

eastern  
river basin district

# Draft Programme of Measures *Groundwater*

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# Document Control Sheet

<b>Project</b>	Eastern River Basin District			
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# Water Framework Directive

- ❑ The Draft River Basin Management Plan was published on the 22<sup>nd</sup> December 2008 for Public Consultation.
- ❑ This Programme of Measures accompanies the River Basin Management Plan created for the Eastern River Basin District.
- ❑ The River Basin Management Plan can be downloaded from the website, whilst more detail of the Programme of Measures is contained in the River Basin Management System which can be accessed through Local Authorities.
- ❑ The River Basin Management System is a web-based tool that assists Local Authorities to store information about the condition of their waters and the Programme of Measures for their improvement.
- ❑ For more information please visit [www.erbd.ie](http://www.erbd.ie)



# Groundwater

## ❑ Where does groundwater come from?

- Groundwater originates from rainfall which partly infiltrates into the ground.
- Groundwater travels underground from areas of recharge to areas of discharge (such as rivers or the coastline).
- Groundwater is available, at least in small amounts, almost everywhere.

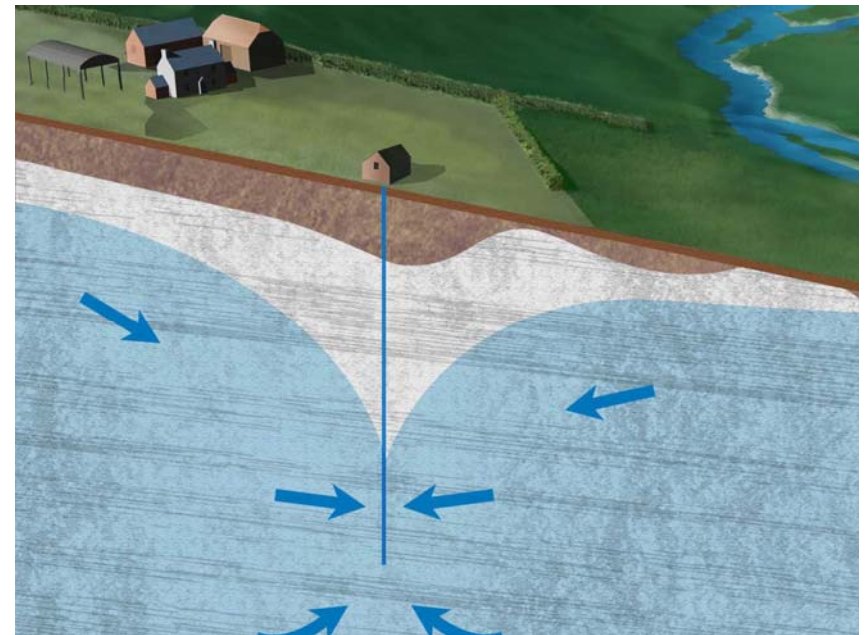
## ❑ Why is groundwater important?

### ❑ *Ecology:*

- It provides the supporting conditions necessary for the good status of surface waters and wetland areas.
- It directly influences ecosystem functions.

### ❑ *For Humans:*

- It serves as an important source of water for public and private water supply, including industrial and commercial activity.



*Groundwater Abstraction from a Well*

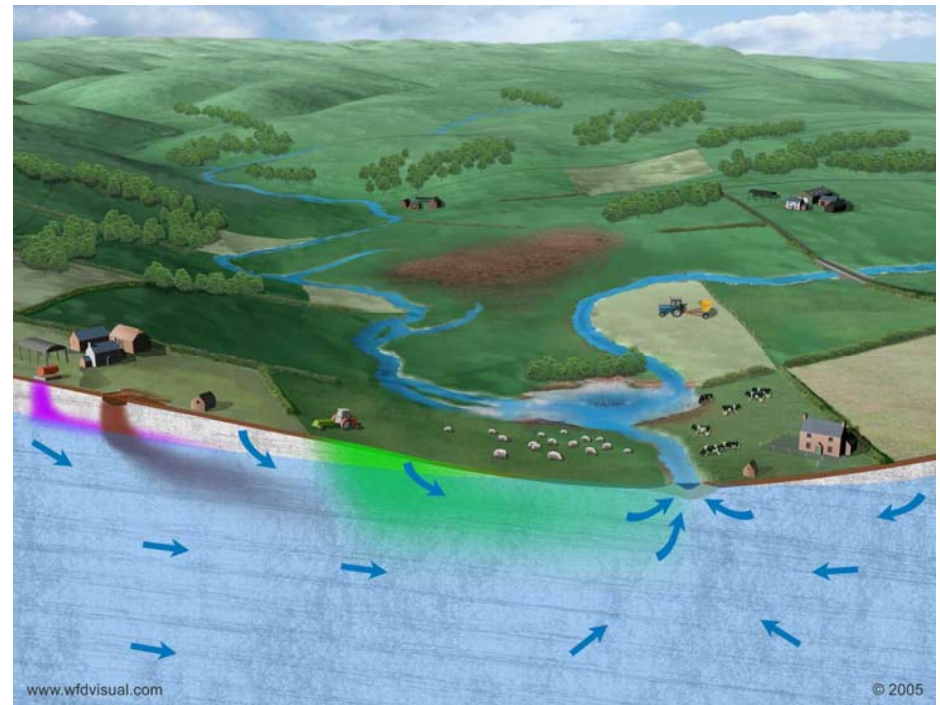
# Groundwater

- ❑ **How does groundwater become polluted?**
- ❑ Groundwater becomes polluted by human activity. There are many possible sources of pollution. Examples are:
  - Waste disposal sites
  - Excessive fertiliser or pesticide use
  - Leaking sewer networks and septic systems
- ❑ Receptors such rivers, wetlands, and supply wells may be directly impacted by pollutants that are carried in groundwater.
- ❑ **How will the Water Framework Directive help?**
- ❑ The WFD sets environmental status objectives directed at groundwater quality and quantity.
- ❑ Groundwater must meet Good Status objectives by year 2015.
- ❑ Groundwater bodies that are deemed to be at less than Good status will require Programmes of Measures to bring them into at least Good Status. Once Good status objectives are reached, they must be protected and maintained.
- ❑ The Environmental Protection Agency is responsible for classifying status of groundwater resources.



# Groundwater Pollution Example

- ❑ How farm activities can result in groundwater pollution:
  - Leaking slurry tank
  - Landspreading with manure
  - Excessive fertiliser and pesticide use
- ❑ Risks:
  - Deterioration of groundwater quality
  - Impact on receptor quality (e.g., river water quality)
- ❑ Measures:
  - There are several measures that can be implemented to minimise or prevent these risks.
  - Potential measures are discussed in the following pages.



