Groundwater Abstraction Licensing in Northern Ireland

Peter McConvey – GSNI/EHS Hydrogeologist

Groundwater Management Team, WMU

Overview

Prior to recent legislation, unless very large abstraction requiring EIA or some planning permission element, water could be abstracted with limited to no consideration of environmental impacts

Two main legislative drivers for introducing regulation of water abstraction

- **Water Framework Directive**
  - Overall sustainability of water resource use
  - Impacts on sensitive ecosystems
- **Habitats Directive**
  - Impacts on sensitive ecosystems of international and national importance

Mechanism needed for managing impacts from existing abstractions and ensuring 'new' abstraction does not have unacceptable impact

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

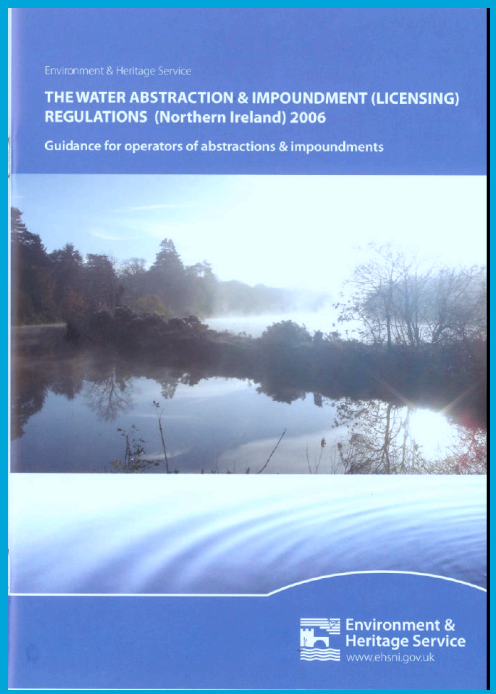
Geological Survey of Northern Ireland

Legislation

- EIA (Agriculture) Regulations 2005

Introduced to ensure support compliance with EC EA Directive
Deals only with agricultural abstractions
greater than 250 m^3/d

- Water Abstraction and Impoundment (Licensing) Regulations (Northern Ireland) 2006



ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland

Legislation

AIL Regs cover both **abstraction** from surface waters and groundwater

"*Abstraction - the doing of anything whereby water is removed from a waterway or underground stratum*"

And also **impoundment** of water in surface waters

"*an artificial collection or storage of water, a body of water confined*"

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland

Developing Regulations

- Development of legislation and technical procedures for assessing applications adopting risk-based approach
- Following consultation and review of regulatory regimes in the rest of the UK and further afield, two part strategy adopted

➢ Introduction of REGULATIONS with ‘grace period’ for people to register their existing abstractions with no associated charges

➢ Later consideration of requirement for FEES AND CHARGES relating to generation of monies to fund this ‘new work’ which has associated technical and administrative costs

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland

Risk based

Volume	Regulations
< 10 m^3/d	Deemed authorised, no action required, PCA compliance
10 m^3/d – 20 m^3/d	Deemed authorised subject to notification to EHS, PCA compliance
20 m^3/d – 100 m^3/d	Formal application required, 'simple licence' to be issued, possibly with conditions associated with rates and monitoring
>100 m^3/d	Formal application required, 'complex licence' to be issued, generally containing conditions

PCA – Permitted Controlled Activities – essentially good practice i.e. water leakage to be kept at minimum, avoiding polluting when drilling, well-head maintenance

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland

Sectors Impacted

- Public Water Supply
- Food Processing
- Bottled Drinks
- Agriculture
- Quarry Operators
- Others

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland

Context and Technical Challenges

- Groundwater abstraction is small proportion of overall public water supply in NI (~ 5% and falling)
- Several thousand industrial, agricultural and domestic sources
- For public water supply, reservoirs, lakes and rivers and dominant and regulation effort will thus be focussed on this
- However still areas where there could be local abstraction pressures on the resource and in particular on groundwater dependent ecosytems

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland

Context and Technical Challenges

- Regulations are such that existing abstractors must register/apply within first year (potentially hundreds or more applications) to be certain of avoiding any application charge.
- **Existing** abstractions to be permitted to continue once register/apply, with licence assessments undertaken on a priority basis
- All **new** groundwater abstractions above 20 m^3/d will require some technical assessment of potential for impact and licence decision within set timeframe (4 months) – but numbers should be manageable
- Newly formed Abstraction and Impoundment Licensing (AIL) team in EHS on learning curve and rely on groundwater and hydrology teams (also on a learning curve) for technical support

