Department of Agriculture, Environment and Rural Affairs
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DAERA Environmental Advice for Planning

Practice Guide

Cemeteries, Burials and the Water Environment

A good practice guide for applicants and planning authorities when planning cemetery developments or extensions.

Contents

Overview

The development of new cemetery sites/graveyards or extensions to such sites has the potential to result in impact on the local water environment and in particular, the groundwater underlying the site. It is important when planning such sites that consideration is given to possible impacts and where appropriate, ensure that adequate site investigation and risk assessments are undertaken. The extent of site investigation and risk assessment should be proportionate to the size of the proposed development.

This guidance document aims to help developers and their environmental consultants who are responsible for the development of new cemetery sites/graveyards or extensions to such sites. It is strongly recommended that the applicant seeks the professional advice of a hydrogeologist. Hydrogeologists (not hydrologists) can be identified through internet search, Yellow Pages or the Ends Directory (www.endsdirectory.com).

The guidance covers the main areas and issues to be considered when assessing the potential impact on groundwater and provides details of the relevant information required to enable DAERA to provide advice. This guidance applies to traditional and green burial grounds. It also provides useful information for individual private home burials or sites used for single burials.

Why is it important to protect groundwater?

Groundwater has three major uses in Northern Ireland:

- private drinking water supply;
- abstractions for agricultural and industrial purposes, including bottled ‘mineral’ waters, carbonated drinks and food manufacturing; 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 farming and agricultural products, make the water unsuitable for certain industrial processes and pose a threat to our countryside and environment including their suitability for recreational purposes. It takes a long time (decades) and a lot of resources (millions of pounds) to clean up contaminated groundwater and hence preventing contamination in the first place is paramount. In summary, the contamination of groundwater can not only have health and environmental impacts, but also serious economic consequences.

How can cemeteries contaminate groundwater?

After a while in the ground a body and its coffin will begin to decay. As this happens fluids can leach out and may eventually work their way down to the groundwater underlying the site. This fluid may contain embalming fluid, pathogens/microbes and nitrogen compounds which could contaminate groundwater. In some cases it may also pose a health risk if it contaminates a groundwater-fed drinking water source.

As groundwater can travel considerable distances underground (and with it any pollutants) it is necessary to consider the possible risk of groundwater contamination when planning new graveyards or cemeteries.

What information does DAERA require before assessing if a cemetery development/extension will pose a threat to groundwater?

DAERA will expect information on the following to be provided:

- A desktop study*;*
- An intrusive site investigation and a water features survey; A hydrogeological risk assessment including a conceptual site model; and
- The proposed layout of the site *(this is the final stage as the above tasks will inform the site planning).*

Desktop study

When considering use of land for burial purposes, it is normal practice for an initial desktop assessment to be undertaken using information readily available from a variety of sources (see 'Information Sources' at the back of this document). This allows for initial consideration of the potential issues and risks associated with the specific site based upon geological setting, water quality, proposed burial rate per annum and total capacity of the cemetery.

For existing sites, important local knowledge about the ground/ geological conditions can be obtained through discussion with the local grave digger.

Based upon this initial consideration, the need for intrusive investigation can be better assessed, taking into account the proposed scale and sensitivity of the site location. Further information regarding this decision process can be found in reference 2 to 4.

All plans and historical maps extracts should be large scale, to scale, with a north point, and clearly show the site boundary.

Intrusive site investigation

The site walkover should aim to identify any boreholes, watercourses and sensitive targets in the proximity of the proposed site (see previous section) and determine their distance from or position within the proposed site (please see the practice guide 'Water Features Survey' – reference 3). This will allow features to be mapped for submission along with the report and accompanying planning application.

The absolute minimum requirement for a site investigation should normally consist of a site walkover as described above and the digging of trial pits. The trial pits and any observed water seepages or strikes are required to be logged according to British Standard BS5930:2015. Logs should be appended to any planning application together with a location map of the trial pits. If photographs of trial pits are submitted they should include a visible tape measure confirming the depth of the pit.

The trial pits should be excavated to a minimum depth of 1 metre **below the intended depth of the burial pit** to assess the site and soil for its suitability as a burial site. The number of trial pits will depend on the size of the site.