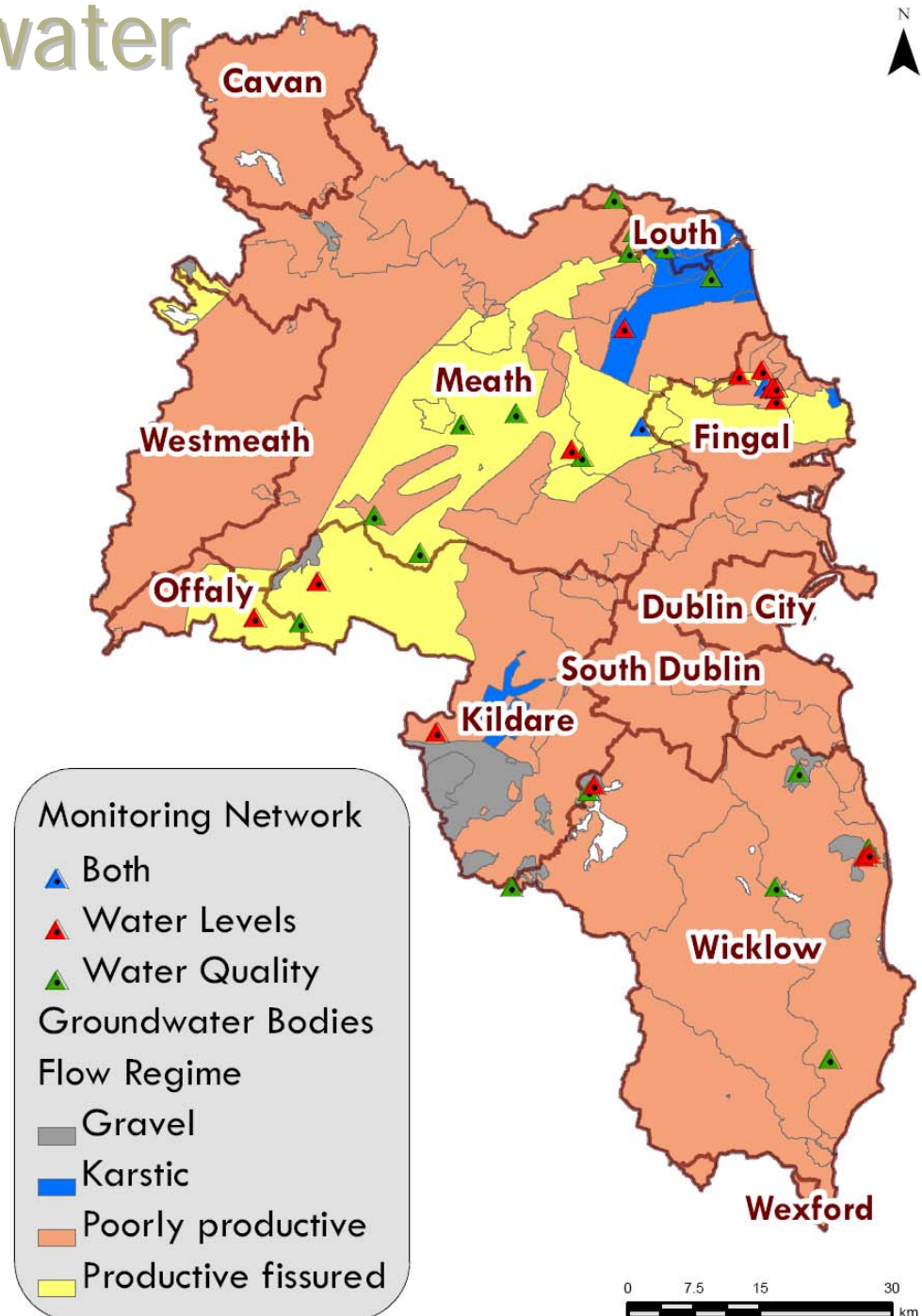
***Groundwater Pollution from Agricultural Sources***

# Overview of Groundwater in the ERBD



## Geography

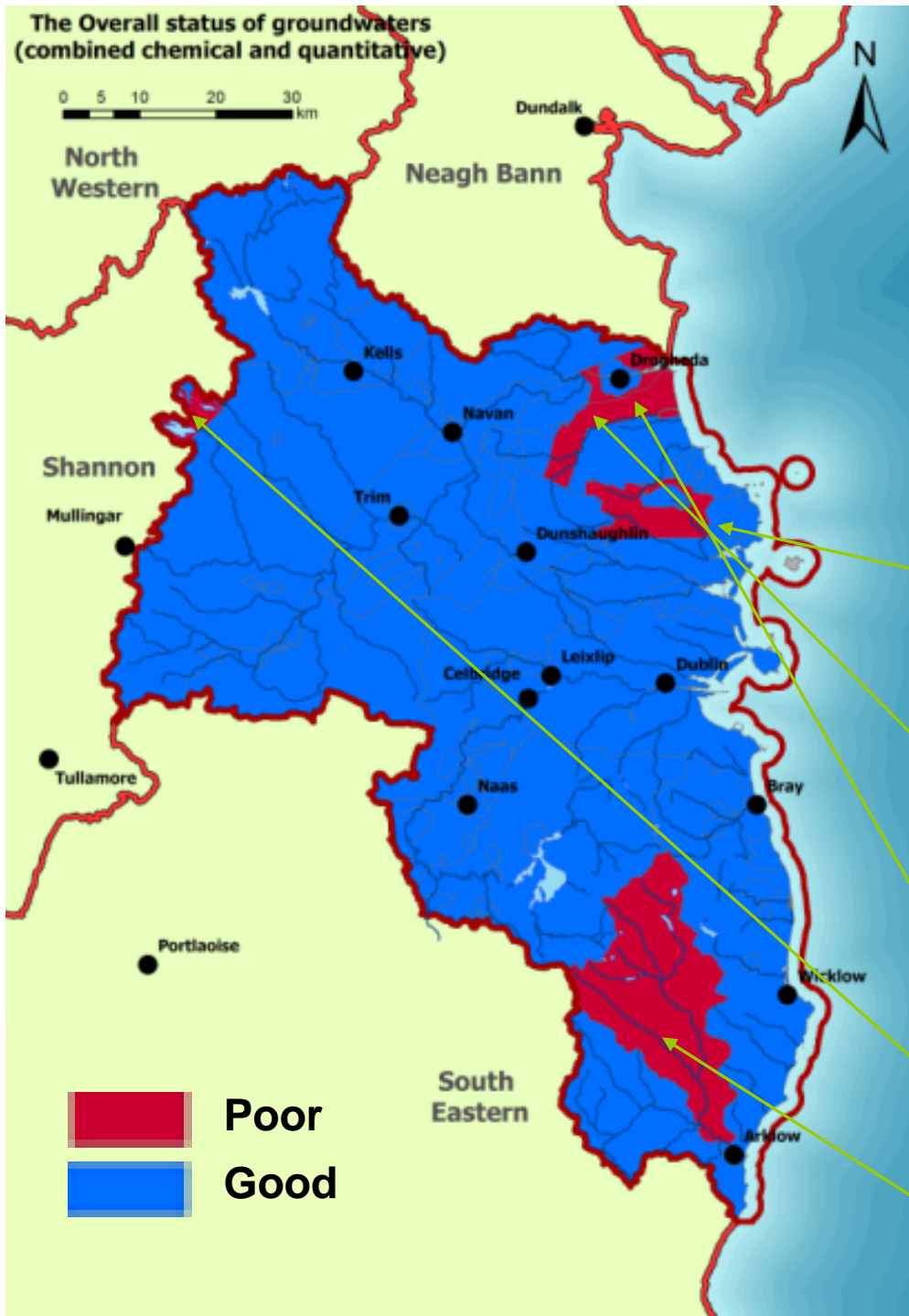
- ❑ Groundwater is an important natural resource in the ERBD, for humans and ecosystems alike
- ❑ Groundwater supplies baseflow to streams and provides environmental supporting conditions for many different types of wetlands
- ❑ Groundwater is locally important and is being increasingly developed as a source of water for public supplies.
- ❑ The entire area of the ERBD is divided into 75 groundwater bodies.
- ❑ Groundwater conditions in the ERBD are generally good.
- ❑ There are some areas where groundwater is at risk from being over-abstracted or polluted.
- ❑ An extensive monitoring network has been established by the Environmental Protection Agency.