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland

Context and Technical Challenges

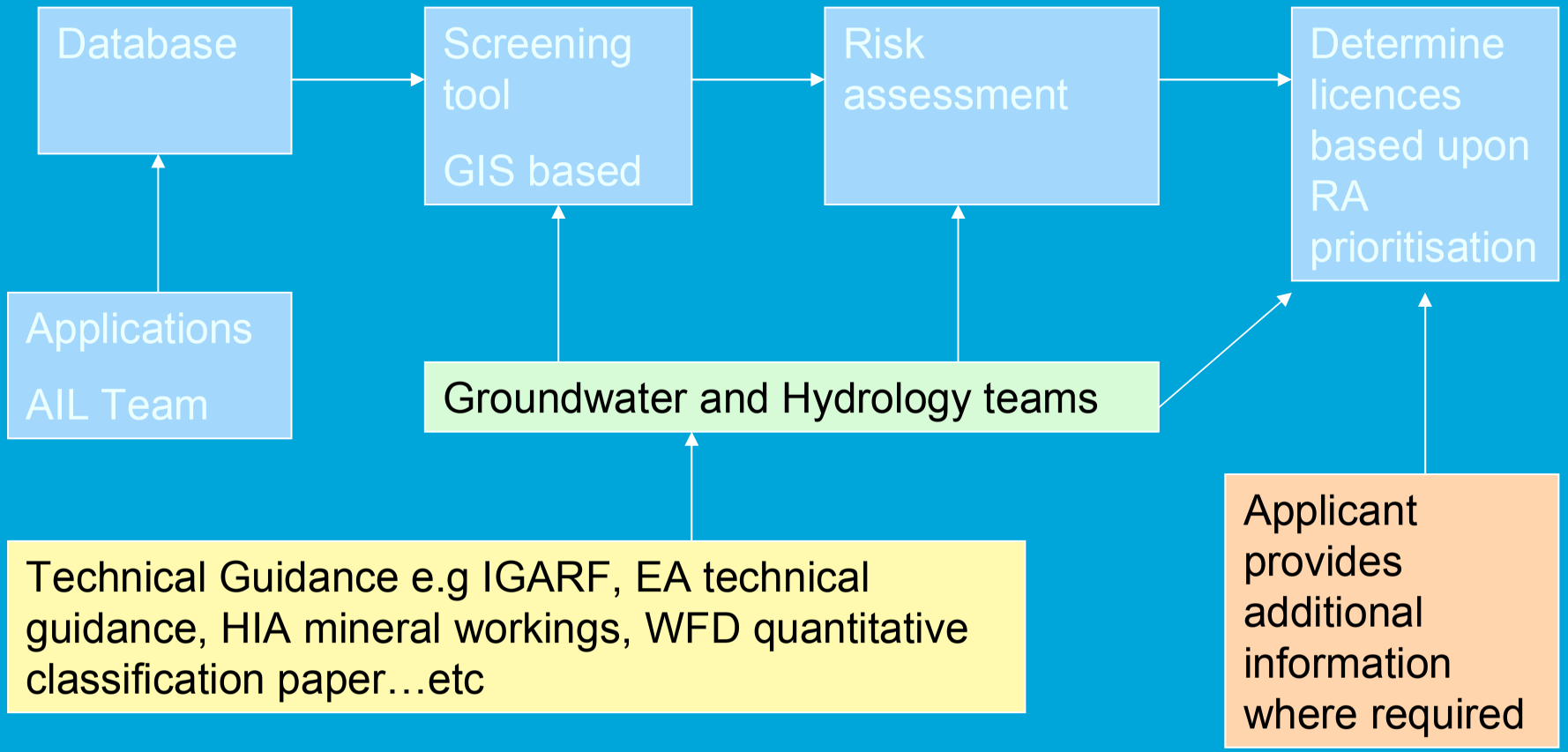
- Need for screening tool for EXISTING abstraction licence applications to prioritise which should be reviewed first with respect to potential impact they may be having.
- Procedures required for any application received for a NEW abstraction
- All tools and procedures need to consider the ‘traditional’ elements of abstraction impact assessment (local derogation of existing supplies, resource availability .etc) as well as the requirements of the WFD and Habitats Directives
- Fortunately there is substantial overlap between all three elements

