

River Basin Management Plans – Groundwater Classification

Landfill

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An Agency within the Department of the
Environment
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NIEA Northern Ireland
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1.0 Purpose

This paper describes the approach taken to assess the Water Framework Directive (WFD) chemical status of groundwater bodies with respect to impact from landfill (waste disposal) sites.

2.0 Background

The WFD requires that groundwater bodies must be classified as good or poor for both chemical status (in relation to a large range of pollution pressures) and quantitative status (in relation to groundwater abstraction pressures).

Potential impacts from landfill sites have been considered in the context of three of the five tests developed for groundwater body chemical classification, based on WFD requirements and guidance provided at an EC and UK level¹. The five tests consider groundwater chemical composition with respect to impacts both on the groundwater body (including significant potable supplies), and on the ecological receptors which depend on it. The worst result from all five tests is taken as the overall chemical status result for each groundwater body.

Northern Ireland, like the rest of the UK, has a range of permitted landfill site types.

The sites are classified according to the waste type they receive:

- i) Hazardous (in NI one non-hazardous landfill has a separately engineered cell for asbestos waste only)*
- ii) Non-Hazardous (Domestic and some Industrial Waste)
- iii) Inert

**this only applies after the coming into force of the ban on co-disposal of waste in 2005, before this date some sites now classified as non-hazardous also accepted special waste (now referred to as "hazardous waste" following the coming into force of the Hazardous Waste Regulations in 2005).*

The sites, developed over many decades, will have been designed and operated under a range of conditions with the older sites potentially being of 'dilute and disperse' type with no liner. More recent sites have operated as full containment sites.

With respect to current regulations, landfill sites fall under different categories:

- i) sites that closed some time ago with little or no monitoring;
- ii) sites that closed before December 2003 with no licence or closure plan just prior to the enforcement of new Waste Management Licensing regulations. Some of these sites may still have a Water (NI) Order 1999 consent to discharge;
- iii) sites being closed in 2007 under Closure Notices issued under The Landfill Regulations, where modified waste management licences have been issued for the closure and aftercare of the landfill, including monitoring;
- iv) currently operating sites that have transferred to the Pollution Prevention and Control (PPC) regulations regime under transitional arrangements;

¹ UK Technical Advisory Group on the Water Framework Directive. Paper 11b(i): Groundwater Chemical Classification for the purposes of the Water Framework Directive. This paper can be downloaded from the www.wfduk.org web site.

- v) new sites that will operate under the PPC and landfill legislation, and as such will be required to be fully Landfill Directive compliant; and
- vi) illegal sites – there is evidence that illegal waste disposal has taken place in Northern Ireland but generally only limited information is known regarding location and/or nature of waste.

For current regulated sites, self monitoring of surface water and groundwater should be being undertaken by the operator. In addition the Northern Ireland Environment Agency (NIEA) undertake check monitoring at a selection of operating and closed sites.

At sites receiving putrescible waste and where complete engineered containment and leachate management was/is not applied (and in some cases even where it was/is applied) some local impact on the underlying and adjacent groundwater quality could be expected.

For the UK as a whole, the scale of impact on groundwater and associated surface waters and ecosystems from landfill sites is generally considered to be less significant than might be expected, except where there are sensitive receptors (e.g. wetlands, springs, abstractions) in close proximity to a particular site. Some exceptions to this exist where improper disposal of particularly persistent industrial waste has occurred.

A review of the impact of landfill sites was undertaken by the House of Lords European Communities Committee Seventeenth Report 1998 which concluded that practices in the UK were such that significant impacts on groundwater are unlikely to be widespread from landfill sites although it did recognise local impacts can occur (www.publications.parliament.uk).

3.0 Classification

A variety of factors will influence whether a specific site poses a particular risk to the water environment including;

- Volume, nature and age of waste
- Site design, engineering and management
- Local hydrogeological setting
- Proximity to sensitive receptors

This assessment has been undertaken to support the following elements of classification:

