



# Mallard Pass

Solar Farm

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### Environmental Statement Volume 2 Appendix 11.2: Water Resources and Ground Conditions - Assessment Methodology

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## **Appendix 11.2 Water Resources and Ground Conditions Assessment Methodology**

### **Introduction**

- 1.1.1. This appendix sets out the methodology for the assessment of the effects to Water Resources and Ground Conditions as a consequence of the Proposed Development.

### **Study Area**

- 1.1.2. The water resources and ground conditions includes all areas where ‘Site Works’ is proposed as shown in **Figure 11.1** of the ES Figures [EN010127/APP/6.3] (referred to as the “core study area” for the purposes of this Appendix). A wider study area includes 5 km around the core study area. Both study areas are shown on **Figure 11.1**. At distances greater than 5km within lowland catchments, it is considered that schemes such as a solar farm are unlikely to contribute to a hydrological effect, in terms of chemical or sedimentation effects, due to attenuation and dilution over the distance of potentially polluting chemicals. A smaller 2 km study area is based on the Order Limits and is used to assess PWS (the PWS Study Area) as shown in **Figure 11.1**. These study areas are defined based on professional judgement and experience assessing similar scale developments within lowland agricultural environments and similar hydrological catchments in England.

### **Sources of Information**

- 1.1.3. Sources of information used to inform the baseline and assessment methodology include:
  - a. Site walkover undertaken between 8<sup>th</sup> - 10<sup>th</sup> March and 1<sup>st</sup> and 2<sup>nd</sup> August 2022;
  - b. The National River Flow Archive (NRFA) [Ref 1];
  - c. British Geological Survey (BGS) mapping [Ref 2];

- d. Historical mapping;
- e. Department for Environment, Food and Rural Affairs (Defra) Multi-Agency Geographic Information for the Countryside (MAGIC) Map [Ref 3];
- f. The Environment Agency 'Catchment Data Explorer' [Ref 4];
- g. The Environment Agency Flood Map for Planning [Ref 5];
- h. The Defra Spatial Flood Defences dataset [Ref 6];
- i. Consultation with Anglian Water and the Environment Agency (EA) to identify public water abstractions within 2 km of the Site boundary;
- j. Consultation with Rutland County Council and South Kesteven District Council was carried out on 16<sup>th</sup> February 2022 to identify Private Water Supplies (PWS) located within the PWS Study Area; and
- k. Natural England and the Joint Nature Conservation Committee (JNCC) GIS datasets [Ref 7].

### **Assessment Criteria and Assessment of Significance**

- 1.1.4. The approach to assessing and assigning significance to an environmental effect is derived from a variety of sources including, legislative requirements, topic-specific guidance, standards and codes of practice (see **Appendix 11.1**) the EIA Regulations, advice from statutory consultees and other stakeholders and the expert judgement of the team undertaking the EIA.
- 1.1.5. The following three-stage approach was used for determining the significance for all environmental chapters within the ES:
  - a. Assigning an environmental value to (or sensitivity of) a resource or receptor:
  - b. Assigning a level of impact; and
  - c. Assigning a level of significance.

***Receptor Sensitivity/Importance/Value***

**Table 1 Framework for Determining Sensitivity of Water Resources and Ground Conditions Receptors**

<b>Receptor Sensitivity</b>	<b>Sensitivity Description</b>
High	<ul style="list-style-type: none"> <li>• A large, medium or small water body with an EA Quality classification of “High” or “Good” and / or a Current Chemical Quality classification of “Good”;</li> <li>• The hydrological receptor and downstream environment has limited capacity to attenuate natural fluctuations in hydrochemistry and cannot absorb further changes without fundamentally altering its baseline characteristics / natural processes;</li> <li>• The hydrological receptor is of high environmental importance or is designated as having national or international importance, such as Special Areas of Conservation (SACs) and Sites of Special Scientific Interest (SSSIs);</li> <li>• The hydrological receptor is designated for supporting ecological interest;</li> <li>• The hydrological receptor acts as an active floodplain or other flood defence;</li> <li>• The hydrological receptor will support abstractions for public water supply or private water abstractions for more than 25 people;</li> <li>• Abstractions used for the production of mass-produced food and drinks.</li> <li>• Areas containing geological or geomorphological features considered to be of national importance (e.g., SSSIs); and / or</li> <li>• Local groundwater constitutes a valuable resource because of its high quality and yield, e.g., aquifer(s) of local or regional value, statutorily designated nature conservation sites (e.g., SACs and SSSIs) dependent on groundwater.</li> </ul>
Moderate	<ul style="list-style-type: none"> <li>• A large, medium or small water body with an EA Quality classification of “Moderate”;</li> <li>• The hydrological receptor and downstream environment will have some capacity to attenuate natural fluctuations in hydrochemistry but cannot absorb certain changes without fundamentally altering its baseline characteristics / natural processes;</li> <li>• The hydrological receptor is of regional environmental importance (such as Local Nature Reserves), as defined by the EA or NE;</li> <li>• The hydrological receptor does not act as an active floodplain or other flood defence;</li> </ul>