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland

Context and Technical Challenges

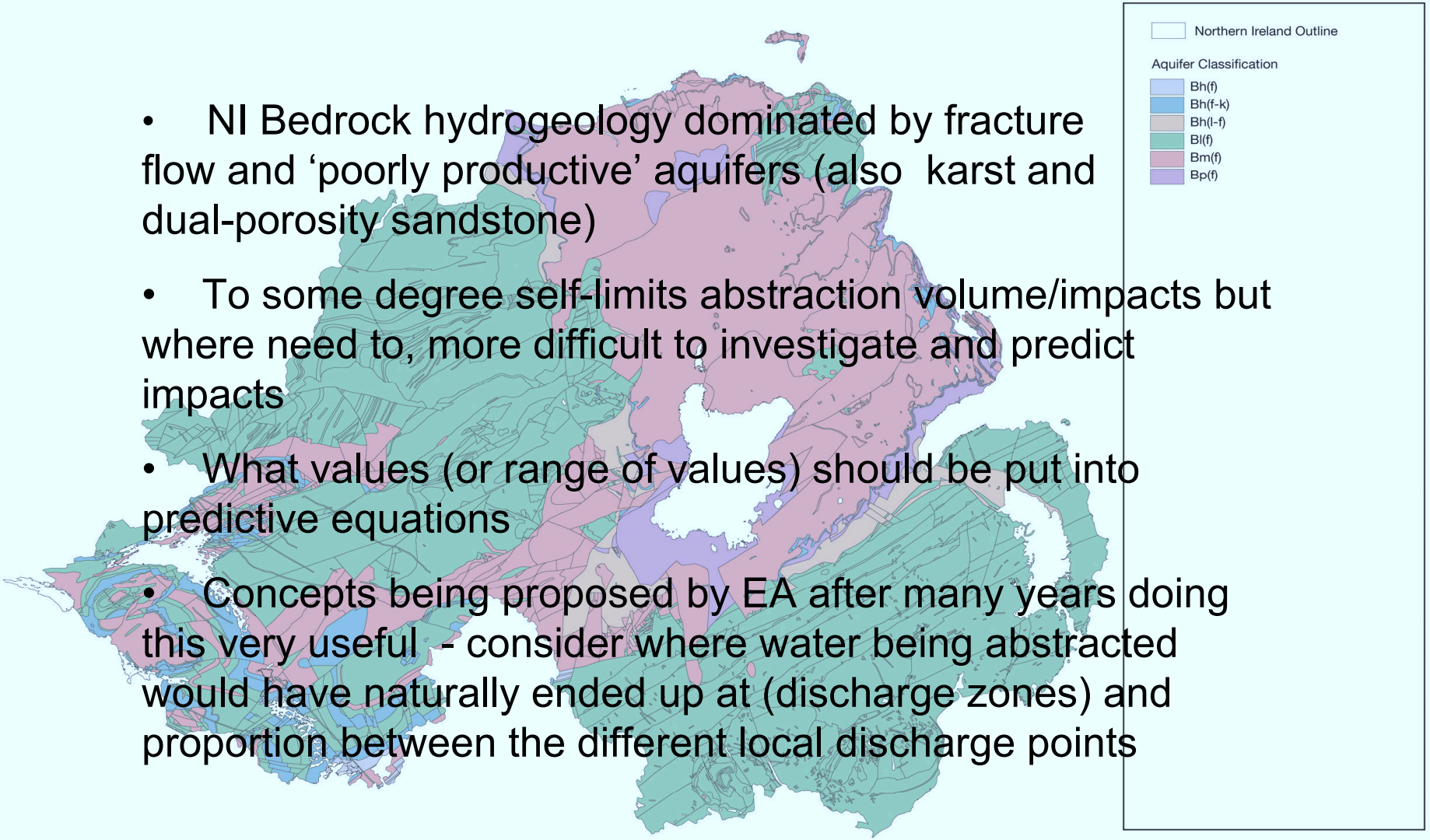


ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland

Technical Challanges



- NI Bedrock hydrogeology dominated by fracture flow and ‘poorly productive’ aquifers (also karst and dual-porosity sandstone)
- To some degree self-limits abstraction volume/impacts but where need to, more difficult to investigate and predict impacts
- What values (or range of values) should be put into predictive equations
- Concepts being proposed by EA after many years doing this very useful - consider where water being abstracted would have naturally ended up at (discharge zones) and proportion between the different local discharge points