# Groundwater Status

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- ❑ *The default WFD objective for all groundwater is to achieve Good Qualitative (Chemical) Status and Good Quantitative Status by 2015.*
- ❑ The ERBD project has worked with the Environmental Protection Agency to classify the status of all groundwater bodies in the ERBD with respect to:
  - Groundwater quantity
  - Groundwater quality
- ❑ Only 5 groundwater bodies have been classified as being at Poor status (see map on following page).
- ❑ 1 groundwater body is at Poor status from possible overabstraction while 4 were assigned Poor status on the basis of water quality impacts.

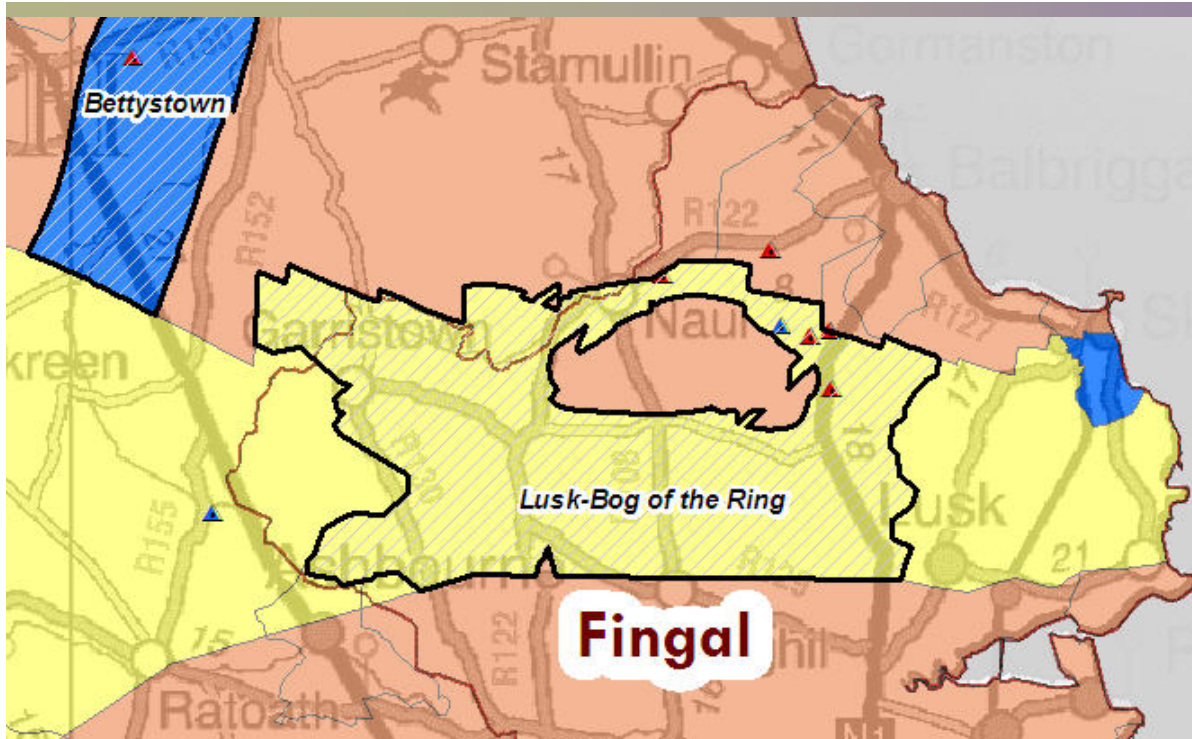


# Groundwater Status

## *Groundwaters at poor status in the ERBD*

Groundwater Area	Reason
Bog of the Ring Wellfield near Lusk, Co. Fingal	Apparent Overabstraction (Quantity)
Bettystown, Co. Meath	Groundwater discharges which affect the water quality of streams and rivers in the groundwater area (Quality)
Drogheda, Co. Meath and Louth	
Lough Lene, Co. Westmeath	
Avoca Mine, Co. Wicklow	Pollution from mine waste

# Groundwater Quantity



- ❑ Present and planned abstractions (up to 2015) exceed estimated rate of groundwater recharge for the groundwater body associated with the Bog of the Ring Wellfield near Lusk, County Fingal.
- ❑ There are also concerns over potential impacts of abstraction on the hydrology of the Bog of the Ring



