loss/gain of economic value of water resource
Moderate	Results in impact on integrity of attribute or loss of part of attribute.	Loss/gain in productivity of a fishery. Contribution/reduction of a significant proportion of the effluent in a receiving river, but insufficient to change its GQA grade. Reduction/increase in the economic value of the feature.
Minor	Results in minor impact on water body's attribute.	Measurable changes in attribute, but of limited size and/or proportion.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect the use/integrity.	Physical impact to a water resource, but no significant reduction/increase in quality, productivity or biodiversity. No significant impact on the economic value of the feature.

Therefore, to ensure the significance of these impacts (particularly to the private untreated potable water supplies) is reduced as much as reasonably possible in line with the existing situation, the following mitigation measures are recommended.

Confirmation of Key Proposed Mitigation Measures during Construction and Operation

Please note this letter deals primarily with the potential key adverse impacts identified above. The generic mitigation measures outlined within the ES Hydrological Assessment chapter (e.g. compliance to Environment Agency Pollution Prevention Guidance (PPG) would still be included within site activities).

With regard to foundation excavation, if this is undertaken beneath the level of the groundwater, it could have a potential impact on any local groundwater resources. In light of the upgraded importance rating and in order to provide sufficient mitigation against any potential impact arising during the site construction or operation, further information would be required to inform the detailed designs for the development. As indicated above and using the likely spring lines at and around the site, the level of the groundwater is potentially below the foundation base level (which will be approximately 3m below ground level). However, in order to confirm this, we recommend that observation boreholes are placed adjacent to the proposed turbine foundation locations. The groundwater level can then be obtained and monitored at regular intervals (at least quarterly) prior to, during and after (for an appropriate period of time) construction. It would be useful to obtain readings in the autumn/winter and spring to evaluate the likely seasonal maximum water level prior to construction.

If groundwater levels are observed to be at a level of less than 3m below ground then specific mitigation measures would be required during construction activities. Such measures should include:

- Potential dewatering (pumping) of groundwater to ensure 'dry working' of foundations (dewatered discharges should be directed into recharge trenches wherever possible to ensure water percolates naturally back into the ground); and
- Sealing (e.g. using a clay seal or similar) of the dewatered area to prevent ingress of water into the working zone and leaking of sediments and pollutants out of the working zone.

It is likely that should dewatering activities be required they would be subject to abstraction licensing and therefore Environment Agency approval. In turn, this would require the Environment Agency to approve the appropriate plans and activity schedule to ensure no adverse impacts on the water environment.

As mentioned within the ES Hydrological Assessment chapter (section 7.5.2.8), if the turbine foundations were to be lower than the groundwater level, water resistant materials would be used (e.g. sulphate resistant concrete) to ensure the leaching of substances into the surrounding ground is minimised and therefore groundwater quality not significantly reduced.

To reiterate information provided within the ES Hydrological Assessment chapter (e.g. section 7.5.2.2), the construction and operation of access tracks and hardstanding areas would reduce the amount of surface water percolating into the ground, at a local level. Without mitigation, this would flow off the hardstanding and onto the surrounding ground uncontrolled. This could have a negative (albeit on a very local scale) impact on the ability of water to recharge naturally. In addition, any hydrocarbons, pollutants or sediments could flow off the hardstanding and into the nearby ground. In order to mitigate these potential impacts, the site designs would utilise swales aligning all access roads and hardstandings. These would be designed to collect surface water in shallow, vegetated ditches which would allow surface water to infiltrate into the ground as close to the source as possible, thus remaining a status quo in terms of recharging groundwater.

Depending on requirements, the swales/ ditches should be designed with a gravel French Drain-type sub-base. They would also be designed to contain surface water generated during a reasonably intense storm, such as a 3.33% annual probability (1 in 30 year return period), inclusive of climate change, as outlined within the ES Hydrological Assessment chapter. According to relevant CIRIA document C697 – The SuDS Manual[2] (in particular Table 1.7) utilising swales or grassed ditches are an effective method of removing pollutants and sediments contained in surface water runoff and wholly suitable for the scale of the development proposed.

As mentioned within the ES Hydrological Assessment chapter and subsequent correspondence with the Environment Agency, any on-site hydrocarbons or chemicals would be stored in accordance with relevant Environment Agency PPGs, e.g. using facilities with 110% capacity. In addition, due to the likely relatively low volumes of pollutants stored on site, the presence of vegetated swales or ditches would assist in the removal of pollutants in case of a spill event.

Given the relative scale of the development (e.g. with a maximum land take of approximately 5% of the total site area), the above mitigation measures would ensure that the proposed development would have a minimal impact on the water environment, particularly the local private water supplies.

Summary

Following the site visit and door knocking exercise, the following additions and confirmations can be made to augment previous information provided within the ES Hydrological Assessment chapter and subsequence correspondence:

- The local water features including private water supplies have been reconfirmed and mapped on Figure 1;
- The majority of dwelling and farms within the vicinity of the site have a private water supply, mostly taken from springs but also from boreholes;
- Private water supplies are used for agricultural and domestic purposes, and are predominantly untreated;
- Review of recently released information suggests the underlying geology is a Secondary Aquifer, Type A and provides water to baseflow of rivers and people on a local rather than strategic level;
- As a result of the newly obtained information, the groundwater resources at the site have been re-assed as being of high importance;
- The key potential impacts arising from the proposed development, considered of minor significance to the ground water resource are:
    - Leakages of oils or other pollutants either stored on site or within the turbine mechanisms;
    - Increased surface water runoff arising from the increased hardstanding on the site;
    - Spillages or leakages of oils, hydrocarbons or pollutants from site access vehicles.

[2] http://www.ciria.org.uk/suds/

    - Excavating the foundations of the turbines leading to release of sediment or pollutants into local groundwaters;
    - Construction and use of access tracks leading to increased surface water runoff;
    - Construction traffic causing spills of oils, hydrocarbons or other pollutants.
- The majority of mitigation measures outlined within the original ES (e.g. the use of grassed swales etc. would mitigate against any adverse impacts from an increase in surface water runoff and encourage recharge of groundwaters in as natural a process as possible;
- Should the proposed turbine foundations be located beneath the level of the groundwater, additional mitigation would be required in order to mitigate against any negative impacts on local groundwater;
- Mitigation against groundwater impacts should include:
    - Potential dewatering (pumping) of groundwater to ensure 'dry working' of foundations (dewatered discharges should be directed into recharge trenches wherever possible to ensure water percolates naturally back into the ground);
    - Sealing (e.g. using a clay seal or similar) of the dewatered area to prevent ingress of water into the working zone and leaking of sediments and pollutants out of the working zone; and
    - Use of water resistant materials for foundation design to limit leaching of any pollutants.
- With the recommended mitigation measures in place, the proposed development would not have a significant impact on the local water environment.

We trust the above provides you sufficient information to inform your detailed designs and meets the requirements of the Regulation 19 request.

If you have any further questions please do not hesitate to contact us using the details provided below.

Yours sincerely
for **Scott Wilson Ltd**

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Encl: Figure 1 – Map of local water resources