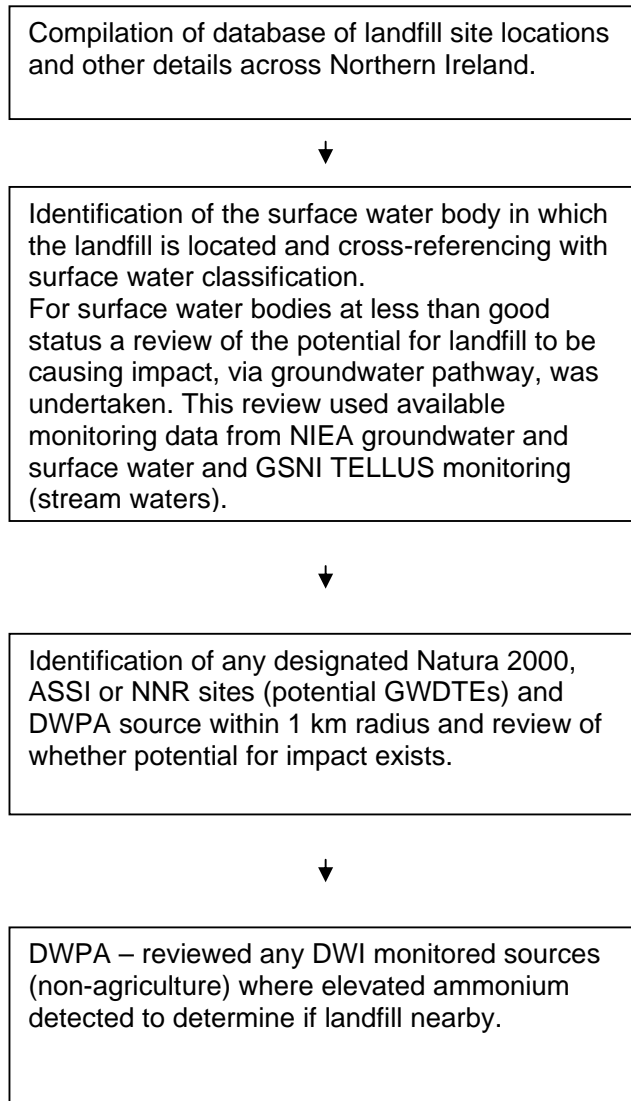
Chemical Classification

- No significant diminution of surface water chemistry and ecology
- Impact on Groundwater Dependent Terrestrial Ecosystems (GWDTEs)
- Impact on Drinking Water Protected Areas

4.0 Assessment Process

The following assessment process was undertaken, managed within a GIS-based project.

It should be noted that for potential GWDTEs (SPA, SAC, ASSIs and NNRs) limited knowledge is currently available regarding their groundwater dependency and sensitivity to water chemistry changes. Where such sites occur within or near an identified landfill an opinion on potential for impact has been made by reference to the hydrogeological setting and information available from NIEA ecologists familiar with the sites.



This assessment has sought to identify all significant landfills and consider their potential for impact with respect primarily to nearby surface water bodies, significant potable groundwater supplies and potential GWDTes (SAC, SPA, ASSIs and NNRs). Local knowledge of hydrogeological settings, site type and available monitoring data was used to determine whether or not a groundwater body associated with a landfill should be classed as “good” or “poor” status.

5.0 Outcome

On the basis of the above assessment no Northern Ireland groundwater bodies have been classified as being at “poor” status due to impacts on receptors from this landfill point source pressure. This reflects the lack of definite evidence for impact on the status or ecological potential of designated surface water bodies and GWDTes or direct impact on a significant potable supply (DWPA).

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A low confidence determination in the assessment was made for most sites. Reasons for this include 1) available monitoring data suggesting impact to some degree on a nearby surface water feature or significant impact on surrounding groundwater, 2) monitoring evidence was less clear regarding potential impact and finally 3) locations of all historic landfill and illegal waste disposal sites have not been fully verified to date.

6.0 River Basin Planning Cycle

Landfill sites have the potential to have an impact on groundwater quality in their immediate surrounds, where appropriate containment and/or management of leachate is not practised. The scale of any impact with respect to the groundwater body is unlikely to be significant except possibly in some very vulnerable hydrogeological settings. More significant impacts could occur where landfills are located close to sensitive receptors such as wetlands.

Whilst current and recently operational landfill sites are subject to existing prevention of pollution legislation, older landfill sites and illegal waste deposits are subject to less control and assessment. Over the river basin plan period further assessment of landfill and waste deposit sites can be undertaken to confirm no significant impacts are occurring. This may require more detailed monitoring of groundwater and surface water bodies where local watercourses adjacent to landfill sites have shown some potential impact from leachate and where the pathway for pollutants from the waste site to the surface water may be groundwater.

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