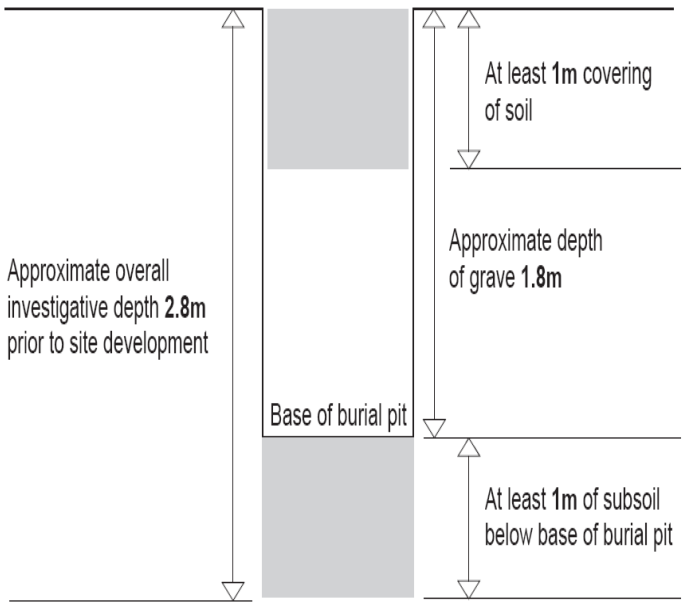
Other points for consideration include:

- Are there any old, metal water mains passing beneath the cemetery whose corrosion could be accelerated?

- Is there any artificial drainage within the ground, associated with previous/existing land use?

For certain large scale and/ or sensitive sites there may be a need to undertake further intrusive site investigation using borehole drilling, baseline sampling and other assessment techniques.

Figure 1: Diagram to illustrate total investigation depth



Hydrogeological risk assessment

The risk assessment will be based upon data and knowledge gained from the desktop assessment and the intrusive site investigation. The scope of the risk assessment required will be dependent on site specific factors such as intended annual burial rate, the local vulnerability of groundwater and the scale of the site proposed. Further guidance on risk assessment can be found in the 'Pollution Potential of Cemeteries – R&D Technical Report P223' and its amendments (references 3 to 4). A moderate to high risk site may likely require contaminant loading and/ or groundwater modelling techniques.

A desk top based consideration of an emergency burial scenario (i.e. If the burial rate was doubled)/ or feasibility of it, should be included in the risk assessment. This may include a consideration of a maximum annual burial rate for the cemetery site.

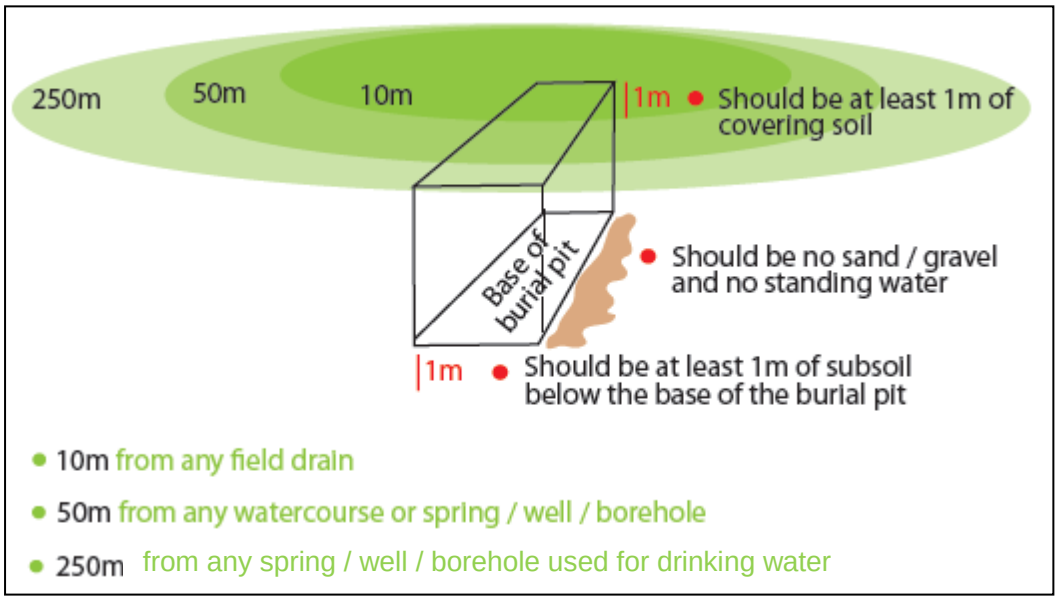
Guidelines for planning cemeteries

Once you have gathered all the information above, this will allow you to start planning the layout of the proposed burial site. The following should be taken into consideration when doing this:

- Burial plots should be at least 250 m away from a borehole, spring or well used for the supply of drinking water and/ or bottling of mineral water.
- Burial plots should be at least 50 m away from all other boreholes, springs or wells.
- Burial plots should be at least 50 m away from a river, canal, lake, wetland or the coast.
- Burial plots should be at least 10 m away from field drains (this also includes old agricultural drainage systems no longer in use as they can act as preferential pathways).
- If bedrock is encountered in the trial pit, that area of the site should not be used for burials.
- The area of the site is not suitable for burial if there is standing water at the bottom of the burial pit when first dug.
- There should be no sand and gravel at the bottom of the burial and trial pits.
- The area of the site is not suitable for burial if it is at risk of flooding (NIEA would request DfI Rivers to review the application in such a instance)

These guidelines are stipulated for a typical site, however, they can be extended/ altered based on the environmental risk identified and assessed at the site.

