



DAERA Environmental Advice for Planning

**Practice Guide**

Wind farms and groundwater impacts

A guide to EIA and Planning considerations

## Contents

Introduction	1
Why is it important to protect groundwater?	1
What impacts can a wind farm have on groundwater?	1
Table 1: Potential impacts on groundwater from wind farms	2
Figure 1: Construction of the foundation of a single wind turbine.	3
What does NIEA expect within an Environmental Impact Assessment in relation to groundwater for a wind farm application?	3
What data is collected for the baseline conditions?	4
Mitigation buffer zones	5
Table 2: Buffer zones for water features	5
Mitigation measures	5
Information sources and further guidance	6

## Introduction

This guidance document aims to help developers identify and mitigate against potential impacts on groundwater associated with wind turbine applications. It helps to inform those producing Environmental Impact Assessments in support of planning applications for proposed on-shore wind farm developments in Northern Ireland. This advice note is also intended to offer guidance to local planning authorities considering the associated potential environmental impacts of onshore wind farm applications.

The guidance covers the main areas and issues to be considered when assessing the potential impact on groundwater. It should not be used to replace existing detailed guidance that may exist. Guidance is given on the collection of baseline information, use of mitigation buffer zones, and reference of Pollution Prevention Guidance Notes.

**Note:** This guidance document specifically relates to wind farms. An application for a single wind turbine requires a different range of information. More information relating to Single wind turbines and groundwater is available at:

<https://www.daera-ni.gov.uk/publications/standing-advice-development-may-have-effect-water-environment-including-groundwater-and-fisheries>

## Why is it important to protect groundwater?

Groundwater has three major uses in Northern Ireland:

- Abstractions for agricultural and industrial purposes, food and beverage production (including bottled water);
- Public and private drinking water supply; and
- Maintenance of flow and water levels in rivers, lakes and wetlands, particularly during times of low rainfall.

The protection of groundwater from the risk of possible contamination is important because pollutants could cause health problems in human beings, reduce the quality of agricultural products, make water unsuitable for certain industrial processes, and pose a threat to our countryside and environment including their suitability for recreational purposes. In summary, the contamination of groundwater can not only have health and environmental impacts, but also serious economic consequences.

## What impact can a wind farm have on groundwater?

The development of a wind farm has the potential to impact on groundwater quality, groundwater quantity and/ or the established groundwater flow regime. **Figure 1** on page 3 shows the scale and extent of the foundation of a single wind turbine which could potentially impact on groundwater flow paths and the related aquatic environment. Changes to the local water environment can affect receptors such as wells/ boreholes, springs, wetlands and their groundwater dependent ecology.

The key impacts to groundwater that can result from the construction, operational and decommissioning stages of wind farms are summarised in **Table 1**.

*Table 1: Potential impacts on groundwater from wind farms*

	Construction Phase	Operational Phase	Decommissioning Phase
Groundwater Flow Regime	<p><b>Earthworks and site drainage:</b></p> <ul style="list-style-type: none"> <li>▪ Reduction in water table if dewatering is required for turbine foundation construction or borrow pits;</li> <li>▪ Changes to groundwater distribution and flow.</li> </ul>	<p><b>Physical presence of turbines and tracks:</b></p> <ul style="list-style-type: none"> <li>▪ Possible changes to groundwater distribution;</li> <li>▪ Reduction in groundwater storage.</li> </ul> <p><b>Reduction of forestry in site area:</b></p> <ul style="list-style-type: none"> <li>▪ Changes to infiltration and surface runoff patterns, thereby influencing groundwater flow and distribution.</li> </ul>	<p><b>Physical presence of former turbines and tracks:</b></p> <ul style="list-style-type: none"> <li>▪ Possible changes to groundwater distribution;</li> <li>▪ Reduction in groundwater storage.</li> </ul>
Groundwater Quality	<p><b>Earthworks:</b></p> <ul style="list-style-type: none"> <li>▪ Disturbance of contaminated soil and subsequent groundwater pollution.</li> </ul> <p><b>Materials Management:</b></p> <ul style="list-style-type: none"> <li>▪ Pollution from spills or leaks of fuel, oil and building materials.</li> </ul>	<p><b>Materials Management:</b></p> <ul style="list-style-type: none"> <li>▪ Pollution from spills or leaks of fuel or oil.</li> </ul>	<p><b>Use of vehicles and machinery to remove infrastructure:</b></p> <ul style="list-style-type: none"> <li>▪ Pollution from spills or leaks of fuel or oil.</li> </ul>

Figure 1: Construction of the foundation of a single wind turbine.