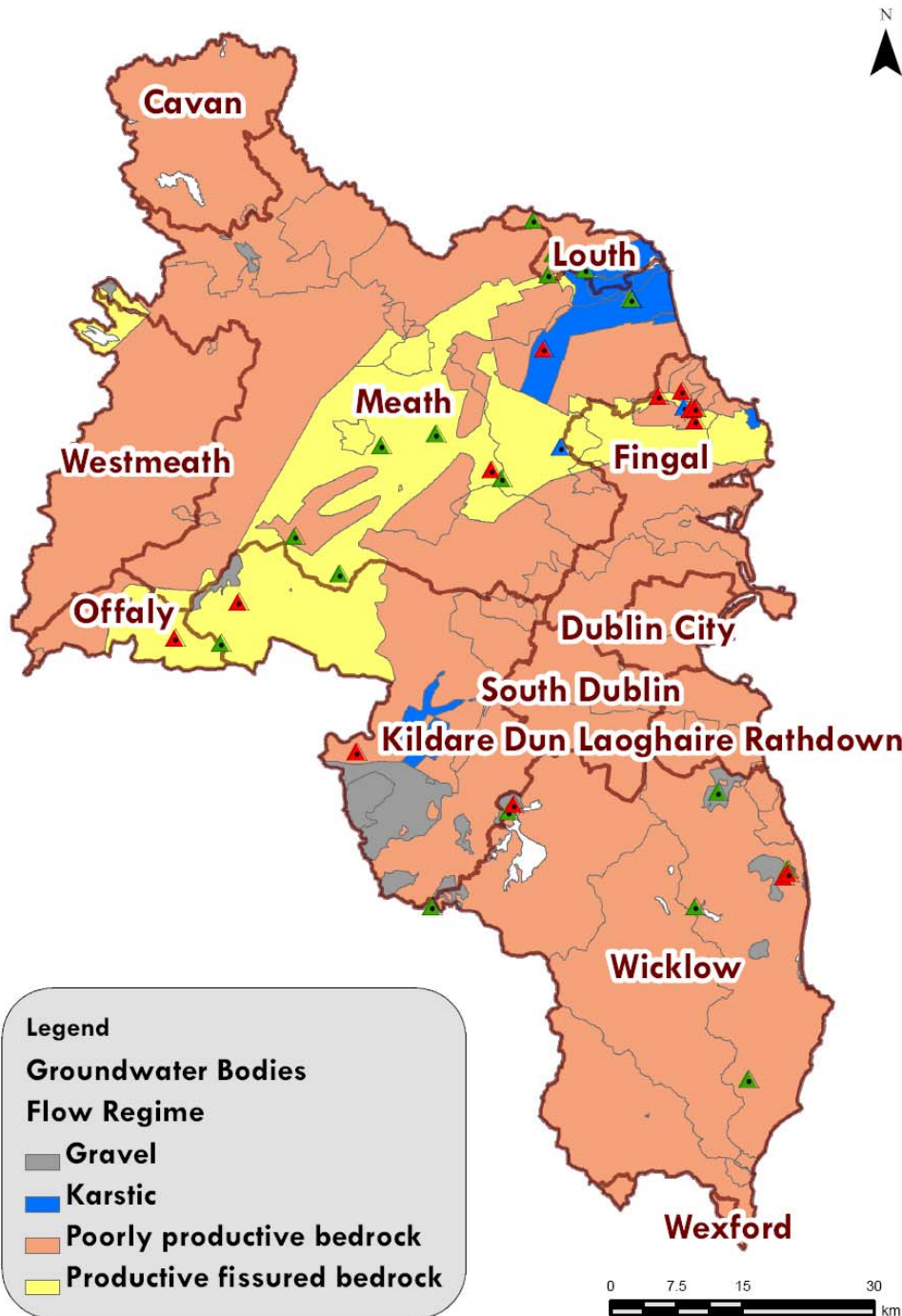
# Groundwater Quality

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- 4 groundwater bodies are at Poor status from water quality considerations:
  - *Avoca Mine*: The groundwater body associated with the Avoca mine is considered to be at Poor status. Groundwater that discharges from the mine adits and spoil areas is impacting the water quality of the Avoca River, which is also classified as being at Poor status. The area that is contributing to the water quality problem is small compared to the overall size of the associated groundwater body.
  - *Surface Water/Groundwater Interaction*: Orthophosphate exceeds its water quality threshold in several streams that flow across the Lough Lene, Drogheda, and Bettystown groundwater bodies. Accordingly, these streams have been classified as being at Poor status. Groundwater quality is also affected by orthophosphate, and because groundwater provides significant baseflow to the affected streams, the listed groundwater bodies are also classified as being at Poor status.

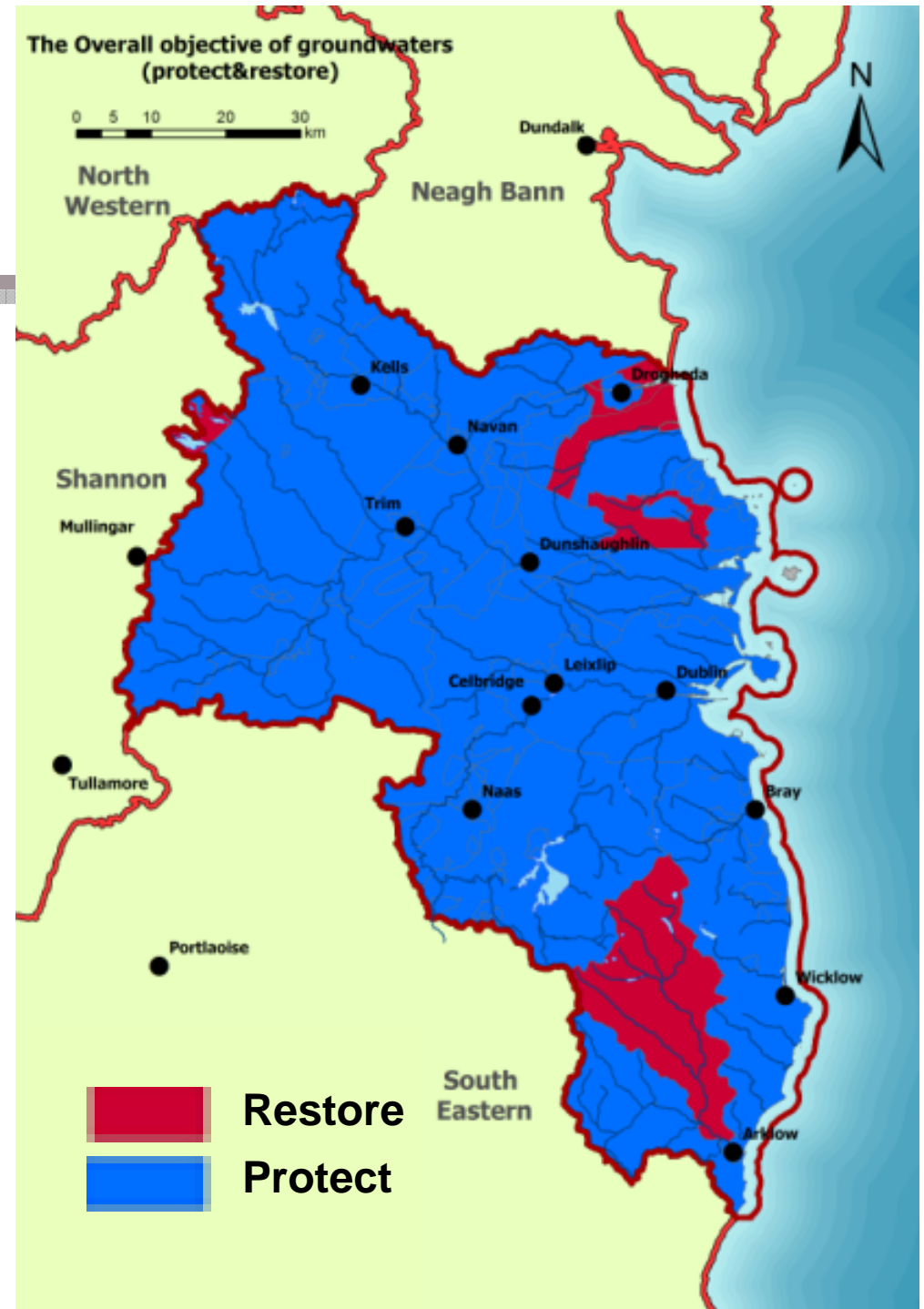
# Influence of Rock Type

- ❑ Assessment of impact and status is made more complicated in the ERBD by the presence of “Poorly Productive” bedrock Aquifers.
- ❑ Poorly Productive Aquifers (PPA) generally transmit small quantities of water and form localised flow systems.
- ❑ Shallow pathways become especially important in PPAs in delivering pollutants to streams and wetlands.