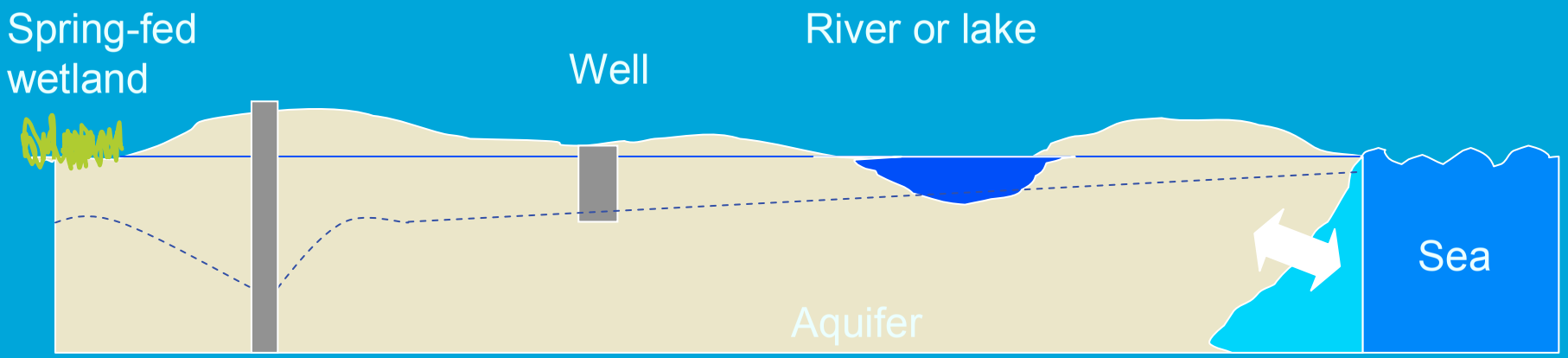
Potential impacts

Habitat impact

Existing Use

Flow / levels

Dilution/ecology



Also overall sustainability (resource balance) as required by WFD

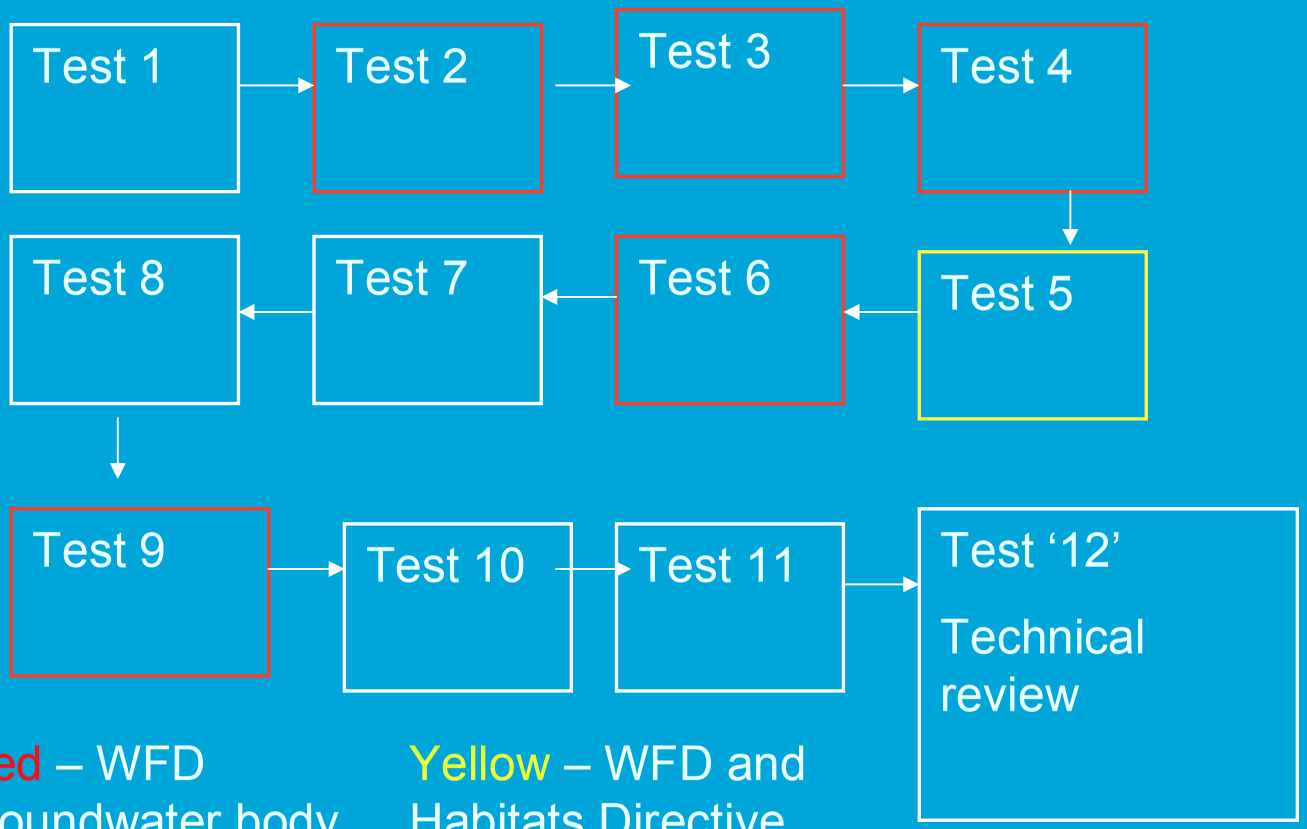
Saline intrusion

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland

Groundwater Abstraction Screening RA



Red – WFD groundwater body status element

Yellow – WFD and Habitats Directive relevant

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland

Groundwater Abstraction Screening RA

Test 1 – Volume (maximum daily m3/d)

<50	Low (1)
50 -100	Moderate (2)
100-250	Moderate (3)
250-500	High (4)
>500	High (5)

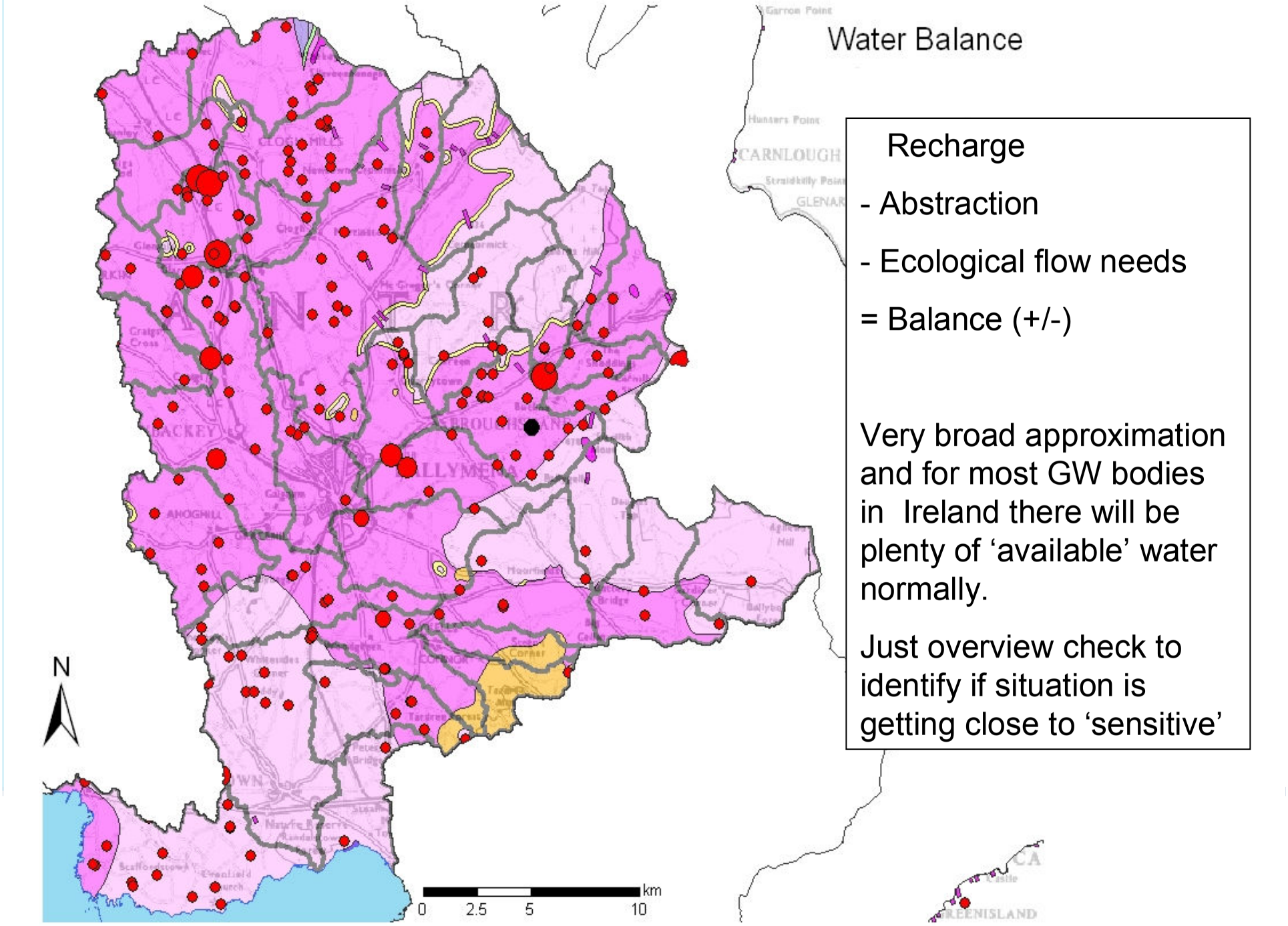
May need to factor in consumptive percentage

Test 2 – Water Balance

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland


Water Balance
Recharge
- Abstraction
- Ecological flow needs
= Balance (+/-)
Very broad approximation and for most GW bodies in Ireland there will be plenty of 'available' water normally.
Just overview check to identify if situation is getting close to 'sensitive'
N
0
2.5
5
10
km

Groundwater Abstraction Screening RA

Test 3 Surface Water Impact (rivers)

Associated surface water body (bodies) with WFD flow standard (WFD48) set as part of status assessment

Is Flow Standard met when include proposed abstraction volume (assume100% connection)?

Yes - Low (1)
No – due to proposed abstraction - moderate (3)
No – already failing - High (5)

For 'No' investigate further to determine if groundwater is significant component (>= 10% of flow standard) of failure.