## What does DAERA expect within an Environmental Impact Assessment in relation to groundwater for a wind farm application?

Within a wind farm Environmental Impact Assessment (EIA) DAERA will expect the following to be provided:

- Detail of the development including the scale and extent of foundations required for the turbines;
- Detail of the baseline conditions of the site, obtained from desk study and a field survey;
- Identification of potentially sensitive receptors (for example private drinking water supplies – see also our Practice Guide: Water Features Survey which is available via the following link <https://www.daera-ni.gov.uk/publications/best-practice-guidance-documents>);
- Identification of potential impacts to groundwater from the development, and assessment of impact significance;
- Evidence of appropriate incorporation of mitigation buffer zones in the layout design; and
- Proposed mitigation measures in line with Pollution Prevention Guidance (PPG) Notes.

## What data is collected for baseline conditions?

The degree of risk from the development is, in part, dependent on the sensitivity of local receptors. At a particular site, the local hydrogeological setting will influence the vulnerability of groundwater and associated receiving surface waters. For this reason it is important to establish local conditions prior to development, termed the baseline conditions.

The geology at the site will inform the hydrogeological setting, as well as other potential impacts; such as slope stability and peat slide issues. Information to be provided in the baseline should include:

- Quaternary (surface) geology and Bedrock geology mapping (provided by the Geological Survey of Northern Ireland (GSNI));
- Borehole log data if available (can be obtained from GSNI);
- The presence of peat to include data from a site walkover;
- Aquifer classification and vulnerability (can be obtained from GSNI GeoIndex); and
- The location of any proposed borrow pits and detail of their proposed restoration (as these may require dewatering) in addition to the proposed turbine and track layout.

A water features survey (to include a field survey) is required as it enables identification of the receptors that might be affected by the development both during and post-development. Guidance on undertaking water features surveys is provided in a separate DAERA Guidance Note.

Early identification of sensitive receptors can be used beneficially to influence the design and construction of the wind farm to reduce potential risks.

A water feature survey should be representative of the current conditions and therefore in certain circumstances an up to date survey will be requested. For example, if a previous water feature survey for the area is over 2 years old.

The baseline conditions should also identify the potential for any existing contaminated or low quality groundwater at the site. The presence of these conditions at the site could affect the construction methods required (for example piling method or use of sulphate resistant concrete) or waste disposal required (for excavated soils or dewatered water disposal). An understanding of the historical setting of the site will determine if there is the potential for contaminated land or saline waters to be present. The search radius for the baseline conditions will depend on the groundwater and surface water catchments likely to be affected.

## Mitigation buffer zones

To reduce the risk of the wind farm development having an impact on the water environment the use of mitigation buffer zones should be considered in the layout design. Should elements of the development (tracks, foundations, borrow pits) be located within the buffer zones then further assessment (such as establishing the potential zone of contribution to the water feature) would be expected within the EIA to justify the expected impact significance. Table 2 overleaf describes the mitigation buffer zone distances to be considered for potentially sensitive water features.

Table 2: Buffer zones for water features

Water Feature	Buffer Zone
Surface Watercourse	10 m
Water Feature <sup>1</sup> used for Drinking Water (public or private)	250 m
Water Feature <sup>1</sup> not used for water supply (but could provide a preferential flow pathway)	50 m
Designated Wetland	250 m

<sup>1</sup> surface watercourse, spring, well, borehole

## Mitigation measures

The presentation of mitigation measures for any wind farm development should make reference to the following Pollution Prevention Guidance Notes:

- PPG 1 – Understanding your environmental responsibilities;
- GPP 2 – Above ground oil storage tanks;
- GPP 5 – Works and maintenance in or near water;
- PPG 6 – Working at construction and demolition sites;
- GPP 13 – Vehicle washing and cleaning;
- GPP 21 – Pollution incident response planning;
- GPP 22 – Dealing with spills; and
- GPP 26 – Safe Storage - drums and intermediate bulk containers.

Please note that a review of the PPGs is currently underway that will result in a replacement guidance series, Guidance for Pollution Prevention (GPPs). Where a specific PPG has already been replaced, the new GPP is referenced.

The current PPGs/ GPPs can be found at:

[http://www.netregs.org.uk/library\\_of\\_topics/pollution\\_prevention\\_guides/all\\_ppgs.aspx](http://www.netregs.org.uk/library_of_topics/pollution_prevention_guides/all_ppgs.aspx)

Water quality and flow monitoring prior to development to provide a qualitative and quantitative baseline might be required. In addition, where an impact on a receptor is identified as significant, appropriate mitigation measure(s) must be identified by the applicant.