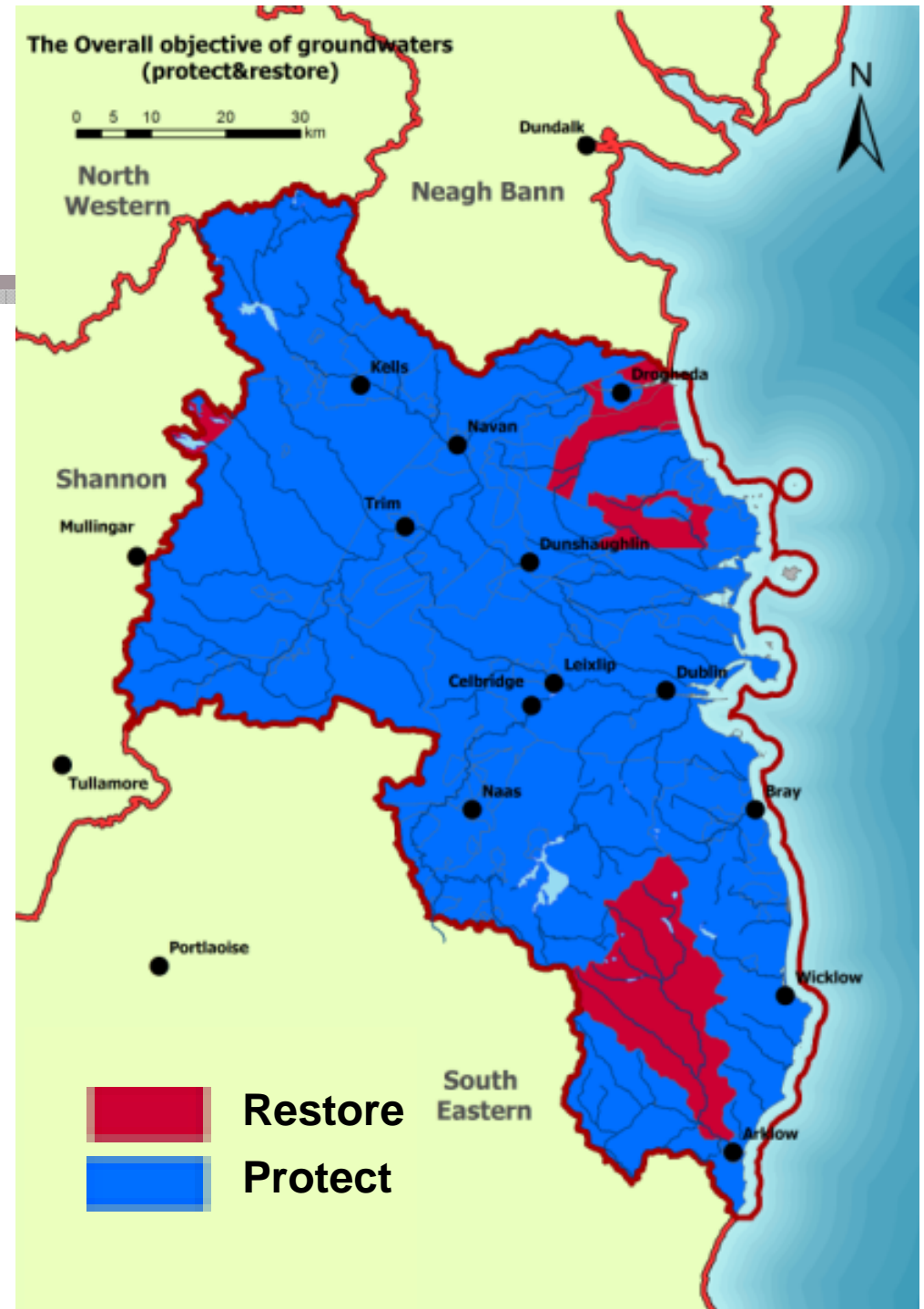
# Measures

- The majority of groundwater resources in the ERBD is at Good Status. Our primary objective is to protect these resources from status deterioration.
- 5 groundwater bodies are classified as Poor status. Our objective is to restore these groundwaters to Good Status, where possible, before 2015



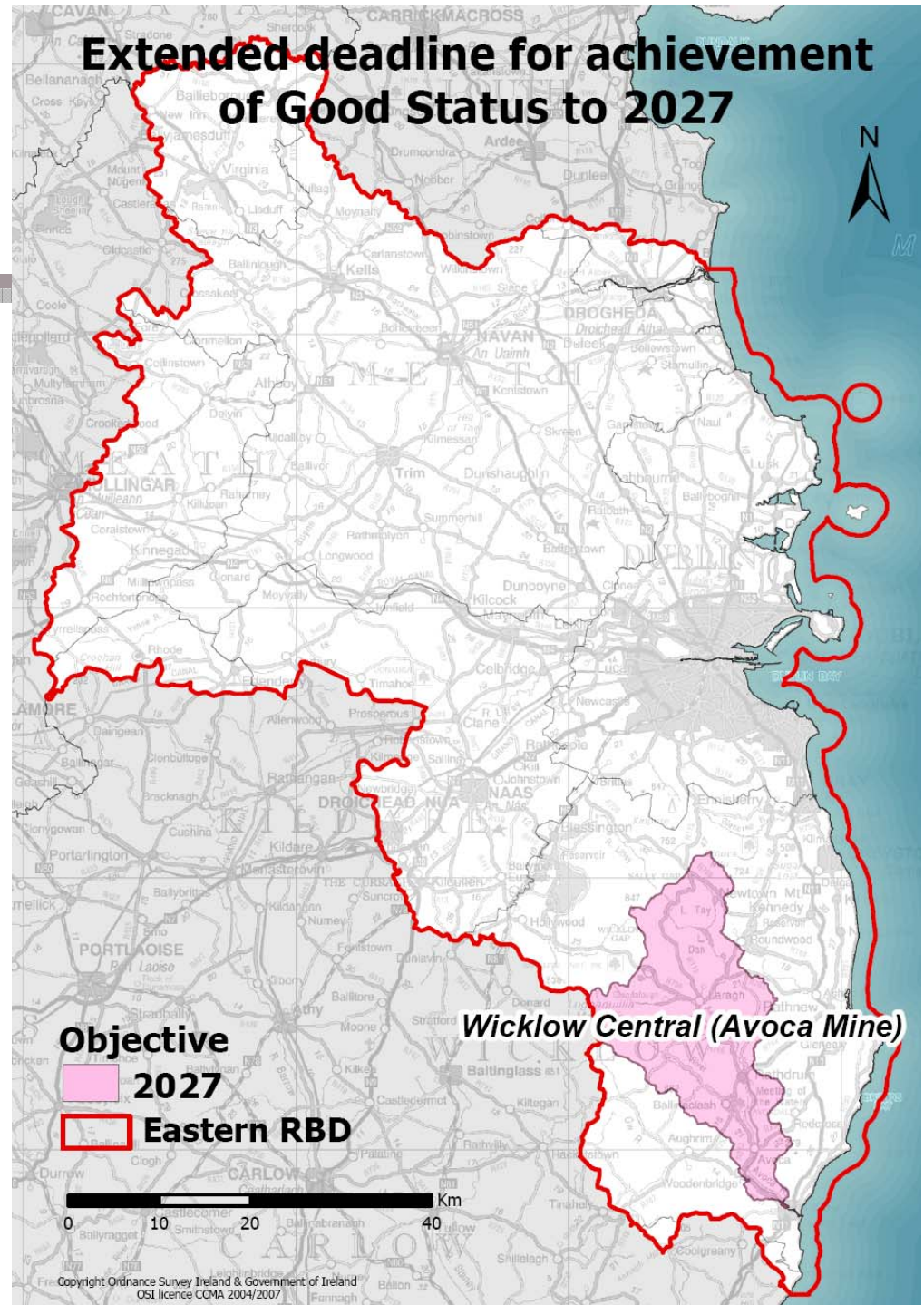
# Measures

- Objectives will be achieved by implementing Programmes of Measures directed at:
  - Pollution prevention
  - Restoration of impacted areas
  - Sustainable development of groundwater resources



