



eastern
river basin district

GROUNDWATER RISK FROM URBAN PRESSURES

**BACKGROUND DOCUMENT
TO THE
WATER MATTERS REPORT**

TABLE OF CONTENTS

Section 1 Introduction 3
Section 2 Summary of Findings 4
Section 3 Next Steps 6

Section 1

Introduction

In March 2005, the Environmental Protection Agency (EPA) submitted the report “The Characterisation and Analysis of Ireland’s River Basin Districts” to the European Commission (EC) as part of the mandatory reporting requirements of the European Union (EU) Water Framework Directive (WFD). The report included a risk assessment of urban pressures on groundwater which was based upon an overly simplistic methodology. It was acknowledged at the time that the risk assessment would require updating. Under the original risk assessments urban areas were considered as point sources of pollution using relative population numbers as risk criteria. There was no differentiation of actual or site-specific risk on the basis of human activities, pathways, extent and state of local infrastructure, or groundwater quality impact data (due to a general lack of such data).

The Eastern River Basin District (ERBD) project was subsequently commissioned by Dublin City Council (DCC), on behalf of the Department of Environment, Heritage and Local Government (DEHLG), to study urban groundwater risk in greater detail, with the intent of informing future needs of a national Programme of (groundwater) Monitoring and a Programme of Measures, both required by the European Union (EU) Water Framework Directive (WFD).

Under the urban groundwater risk study, an urban groundwater pressure assessment has been conducted with the following basic objectives and tasks:

- Describe relevant attributes that define risk of urban groundwater pollution, following the source-pathway-receptor model that is being used across Europe for all WFD-related risk evaluations;
- Screen, rank, and group urban areas in Ireland according to relative risks;
- Collect groundwater impact data;
- Develop guidance for the protection of urban groundwater resources and ecological receptors.

Tasks 1 and 2 have been completed and a report is in preparation. Task 3 involves a groundwater sampling programme which is starting in July 2007 and will be completed in April 2008. Task 3 may also involve the drilling and installation of monitoring wells in one urban area in Ireland, to be targeted for completion in June 2008. Task 4 is similarly targeted for completion by June 2008.

Section 2

Summary of Findings

Thirty-three (33) urban areas in Ireland (with populations greater than 10,000 people) have been systematically examined in context of their source-pathway-receptor characteristics. An index-based ranking scheme was used to differentiate and explore risk attributes. The urban areas that are considered to pose the highest risk to groundwater are associated with Dublin, Waterford, Drogheda, Galway, Limerick, Cork, and Ennis.

Localised impacts on urban groundwater quality in Irish cities/towns have been documented, and are typically associated with specific point sources of pollution (e.g., gasworks, spillages). However, there is a general lack of groundwater quality data in urban areas, and the existing national database is too small to verify risk and be conclusive about the qualitative status of urban groundwater bodies.

Given the general lack of historical groundwater quality data, it is not possible to differentiate impacts on different urban areas.

Leaking sewer systems are regarded as having the highest impact potential on the basis of their geographic spread, however, whether or not they leak depends on a variety of site-specific factors which are difficult to map and quantify. Limited studies in Dublin suggest that shallow groundwater quality in the city centre area along the Liffey may be impacted by leaking sewers. Sewers are typically a source of nutrients, bacteria and other pathogens. Based on this and literature from other countries, including the UK, it is reasonable to infer that sewer leaks occur in most urban areas.

Only three public water supply wells draw upon groundwater that originates within urban areas: Drogheda (2) and Portlaoise (1). There are more than 100 private abstraction wells within urban areas, mostly for industrial and geothermal applications. Industries use groundwater mainly for processing or cooling, and only a few facilities use water for ingestive purposes. Few of the private well operators monitor groundwater quality regularly.

Urban groundwater pollution sources and pathways are complex, and sources of pollution are difficult to control. Because of the complexities involved, urban groundwater pollution is considered to be a significant water management issue as: (a) Irish towns are growing rapidly, and (b) the financial costs of returning affected groundwater bodies to WFD status objectives will likely be significant, requiring extensive monitoring and management measures.

Urban pressures are location-specific, depending on such factors as land use patterns, degree and nature of industrial activity, sewer systems, and local hydrogeology. Urban pressure types generally fall into just a few categories: industrial manufacture, waste disposal, transport activities, road and building runoff, amenity land uses (e.g., parks and lawns), and sewerage. Groundwater

Section 3

Next Steps

Because systematic monitoring has not been done in the past, groundwater quality data are generally not available to verify impact from urban pollution sources at the broader scale. Data that have been researched and have made available to the study tend to be associated with monitoring of individual industrial and waste disposal facilities.

A suitable groundwater sampling programme has been defined to explore urban groundwater quality at the broader scale. The selected wells are mostly active industrial abstraction wells, and permission has been received to sample 24 wells in 12 towns. The selected wells are representative of different land uses. Broadly, these are: city centre; light industrial, commercial/heavy residential; and light residential.

All samples will be analysed for EPA's priority list of substances which are included in EPA's recently published national groundwater monitoring network. This list incorporates an exhaustive list of dangerous substances, including volatile organics, metals, and pesticides. Sampling will be conducted at four quarterly intervals, starting in July 2007 and to be completed in April 2008. Results will be used by EPA to inform about future monitoring needs.

In addition, plans are underway to install dedicated monitoring wells within the urban footprint of Drogheda to study shallow groundwater quality in one urban area in greater detail. While Dublin is considered to be the highest risk case of all of the 33 urban areas studied, Drogheda is regarded as a more meaningful and representative case study, being similar to other towns in Ireland in respect of size, source types, pathways and receptors.

Nested wells at different depths will be installed at several locations within Drogheda. The installed wells will be sampled and analysed for the same suite of substances described above, and results will be included in a final report in June 2008.

When completed, results of the urban pressure assessment on groundwater will be used by EPA to define a national network of monitoring wells in urban areas that will supplement the national network already published.