## Information sources and further guidance

**Geological Survey of Northern Ireland:** GeoIndex, geological maps, reports and memoirs, borehole and site investigation reports

Tel: 028 90388462

Website: [www.bgs.ac.uk/gsni/](http://www.bgs.ac.uk/gsni/)  
[http://mapapps2.bgs.ac.uk/GSNI\\_Geoindex/home.html](http://mapapps2.bgs.ac.uk/GSNI_Geoindex/home.html)

Email: [gsni@economy-ni.gov.uk](mailto:gsni@economy-ni.gov.uk)

### **NIEA River Basin Map Viewer:**

Website: <http://apps.d.aera-ni.gov.uk/RiverBasinViewer/>

### **NIEA WMU Water Information Request Viewer:**

Website: <https://apps.d.aera-ni.gov.uk/WaterInformationRequest/>

### **WMU Digital Dataset Downloads:**

Website: <https://www.daera-ni.gov.uk/articles/wmu-digital-dataset-downloads>

### **NIEA Natural Environment Map Viewer:**

Website: <https://www.daera-ni.gov.uk/services/natural-environment-map-viewer>

**NIEA Water Management Unit:** surface water and groundwater information, hydrogeological data

Tel: 0300 200 7850

Website: <https://www.daera-ni.gov.uk/topics/water>  
Email: [waterinfo@daera-ni.gov.uk](mailto:waterinfo@daera-ni.gov.uk) for water information requests

**SpatialNI:** Historical land use database

Website: [www.spatialni.gov.uk/geoportal/catalog/main/home.page](http://www.spatialni.gov.uk/geoportal/catalog/main/home.page)

**DfI Rivers:** Flow data, flood risk areas

Tel: 028 8676 8342

Website: <https://www.infrastructure-ni.gov.uk/topics/rivers-and-flooding>  
<https://www.infrastructure-ni.gov.uk/topics/rivers-and-flooding/flood-maps-ni>

Email: [rivers.registry@infrastructure-ni.gov.uk](mailto:rivers.registry@infrastructure-ni.gov.uk)

**Ordnance Survey of Northern Ireland:** Topographical information, historical maps, open data

Tel: 0300 200 7804

Website: <https://www.nidirect.gov.uk/campaigns/ordnance-survey-of-northern-ireland>  
<https://www.nidirect.gov.uk/services/osni-open-data-portal>

Email: [mapping.helpdesk@finance-ni.gov.uk](mailto:mapping.helpdesk@finance-ni.gov.uk)

**NIEA Drinking Water Inspectorate:** Private water supplies

Tel: 028 90569282

Website: <https://www.daera-ni.gov.uk/topics/water/drinking-water>

Email: [dwi@daera-ni.gov.uk](mailto:dwi@daera-ni.gov.uk)

**Northern Ireland Water:** Public water supplies

Tel: 08457 440088

Website: [www.niwater.com/home/](http://www.niwater.com/home/)

Email: [waterline@niwater.com](mailto:waterline@niwater.com)

**Waterways Ireland**

Tel: 028 6632 3004

Website: <https://www.waterwaysireland.org/>

Email: [info@waterwaysireland.org](mailto:info@waterwaysireland.org)

**All-Ireland karst dataset:** data download and map viewer for karst features and karst tracer lines

Website: <https://www.gsi.ie/en-ie/data-and-maps/Pages/Groundwater.aspx#KarstFeatures>

**Local Council Environmental Health Departments**

Website: [www.nidirect.gov.uk/local-councils-in-northern-ireland](http://www.nidirect.gov.uk/local-councils-in-northern-ireland)



## DAERA Planning Response Team

Klondyke Building

Cromac Avenue

Malone Lower

Belfast

BT7 2JA

T: (028) 9056 9604

E: [PlanningResponse.Team@daera-ni.gov.uk](mailto:PlanningResponse.Team@daera-ni.gov.uk)

W: <https://www.daera-ni.gov.uk/topics/environmental-advice-planning>

Apr 2015	First Published
June 2019	Updated branding; revised PPGs/GPPs listed and links to Guidance now on DAERA website



Department of  
**Agriculture, Environment  
and Rural Affairs**

[www.daera-ni.gov.uk](http://www.daera-ni.gov.uk)



**INVESTORS  
IN PEOPLE**