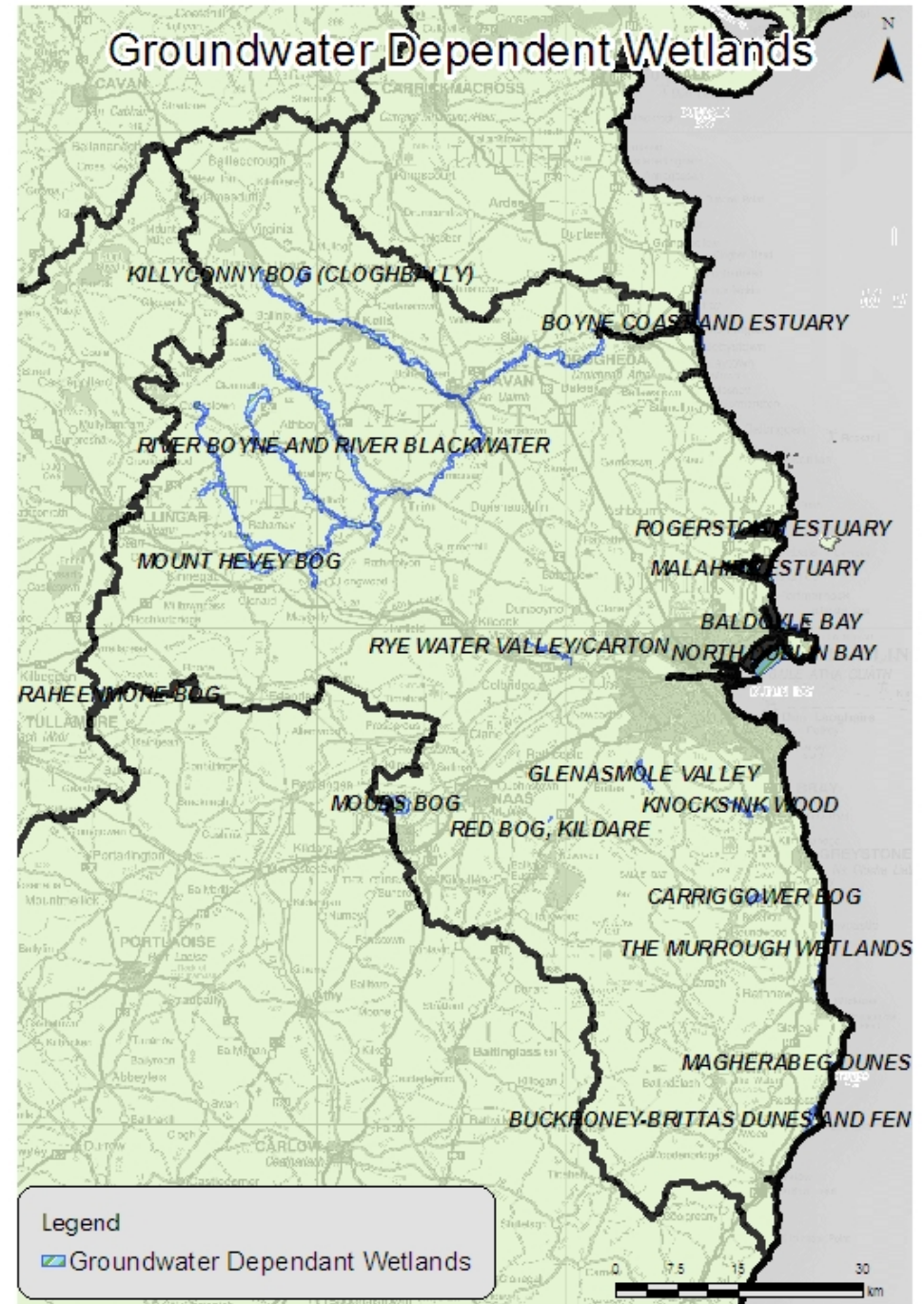
# Avoca – a special case

- ❑ The groundwater body associated with the Avoca Mine has been classified as Poor Status.
- ❑ Remediation of water quality at Avoca by 2015 will be very expensive and may not be technically achievable
- ❑ Remediation options for the historic mine area were recently the subject of a detailed Feasibility Study (CDM, 2008).
- ❑ Because of the complexities involved, the deadline for achieving Good status objectives may have to be extended beyond 2015.



# Protected Areas

- ❑ The WFD sets out specific requirements for:
  - Groundwater Dependent Terrestrial Ecosystems (Wetlands)
  - Drinking Water Sources (Groundwater)
- ❑ All groundwater bodies are protected for the purpose of drinking water.
- ❑ Groundwater dependent wetland areas are protected under the Habitats Directive—they are a subset of Special Areas Conservation (see map to the right).
- ❑ Measures must be implemented to improve those protected areas that are at less than Good status.



# What are the problems to address?

1. *Mobile Organic Compounds (Pesticides)*
2. *Urban Pressures*
3. *Onsite Wastewater Treatment Systems (OSWTS)*
4. *Abstractions*
5. *Contaminated Land*
6. *Landfill*
7. *Forestry*
8. *Quarries*
9. *Groundwater/Surface Water Interaction*

- ❑ There are numerous environmental pressures that need to be addressed.
- ❑ An Initial Characterisation of pressures, and a risk assessment of all water bodies, was completed nationally in 2005 (EPA, 2005)
- ❑ Since 2005, different pressure types have been the subject of Further Characterisation studies (listed to the left).
- ❑ Recommendations on suitable Programmes of Measures have been developed from each of Further Characterisation studies.

# POMS in the ERBD

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- ❑ Having identified problem areas and using outputs from the Further Characterisation studies, the ERBD project has begun to develop POMS that are specific to the ERBD. There are two types of applicable measures:
  - Basic measures - existing laws and regulations.
  - Supplementary measures – non-statutory activities such as codes of practice, surveys and research.
- ❑ Supplementary measures may be needed where Basic measures may not be effective in meeting WFD status objectives.
- ❑ The POMS for the ERBD will be selected by and with significant inputs from Local Authorities (who are mandated to implement the selected POMS).

# *Basic Measures*

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## **Basic Measures:**

A full list of basic measures is listed in the Draft River Basin Management Plan. It includes the regulations enacted from the following 11 European Directives and also requires member states to create measures to address 11 other issues:

### **11 European Directives**

1. Bathing Water Directive
2. Habitats Directive
3. Birds Directive
4. Drinking Water Directive
5. Major Accidents (Seveso) Directive
6. Environmental Impact Assessment Directive
7. Sewage Sludge Directive
8. Urban Waste Water Treatment Directive
9. Plant Protection Products Directive
10. Nitrates Directive
11. Integrated Pollution Prevention Control Directive

### **11 Other Basic Measures**

1. Cost recovery for water use
2. Measures to promote efficient and sustainable use
3. Protection of drinking water sources
4. Control of abstraction and impoundment
5. Authorisation of discharges to groundwater
6. Control of point source discharges
7. Control of diffuse source pollution
8. Control of priority substances
9. Control of physical modifications of surface waters
10. Controls on other activities impacting water status
11. Prevention or reduction of the impact of accidental pollution incidents

# Pesticides

## Groundwater Bodies in the ERBD Prioritised for Monitoring of Pesticides

Bettystown

Blessington S&G

Lusk-Bog of the Ring

Wilkinstown

Trim

Drogheda Urban

Drogheda

Lusk-West

Kilcoole S&G

Enniskerry S&G

- ❑ Excessive use of pesticides can result in groundwater contamination. A national groundwater risk assessment indicates that pesticide detections can be expected in many different settings around the country, but that overall, risk to surface water would be considered greater.
- ❑ The table to the left lists groundwater bodies in the ERBD that were recommended for pesticide monitoring.
- ❑ Several Basic Measures exist to limit risks from pesticides. However, supplementary measures have been recommended to address gaps in information about pesticide usage and monitoring to verify predicted risk.
- ❑ Abstraction wells within the groundwater bodies to the left are included in EPA's national groundwater quality monitoring network.

# *Pesticides*

## Recommended Supplementary Measures

Introduce bye-laws on disposal of plant protection products (pesticides)
Restrict pesticide usage within Inner Source Protection Zones of drinking water sources
Develop inventories of types and quantities of pesticides used in different sectors (except agriculture and forestry, where good usage statistics exist).
Promote use of less mobile, less persistent, active ingredients
Follow label recommendations on application rates and times
Conduct research into degradation rates in Irish soils
Expand frequency of monitoring of drinking water sources
Conduct research into role of bypass-flow in pollutant loading
Improve access to mapping of cropping patterns held in the GIS of the Department of Fisheries, Food and Agriculture

# Diffuse Rural Pressures

## Groundwater Bodies At Risk from Diffuse Rural Pressures

Ashford S&G	Lusk-West
Athboy (001)	Moynalty
Ballany S&G	Naas
Ballymore Eustace S&G	Navan Orebody
Drogheda	Newtown Lough
Drogheda Urban	Old Kilcullen S&G
Dublin Urban	Trim
Duleek	Wicklow East
Dunshaughlin	Wilkinstown
Enniskerry S&G	
Lusk-Bog of the Ring	

- ❑ 3 groundwater bodies are at Poor status from diffuse rural pressures, while another 20 are "at risk" from meeting WFD objectives (though still at Good status).
- ❑ Diffuse rural pressures are associated with agriculture, primarily landspreading of farmyard waste products, including slurry.
- ❑ Basic Measures to address this pressure include the Groundwater Directive and the Nitrate Action Plan.