Figure 2: Guidelines for planning cemeteries



The completed written report and accompanying site plan should be submitted to the Planning Authority along with the planning application documentation. Please ensure your submission includes everything mentioned in the checklist in the following section.

Checklist

Component
Desktop study – information should include local geology (bedrock and superficial), groundwater vulnerability rating, aquifer type, soil type, historical land use, water features survey, locations of nearby drainage features and locations of other sensitive receptors in the vicinity (like protected sites). You **must** include the proposed burial rate per year, the number of expected burials per plot and the total capacity of the cemetery development/ extension and an explanation of how you have arrived at this figure. It may also be useful to include knowledge of the site geology by the local gravedigger.
Intrusive site investigation – include full description of geology in the trial pits/ boreholes with logs prepared according to British Standard BS5930:2015. Log depth-to-bedrock and depth of any water strikes. A map showing location of trial pits/ boreholes within the site should be included. The number of trial pits/ boreholes should be proportionate to the size of the proposed development.
Map of proposed site layout – this should only be undertaken after consideration of all the information gathered above, in conjunction with recommended cemetery planning guidelines mentioned in previous sections. Note: your site assessment may mean that some areas of your site are unsuitable for graves and should therefore be used for pathways/ car parks/ other features.

Useful References or Documents

Robin, N. S. (1996). ***Hydrogeology of Northern Ireland.*** London: HMSO for the British Geological Survey.

The following guidance documents are available online:

1) DAERA 2017. *Water Features Survey.* Available online: Best Practice Guidance documents | Department of Agriculture, Environment and Rural Affairs https://www.daera-ni.gov.uk/publications/best-practice-guidance-documents

2) Young, C.P., Blackmore, K.M., Reynolds, P. and Leavens, A. (2002). *Pollution Potential of Cemeteries – R&D report P223.* Environment Agency England and Wales. Available online: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/290605/str-p223-e-e.pdf [Accessed 3rd June 2019] *

3) Young, C.P., Blackmore, K.M., Reynolds, P. and Leavens, A. (2002). *Amendment 'Pollution Potential of Cemeteries' – R&D report P223.* Environment Agency England and Wales. Available online: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/290376/scho0205biph-e-e.pdf [Accessed 3rd June 2019] *

4) Young, C.P., Blackmore, K.M., Leavens, A and Reynolds, P.J. (2002). *Pollution Potential of Cemeteries.* Environment Agency England and Wales. Available online: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/290607/sprp2-024-1-e-e.pdf [Accessed 3rd June 2019] – literature review *

5) Üçisik, A.S. and Rushbrook, P. (1998). *The impact of cemeteries on the environment and public health.* World Health Organization Regional Office for Europe Available online: http://apps.who.int/iris/bitstream/10665/108132/1/EUR_ICP_EHNA_01_04_01(A).pdf [Accessed 3rd June 2019]

6) Buckley, C. (2012) *Graveyards and Groundwater.* International Association of Hydrogeologists – Irish Group. Available online: http://www.iah-ireland.org/conference-proceedings/2012.pdf. - see pdf page 143 [Accessed 3rd June 2019]

7) Institute of Cemetery & Crematorium Management. 2004 *Policy relating to shallow depth graves.* London: Institute of Cemetery & Crematorium Management. Available online: http://www.iccm-uk.com/iccm/library/ShallowGraves.pdf [Accessed 3rd June 2019]

8) Hart, A. (2005). *Ammonia shadow of my former self: a review of potential groundwater chemical pollution from cemeteries.* Land Contamination & Reclamation 13(3). Available online: http://www.epppublications.com/home/land-contamination-reclamation/volume-13 [Accessed 3rd June 2019]

** DAERA is aware that the documents are marked as withdrawn. They have been replaced by a number of websites on the gov.uk service: https://www.gov.uk/guidance/cemeteries-and-burials-groundwater-risk-assessments. However, the referenced reports still provide a good introduction and overview of the subject.*

Information sources

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://mapapps2.bgs.ac.uk/GSNI_Geoindex/home.html
Email: gsni@economy-ni.gov.uk

DAERA River Basin Map Viewer:

Website: http://appsd.daera-ni.gov.uk/RiverBasinViewer/

DAERA WMU Water Information Request Viewer:

Website: https://appsd.daera-ni.gov.uk/WaterInformationRequest/

WMU Digital Dataset Downloads:

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

DAERA Natural Environment Map Viewer:

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

DAERA 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 for water information requests

SpatialNI: Historical land use database

Website**:** 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

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

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

Northern Ireland Water: Public water supplies

Tel: 08457 440088
Website: www.niwater.com/home/
Email: waterline@niwater.com

Waterways Ireland

Tel: 028 6632 3004
Website: https://www.waterwaysireland.org/
Email: 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

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Jun 2019	Updated document including branding, 'information sources'; revised links to Guidance now on DAERA website

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