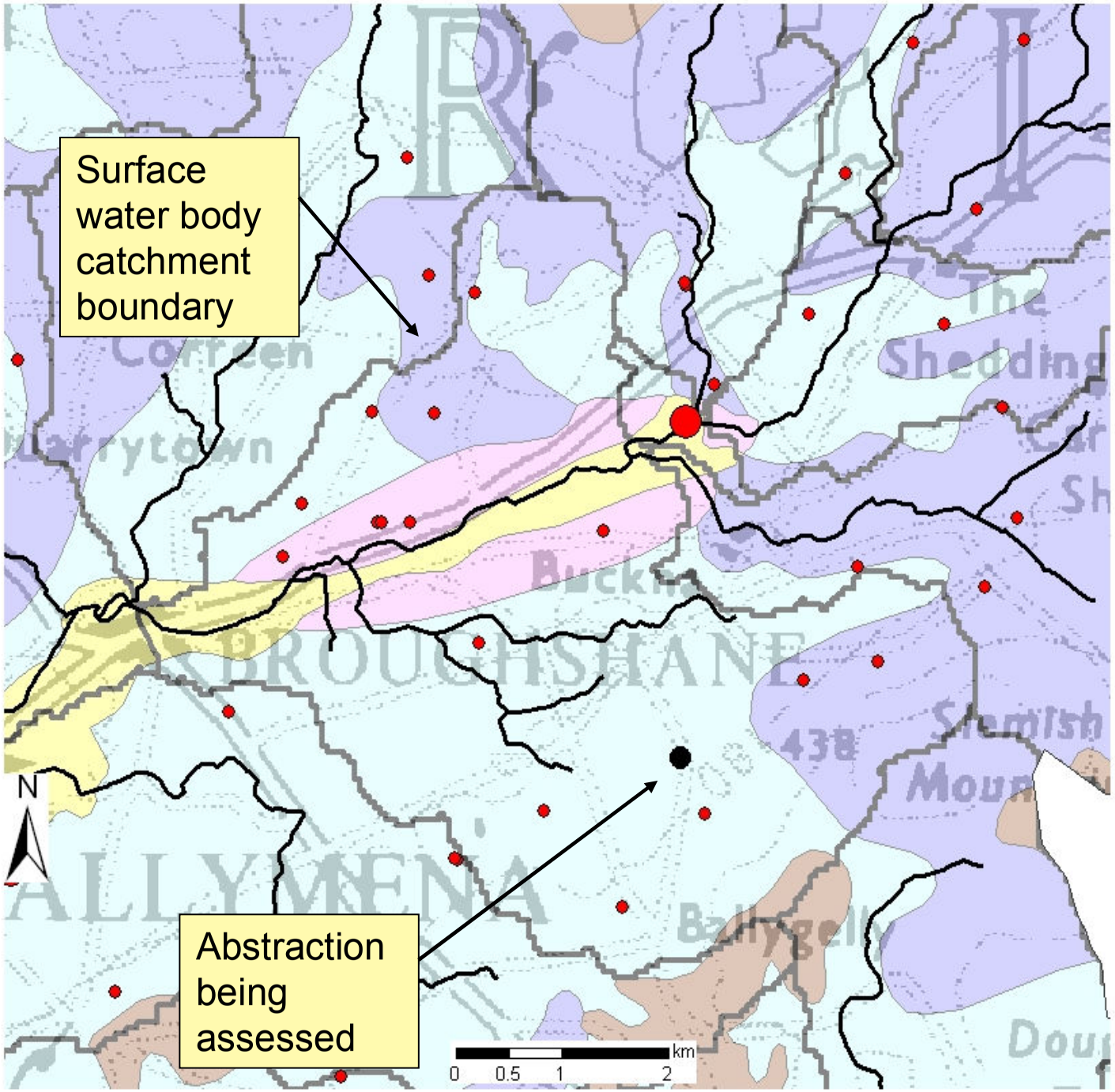
Determine if flow standard failure is contributing to failure of SW body ecology standards

Determine if abstractions within larger catchment unit are impacting the surface water body sub-catchment

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland



Surface Water Body Test

If SW body has been assigned 'poor status' under WFD for flow standard then higher risk rating

Undertake more detailed assessment

Groundwater Abstraction Screening RA

Test 4 Surface water Impact (lake)

Associated surface water body (bodies) with SW flow standard (WFD48)
Is Flow Standard met when include proposed abstraction volume (assume 100% connection)

Yes - Low (1)
No – due to proposed abstraction - moderate (3)
No – already failing - High (5)

For 'No' investigate further to determine if groundwater is significant component (>= 10% of flow standard) of failure.

Determine if flow standard failure is contributing to failure of SW body standards

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland

Groundwater Abstraction Screening RA

Test 5 Protected areas (SAC, SPA, ASSI, NNR)

Proximity of abstraction to designated Protected Area (s) within specified search radius (5km)

For any PA in search radius

> 2km - Low (1)

1-2 km – Moderate (3)