# *Diffuse Rural Pressures*

## **Recommended Supplementary Measures**

Adopt measures applicable for surface water improvements - enforce existing legislation, bye-laws, and codes of good practice

For landspreading, establish appropriate set-back distances for application from wells and springs (Follow GSI/EPA groundwater protection response matrix for landspreading within Source Protection Zones )

Develop nutrient management plans that relate diffuse pressures and groundwater vulnerability

Ensure proper disposal of waste products (e.g., no landspreading of pesticide waste products)

Maintain and enhance soil organic matter levels

Carry out farm surveys

# Onsite Wastewater Treatment Systems (OSWTS)

- ❑ The only Basic Measure to address this situation is the Water Services Act 2007 although Cavan County Council has introduced By-laws to address this directly.
- ❑ Section 70 of the Water Services Act 2007 places a 'Duty of Care' on owners of Onsite Wastewater Treatment Systems.
- ❑ Supplementary Measures will need to be put in place to ensure 'At Risk' areas are protected.
- ❑ The table to the right shows the groundwater bodies that are particularly susceptible to pollution from Onsite Wastewater Treatment Systems. These have been selected based on well monitoring results indicating possible pollution from this source.
- ❑ The Environmental Protection Agency provides guidance for the proper construction and use of onsite wastewater treatment system but enforcement is required to ensure the guidance is followed.

Groundwater Bodies for which Onsite Wastewater Treatment System (OSWTS) Measures are suggested.

Ashford S&G	Newtown Lough
Athboy (001)	Old Kilcullen S&G
Ballany S&G	Rye Water Valley GWDTE
Ballymore Eustace S&G	Trim
Drogheda	Wicklow East
Dublin Urban	Wilkinstown
Duleek	
Dunshaughlin	
Enniskerry S&G	
Lusk-Bog of the Ring	
Moynalty	
Naas	
Navan Orebody	

# *Onsite Wastewater Treatment Systems (OSWTS)*

## **Recommended Supplementary Measures**

Integrate OSWTS risk matrices into LA development plans

Introduce LA bye-laws regarding maintenance of OSWTS

Adopt a LA common register of approved Site Assessors and common Code of Practice for maintaining register

Adopt a common RBD approach to site investigation, application of EPA Code of Practice for Single Houses for Single Housing

Establish national database of all site assessments

Utilise LA risk maps of OSWTS to inform decision making and target areas for inspections

# Urban Pressures

- ❑ All urban areas present a risk to groundwater pollution, but there are degrees of risk based on the level and variety of pressures, as well as differences in physical settings.
- ❑ In the ERBD, Dublin and Drogheda are considered the highest risk urban areas. Groundwater quality in each has been locally impacted.
- ❑ There is a long list of Basic Measures, that if fully implemented, would be protective of urban groundwater.
- ❑ There is also a long list of best management practices in literature.
- ❑ Supplementary measures were developed as part of the ERBD-led national FC/POM study on urban pressures.

Groundwater bodies in the ERBD at highest risk from Urban Pressures

Dublin Urban

Drogheda Urban

# Urban Pressures

- Supplementary measures fall into five broad categories:
  - Planning
  - Infrastructure
  - Monitoring and reporting
  - Research and surveys
  - Codes of practice
- Measures focus on pollution prevention

Groundwater bodies in the ERBD at highest risk from Urban Pressures

Dublin Urban

Drogheda Urban

# *Urban Pressures*

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- Planning:
  - Develop groundwater protection schemes for supplies in Drogheda
  - Develop groundwater management plan for Dublin and Drogheda
  - Register all abstraction wells in urban footprints, especially those used for human consumption, directly or indirectly
  - Support further development of the SuDS evaluation tool ([www.sudsireland.com](http://www.sudsireland.com))
  - Promote groundwater awareness and training in the planning process

# *Urban Pressures*

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- Improved Infrastructure
  - Sewer leak detection and rehabilitation programmes
  - Identify and map sewer exfiltration hazard areas
  - Prioritise supervision of sewer construction in groundwater vulnerable zones
  - Enhance sewer design and construction in source protection areas and groundwater vulnerable zones
  - Avoid construction of sewer networks in inner protection zones of groundwater protection schemes
  - Develop response matrices for sewer networks, similar to existing response matrices for landfills developed by the EPA and the GSI
  - Improved enforcement and supervision during construction of roadway drainage features

# *Urban Pressures*

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## □ Monitoring and Reporting:

- Monitoring of Licensed Facilities (Point source monitoring):
  - Improve water quality data capture - link facility reporting to EDEN
  - Standardise a minimum no. of parameters to be analysed
  - Establish common detection limits for reporting purposes
  - Specify reporting of filtered vs. unfiltered samples
  - Map and code existing monitoring wells
- Establish monitoring networks for diffuse pressures:
  - Make use of existing abstraction wells
  - Determine appropriate monitoring strategy
  - Construct monitoring wells in highest risk areas
  - Incorporate monitoring into EPA's national monitoring network

# *Urban Pressures*

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- Research and Surveys:
  - Surveys use of groundwater in urban footprints, especially food and drinks industry
  - Survey use of pesticides
  - Research impacts of road runoff on groundwater quality
  - Research impacts of SuDS on groundwater quality
  - Prioritise mapping of GWDTEs in urban footprints
  - Study and monitor the “at-risk” Ryewater GWDTE (Leixlip/Maynooth)

# *Urban Pressures*

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- Codes of Practice:
  - Improve routines for reporting of groundwater vulnerability in the geotechnical industry
  - Improve and promote asset management practices – GIS and Information Management Systems (IMS) – sewer network information, water distribution systems information, industrial discharges
  - Improve and promote good well construction practices
  - Alter routines for reporting of data from IPPC and waste licensed facilities

# *Urban Pressures*

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## **Other Recommended Supplementary Measures**

Enforce Section 16s (discharges to sewer and groundwater) at public works (Act 1 of 1977 (Local Government (Water Pollution) Act))

Enforce LAs' 'measures' in urban areas in Dangerous Substances Regulations Reports

Enforce LAs' Section 4s (discharges to water bodies) (Act 1 of 1977 (Local Government (Water Pollution) Act))

Enforce IPPC licences

# *Abstractions*

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- ❑ **The groundwater body at the Bog of the Ring Wellfield** appears to be at risk from over-abstraction.
- ❑ The abstraction could be having an impact on the hydrology of the bog.
- ❑ The construction details of the production wells may be contributing to the apparent abstraction influence on shallow groundwater.
- ❑ Monitoring is continuing to assess the long-term sustainability of current abstraction rates.

# *Abstractions*

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- Groundwater is becoming increasingly considered as a source of public water supply in the ERBD. Examples are:
  - East Meath South Louth Improvement Scheme
  - Wicklow Town
  - Arklow Town
  - Kildare Water Strategy
- The true extent of groundwater abstractions in the ERBD is not known. Public and Group Water Scheme records exist, but there are many data gaps associated with:
  - Quarry dewatering operations
  - Farms/Irrigation schemes
  - Golf course irrigation practices
  - Other industrial and commercial uses

# *Abstractions*

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- ❑ A national FC/POM study on groundwater abstraction pressures, led by the ERBD, provides technical guidance towards establishing a licensing system for abstractions. Consideration is being given to introduce a licensing system in response to new requirements by the WFD.