Receptor Sensitivity	Sensitivity Description
	<ul style="list-style-type: none"> <li>• The hydrological receptor supports abstractions for public water supply or private water abstractions for up to 25 people;</li> <li>• Areas containing geological features of designated regional importance including Regionally Important Geological/geomorphological Sites (RIGS), considered worthy of protection for their historic or aesthetic importance;</li> <li>• Aquifer of limited value (less than local) as water quality does not allow potable or other quality sensitive uses. Exploitation of local groundwater is not far-reaching; and / or</li> <li>• Local areas of nature conservation known to be sensitive to groundwater effects.</li> </ul>
Low	<ul style="list-style-type: none"> <li>• A large, medium or small water body with an EA Quality classification of “Poor” or “Bad” and / or a Current Chemical Quality classification of “Fail”;</li> <li>• The hydrological receptor and downstream environment will have capacity to attenuate natural fluctuations in hydrochemistry but can absorb any changes without fundamentally altering its baseline characteristics / natural processes;</li> <li>• The hydrological receptor is not of regional, national or international environmental importance;</li> <li>• The hydrological receptor is not designated for supporting freshwater ecological interest;</li> <li>• The hydrological receptor does not act as an active floodplain or other flood defence;</li> <li>• The hydrological receptor is not used for recreational use;</li> <li>• The hydrological receptor does not support abstractions for public water supply or private water abstractions;</li> <li>• Geological features or geology not protected and not considered worthy of specific protection; and</li> <li>• Poor groundwater quality and / or very low permeability make exploitation of groundwater unfeasible. Changes to groundwater not expected to affect local ecology.</li> </ul>

***Magnitude of Impact***

**Table 2 Framework for Determining Magnitude of Change**

<b>Magnitude of Effect</b>	<b>Magnitude Description</b>
<b>High</b>	<ul style="list-style-type: none"> <li>• A short or long term major shift in hydrochemistry or hydrological conditions sufficient to negatively change the ecology of the receptor. This change would equate to a downgrading of an EA Quality classification by two classes, e.g., from “High” to “Moderate”;</li> <li>• A sufficient material increase in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water;</li> <li>• A major (greater than 50%) or total loss of a geological receptor or peat habitat site, or where there would be complete severance of a site such as to fundamentally affect the integrity of the site (e.g., blocking hydrological connectivity);</li> <li>• Major permanent or long term negative change (i.e., degradation of quality) to groundwater quality or a reduction in the available yield;</li> <li>• Major permanent or long term negative change to geological receptor;</li> <li>• Changes to quality or water table level will cause harm local ecology or will lead to flooding issue;</li> <li>• A major permanent or long term negative change to geological receptor, such as the alteration of pH or drying out of peat; and / or</li> <li>• Changes to groundwater quality or water table level that will negatively alter local ecology or will lead to a groundwater flooding issue.</li> </ul>
<b>Moderate</b>	<ul style="list-style-type: none"> <li>• A short or long term non-fundamental change to the hydrochemistry or hydrological environment, resulting in a change in ecological status. This change would equate to a downgrading of a EA water quality classification by one class, e.g., from "Good" to "Moderate";</li> <li>• A moderate increase in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water;</li> <li>• A loss of part (approximately 15 % to 50 %) of a geological receptor or peat habitat site, major severance, major effects to its integrity as a feature, or disturbance such that the value of the site would be affected, but could still function;</li> <li>• Changes to the local groundwater regime may slightly affect the use of the receptor;</li> <li>• The yield of existing supplies may be reduced or quality slightly deteriorated; and / or</li> <li>• Fundamental negative changes to local habitats may occur, resulting in impaired functionality.</li> </ul>

<b>Magnitude of Effect</b>	<b>Magnitude Description</b>
<b>Low</b>	<ul style="list-style-type: none"> <li>• A detectable non-detrimental change to the baseline hydrochemistry or hydrological environment. This change would not reduce the EA Current Ecological Quality classification;</li> <li>• A marginal increase in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water;</li> <li>• A detectable but non-material effect on the receptor or a moderate effect on its integrity as a feature or where there would be a minor severance or disturbance such that the functionality of the receptor would not be affected; and / or</li> <li>• Changes to groundwater quality, levels or yields that do not represent a risk to existing baseline conditions or ecology.</li> </ul>
<b>Negligible<sup>1</sup></b>	<ul style="list-style-type: none"> <li>• No perceptible changes to the baseline hydrochemistry or hydrological environment;</li> <li>• No change to the EA water quality classification;</li> <li>• No increase in the probability of flooding onsite and offsite;</li> <li>• A slight or negligible change from baseline condition of geological resources; and</li> <li>• Change hardly discernible, approximating to a 'no change' in geological condition.</li> </ul>

### **Significance of Effect**

- 1.1.6. The predicted significance of the effect is determined through a standard method of assessment and based on professional judgement, considering both the sensitivity of the receptor and the magnitude of the potential effect as defined in Table 3. Effects of moderate significance or greater are considered significant.

<sup>1</sup>Negligible magnitude of change includes magnitude of effects that would be assessed as no change to the baseline scenario.

**Table 3 Framework for Assessment of the Significance of Effect**

<b>Magnitude of Effect</b>	<b>Sensitivity of Resource or Receptor</b>		
	High	Moderate	Low
High	Major	Major	Minor
Moderate	Major	Moderate	Minor
Low	Moderate	Minor	Negligible
Negligible	Negligible	Negligible	Negligible



## References

- Ref 1 National River Flow Archive (2022). 321023 – Holywell Brook at Holywell [online].
- Ref 2 British Geological Survey (2022). Geology of Britain viewer (various) [online].
- Ref 3 Department for Environment, Food and Rural Affairs (2022). Magic Map Application – Designations (various) [online].
- Ref 4 Environment Agency (2021) Catchment Data Explorer [online].
- Ref 5 Environment Agency (2017). Flood map for planning [online].
- Ref 6 Department for Environment, Food and Rural Affairs (2022). Spatial Flood Defences [Online].
- Ref 7 Natural England (2022) Open Data Geo Portal (various) [online].