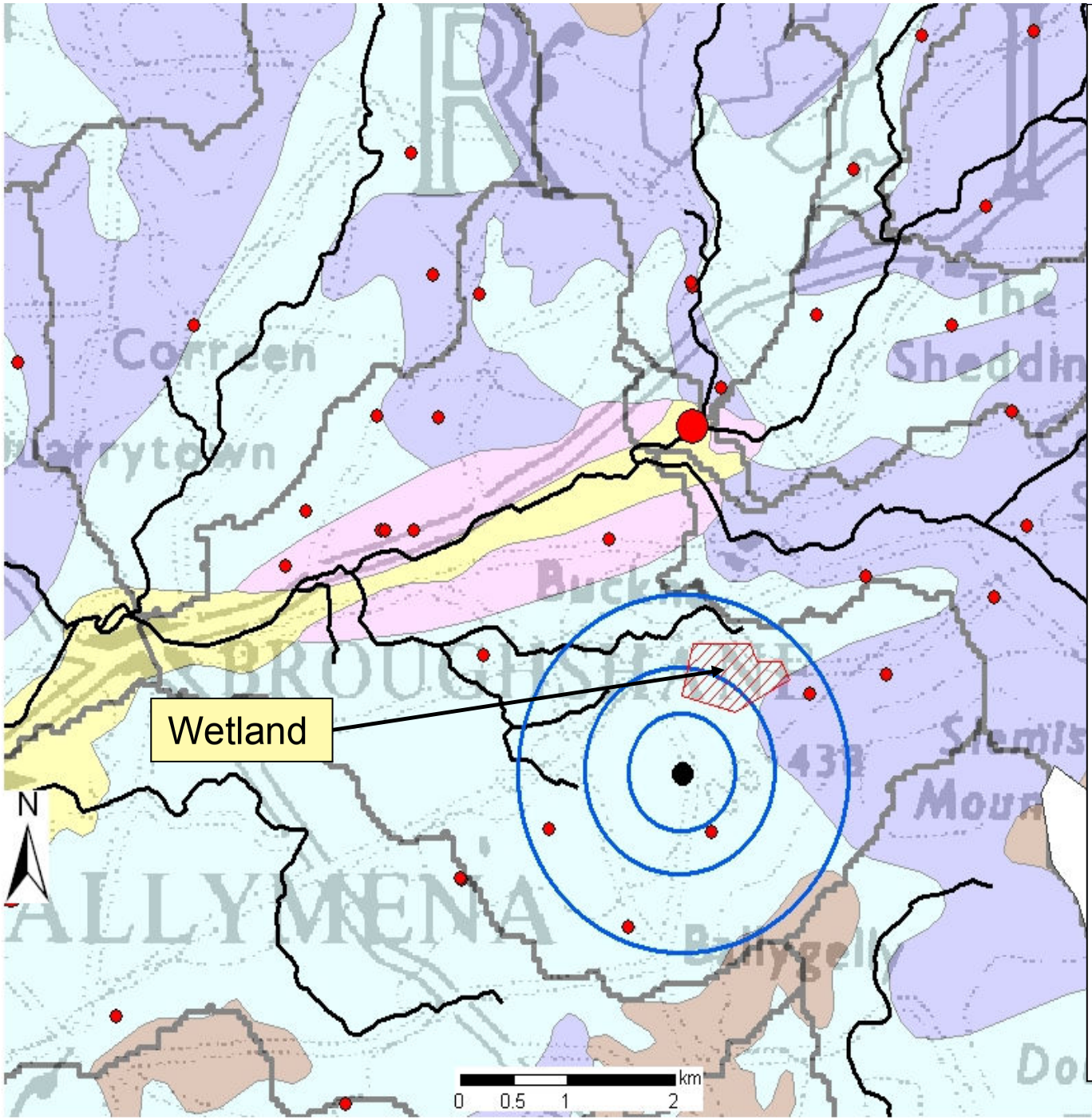
< 1km - High (5)

Further hydrogeological assessment will be required to determine whether abstraction could influence PA catchment flow

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland



Protected Areas Test

Search radii

Risk rating dependent upon how close nearest PA (GWDTE)

Nearer – higher risk

Will need to curtail search zones at groundwater body boundaries and when reviewing, apply more expert opinion regarding hydrogeological setting and potential for ‘interference’

Groundwater Abstraction Screening RA

Test 6 Saline Intrusion

Does abstraction fall within saline intrusion zone ?

- Yes – High (5)
- Within 1km – Moderate (3)
- Outside 1km – Low (1)

Test 7 Other abstractions

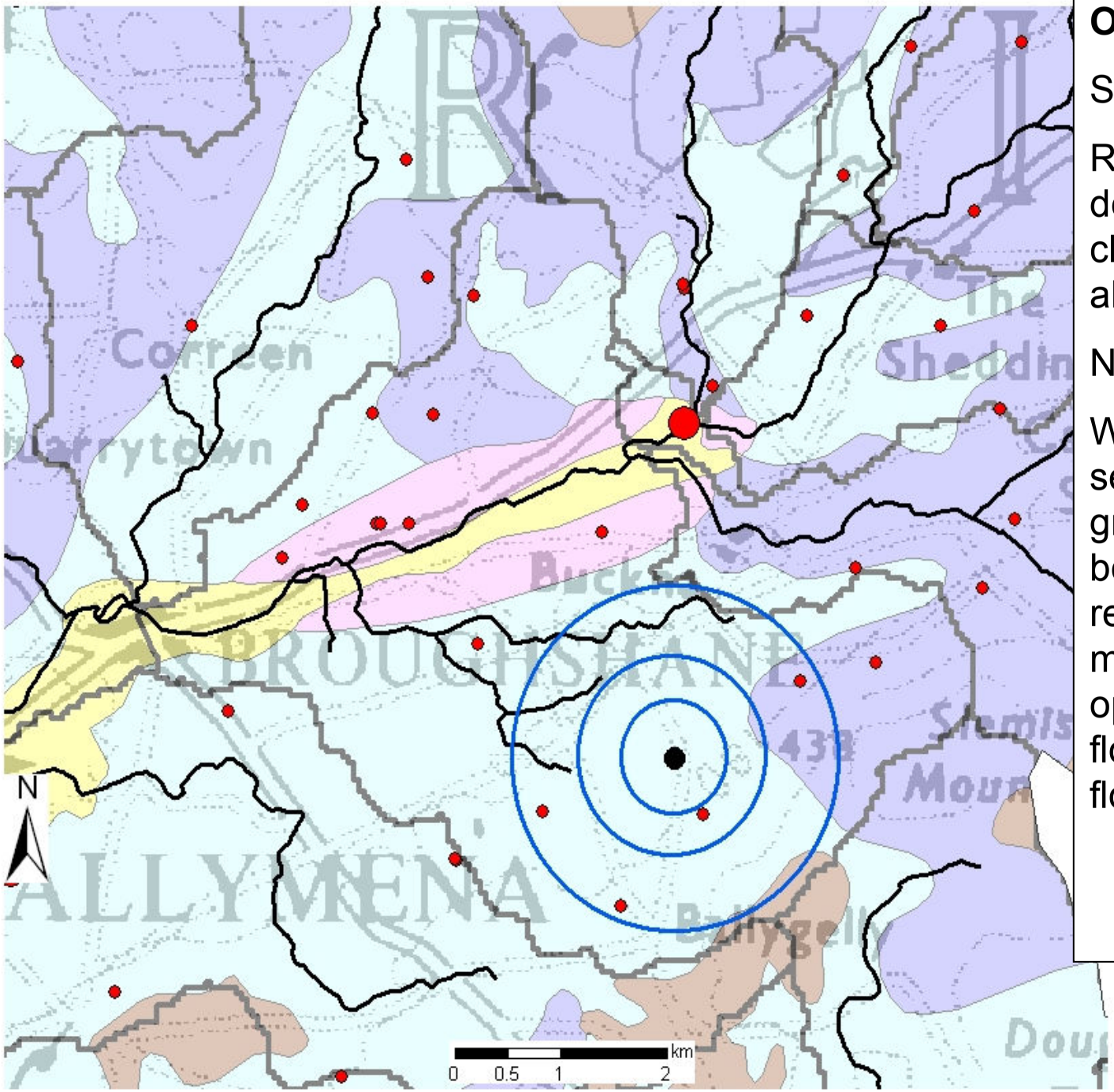
Proximity of proposed abstraction to other existing groundwater abstractions within 3 km radius within same groundwater body