# *Abstractions*

## Recommended Supplementary Measures

Survey and register existing abstraction wells or schemes that are not yet in the national register

Promote good well construction practices

Implement water conservation programmes

Upgrade water transmission systems

Restrict groundwater development in ecologically sensitive areas

Identify alternative sources of water for grey water uses

# *Contaminated Land*

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- ❑ **The Wicklow Central groundwater body** is at Poor status due to pollution associated with the Avoca mine.
- ❑ Groundwater contributes to the water quality problems of the Avoca River, which is also at Poor status.
  
- ❑ A recently completed Feasibility Study on remediation measures (CDM, 2008) provides alternatives for both passive and active treatment technologies.
- ❑ Alternatives for remediation are currently being reviewed and evaluated by the DCENR.
- ❑ Remediation of the Avoca mine will be costly and technically challenging

# *Landfill*

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## Basic Measures

Enforce waste licences

# Groundwater Dependent Terrestrial Ecosystems - Measures

- ❑ Several GWDTEs in the ERBD are “at risk” from different types of environmental pressures. None in the ERBD are at Poor Status.
- ❑ Much work remains to be done with GWTDEs, led by the NPWS.

Groundwater Area	'At Risk' - Groundwater Dependent Terrestrial Ecosystem
Kilcullen	Red Bog, Kildare SAC - 397
Wicklow East	Buckroney / Brittas Dunes & Fen SAC - 729
Dublin Urban	North Dublin SAC - 206
Lough Lene	Lough Bane / Lough Glass SAC - 2120
Rye Water Valley	Rye Water Valley / Carton SAC - 1398
Newtown Lough	River Boyne & River Blackwater SAC - 2299

## Recommended Supplementary Measures

Detailed mapping of GWDTE boundaries

Surveys and monitoring to define the environmental supporting conditions of individual GWDTEs

Basic Pollution Prevention Measures (as featured under pressure categories)



# Programme of Measures

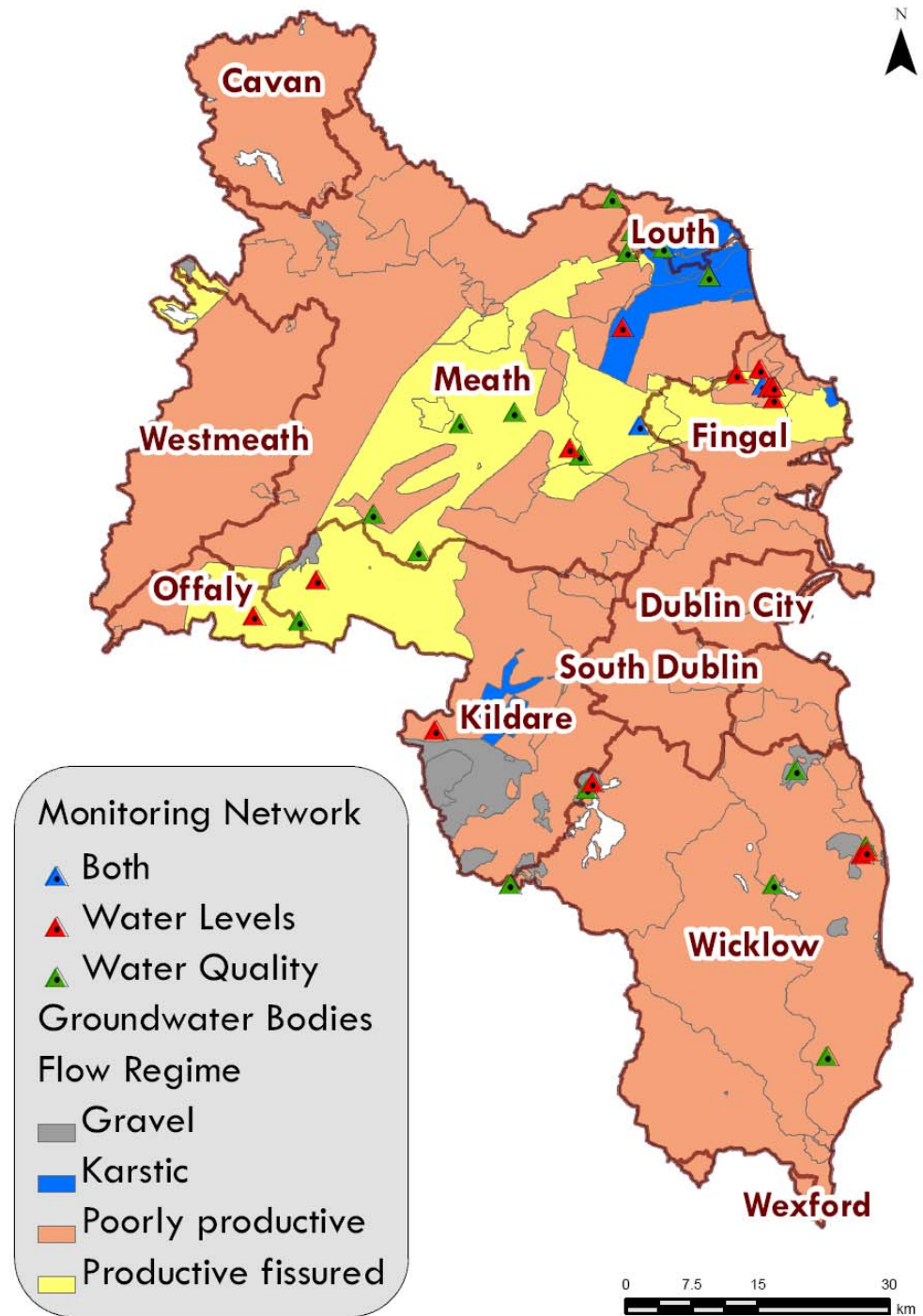
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- ❑ We have created two scenarios for you to assess. The first aims to achieve Good Status in all waterbodies by 2015. This could be costly and difficult to achieve. The second scenario prioritises measures that are deemed to be most effective for the first cycle of the River Basin Management Plan to 2015.
  
- ❑ ***Scenario 1 – Maximum Implementation of all measures by 2015***
  - All Basic Measures
  - All necessary supplementary measures to get to Good Ecological Status by 2015
  
- ❑ ***Scenario 2 –Prioritised Implementation of Measures***
  - Prioritised implementation of measures
  - The most effective supplementary measures



# How will we track progress?

- ❑ Progress will be measured through groundwater monitoring:
  - Groundwater levels
  - Groundwater quality.
- ❑ A groundwater monitoring network for the ERBD was designed in December 2006.
- ❑ The EPA has monitored these sites in 2007/2008.
- ❑ The nature and extent of the monitoring network can be modified with results of the Programme of Measures



# What can you do?

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- ❑ ***You have your say!*** Now is your chance to have a say on the Programme of Measures:
  - Have all issues been addressed?
  - Please review the supplementary measures and let us know if anything needs to be added.
- ❑ In general we can all help to implement the WFD by taking account of our personal impact on the water environment. For example:
  - Using less water will reduce the amount of water we need to abstract daily.
  - If we use a septic tank, we can ensure our septic tank is working properly.
  - We can dispose of waste products in an appropriate manner.



# How to comment

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Please *have your say* in any of the following ways:

1. Email your comments to [comments@erbd.ie](mailto:comments@erbd.ie) and include River Basin Management Plan Comments in the subject line

2. Write to:

River Basin Management Plan Comments

Project Co-ordinator

Eastern River Basin District Project Office

Dublin City Council

68-70 Marrowbone Lane, 4<sup>th</sup> Floor

Dublin 8