- Other abstractions within 1km – High (5)
- Other abstractions within 3 km – Moderate (3)
- No abstractions within 3km – Low (1)

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland



Other abstractions

Search radii

Risk rating dependent upon how close nearest abstraction is

Nearer – higher risk

Will need to curtail search zones at groundwater body boundaries and when reviewing, apply more hydrogeological opinion regarding flow direction, local flow boundaries .etc

Groundwater Abstraction Screening RA

Test 8 Cross-border

Is abstraction within cross-border groundwater body

Yes and within 1km of border – High (5)
Yes but not within 1km – Moderate (3)
Not in cross-border body – Low (1)

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk
Geological Survey of Northern Ireland

Groundwater Abstraction Screening RA

Test 9 Groundwater Levels

Is abstraction with falling groundwater level zone or surface water catchment with reducing flows?

Yes – High (5) No – Low (1)

Test 10 Plume impacts

Is abstraction within a defined zone of polluted groundwater or within 0.5 km of contaminated land/landfill site?

Yes – High (5) No – Low (1)

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland

Groundwater Abstraction Screening RA

- **Test 11 Visual Ordnance Survey Map Inspection**

Are there non -designated water dependent features within:

500 m – High (5)

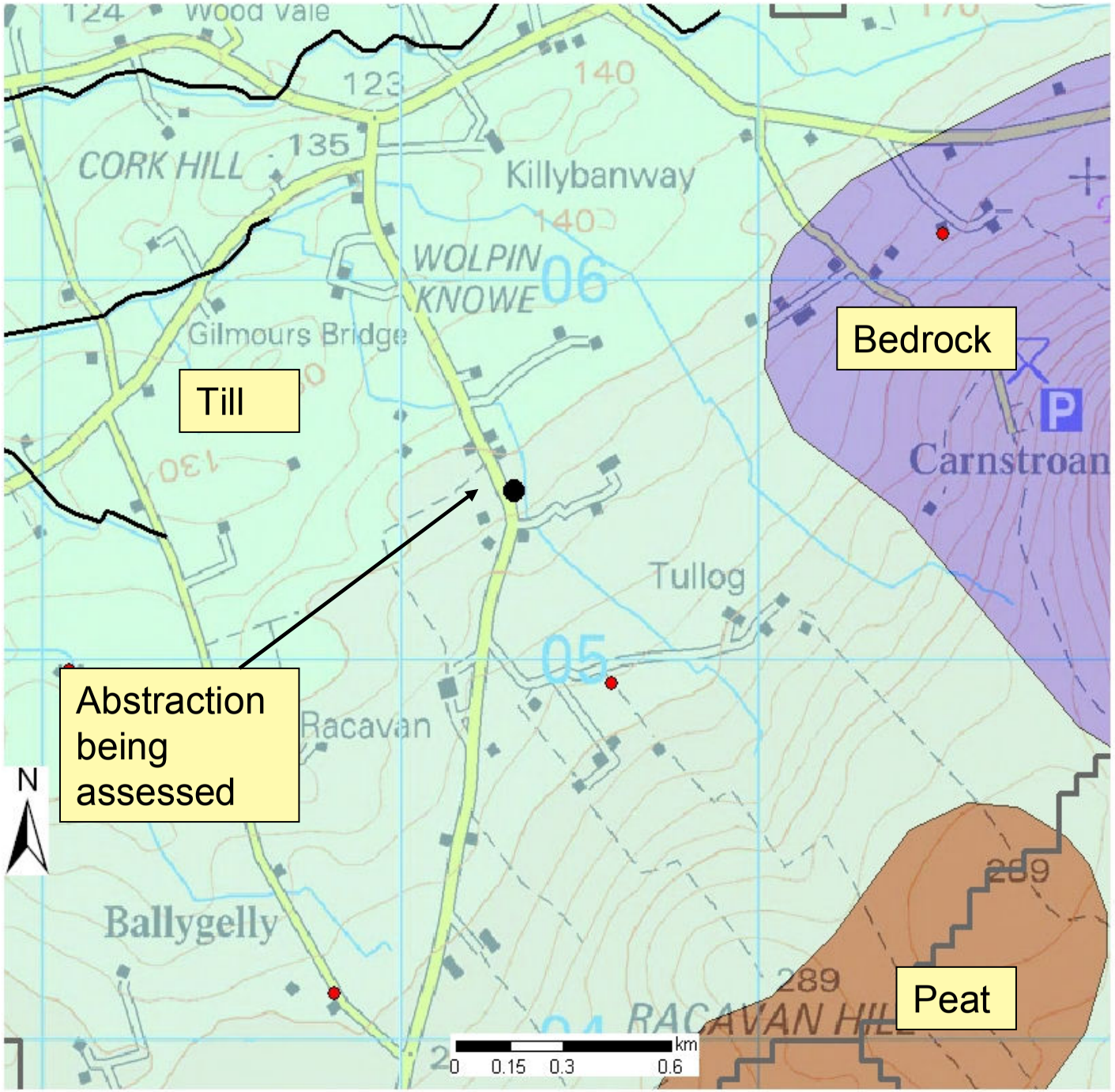
500 m – 1km – Moderate (3)

> 1km < 3km – Low (1)

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland



Local Water Features Test

Identifies non-designated features which may be impacted by drawdown

Local Water Features Test

Identifies non-designated features which may be impacted by drawdown

Groundwater Abstraction Screening RA

Test 1 Result + Test 2 Result +… Test n result = Overall Risk Score

(Prioritisation)

But some things more important so may require weighting

And/or

Can be one critical factor (test) that needs further consideration

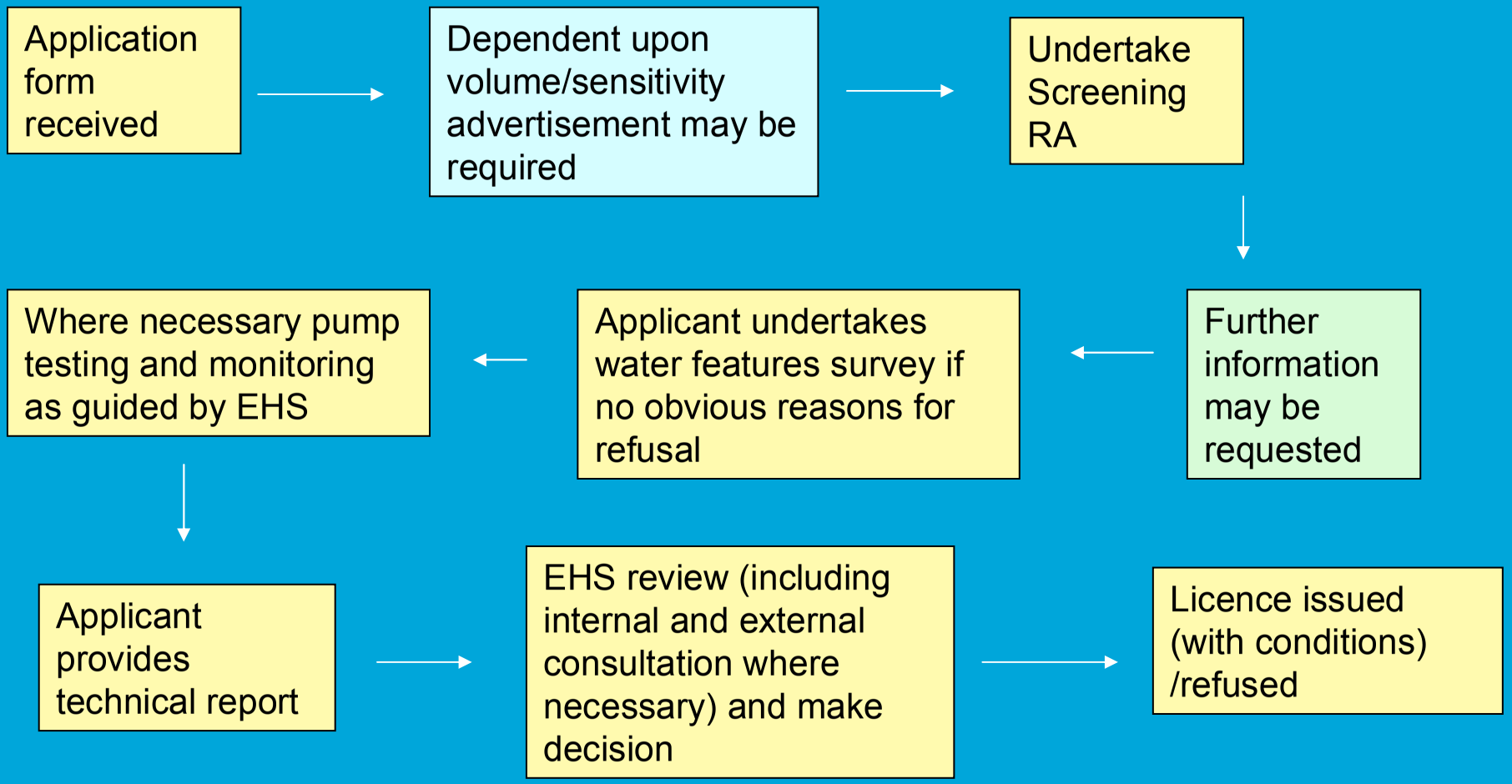
Needs initial assessment reviewed/discussed at technical review meetings to build-up in-house knowledge and experience

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland

Groundwater Licensing - New Abstractions



ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland

Groundwater Licensing Technical Detail

In the context of the different NI hydrogeological settings

For **existing** abstractions

- Have all required abstractions registered
- Confirm water use and consumptiveness
- Review hydrogeological setting and conceptual model of where abstracted water would have naturally discharged
- Require some applicants to undertake 'investigation'
- Refine risk assessment and make licence recommendations

For **new** abstractions

- Water Features Survey – what search radius
- Pump testing - how long for and what should be monitored and is it worth it
- Review applicants assessment and make licence recommendations

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland

Groundwater Licensing in Northern Ireland

Conclusions

- TESTS proposed cover main concerns and support attaining or maintaining water body good status but are a SCREENING TOOL
- Will always need a technical review
- Technical guidance will need to be developed for both internal and external use for consistency and transparency
- Challenging new area but much experience elsewhere that should be able to be adopted and adapted to ensure a risk-based and pragmatic licensing regime is developed

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland

Groundwater Licensing in Northern Ireland

Thank you

ENVIRONMENT AND HERITAGE SERVICE

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Geological Survey of Northern Ireland