

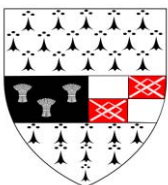
## Water Framework Directive Groundwater Monitoring Programme

### Site Information

### Bennettsbridge RWS (BH2)



Bennettsbridge RWS (BH2) is a borehole used as part of a public water supply. The abstraction rate is 1008m<sup>3</sup>/day. The GSI prepared a source protection report in 2002.



Kilkenny

**August 2011**

SITE INFORMATION					
Site Name:	Bennettsbridge RWS (BH2)		County:	Kilkenny	
RBD:	SERBD		EU Reporting Code:	IE_SE_G_021_10_004	
Easting:	254756		GWB Name:	Bennettsbridge	
Northing:	144669		GWB Code:	IE_SE_G_021	
Site Use:	Drinking Water (PWS)		Drinking Water Code:	1500PUB1002	
Hydrometric Area:	15		Water Level Monitoring Network:	Level	Flow
Townland:	KNOCKANORE			Y	N
Ownership:	Kilkenny County Council				
Water Quality Monitoring Network:	Surveillance		Operational (Point)		Operational (Diffuse)
	N		N		Y
Site Comments:	Bennettsbridge comprises an infiltration gallery and a borehole. Sampled water appears to be a mixture.				
SITE DIRECTIONS					
Location and Access Information:	Located in the townland of Knockanore, 4.5 km northwest of Thomastown. The site is directly east of the River Nore.				
Additional Comments:	---				
WELL INFORMATION					
Monitoring Point Type:	BH	Abstraction Rate (m³/d):	3360	Ground Elevation (m OD):	28.6
Borehole Log Available:	---	Total Drilled Depth (m bgl):	122	Depth to Bedrock (m bgl):	10
Top of Casing (m agl):	---	Upper Casing Diameter (mm):	200	Lower Casing Diameter (mm):	---
Final Borehole Depth (m):	---	Upper Casing Bottom Depth (m bgl) :	11	Lower Casing Bottom Depth (m bgl):	---
Screen Interval (m bgl):	---	Screen Type (PVC,Steel,other):	---	Screen Slot Size (mm):	---
Grout Type (cement,bentonite):	---	Grouted above (m bgl):	---	Grout Volume Injected (m³):	---
Gravel Pack Interval (m bgl):	---	Gravel Pack Volume (m³):	---	Open Hole Interval (m bgl):	---
Potential Yield (m³/day):	1229-1571	Comments on Monitoring Site:	There are three access locations for an infiltration gallery. The access manholes are 16m back from the river and are 1.8 m high concrete chambers. The borehole is located beside the pumphouse. The abstraction rate for the borehole is 1008 m³/day, and for the entire scheme it is 3360 m³/day.		
Specific Capacity (m³/d/m):	25				
Static Water Level (m bgl):	26.86				
Scheme Name:	Bennettsbridge	Number of Abstraction Points in the Scheme:	2	Source Report Available	Y
Source Report Info:	Source report prepared by GSI in 2002.				
Scheme Summary:	Bennettsbridge public drinking water source comprised two elements; a borehole drilled into rock in 1999, and an infiltration gallery constructed in the 1960's into sands and gravels alongside the River Nore.				

HYDROGEOLOGY								
GEOLOGY	Soil:	Alluviums (AlluvMIN)					Subsoil Permeability:	Moderate
	Subsoil:	Alluvium (A)						
	Bedrock:	Dinantian Lower Impure Limestones						
HYDROGEOLOGY	Aquifer Category:	Rkd/Lg	Vulnerability at Monitoring site:	High			Flow Regime:	Poorly productive
ZONE OF CONTRIBUTION	Estimated ZOC Size (km²):	2.53	ZOC Delineated By:	GSI			Recharge Estimate (mm/yr):	310
	ZOC Delineation Comments:	Sampled water appears to be a mixture of infiltration gallery and borehole water thus GSI ZOC is assumed as most appropriate ZOC. delineated for the infiltration gallery and one borehole. The boundaries are based on the abstraction and discharge rates, analytical modelling and hydrogeological mapping. See the source report for details. ZOC is insufficient in area and river recharge is assumed to contribute to the infiltration gallery component.						
Groundwater Vulnerability within ZOC (% area):	Extreme (X)	Extreme (E)	High	Moderate	Low	High to Low	Unclassified	
	27.07	71.25	1.68	0	0	0	0	
HYDROCHEMISTRY								
Hydrochemical Signature:	Ca-HCO3		Additional Water Chemistry Information:	During the monitoring period: The average nitrate concentration was 18 mg/l NO3 and the maximum nitrate concentration was 29 mg/l NO3. The average ammonium concentration was 0.02 mg/l N and the maximum ammonium concentration was 0.05 mg/l N. The average molybdate reductive phosphorus (MRP) concentration was 0.014 mg/l P and the maximum MRP concentration was 0.05 mg/l P. The average chloride concentration was 20.3 mg/l Cl and the maximum chloride concentration was 28 mg/l Cl.				
Alkalinity (mg/l HCO3):	Average:	Range:						
	321	240-394						
Hardness (mg/l CaCO3):	Average:	Range:						
	377	289-458						
Conductivity (uS/cm):	Average:	Range:						
	701	626-835						
Monitoring Record Period:	From:	To:						
	2000	2010						
RISK ASSESSMENT								
Pressure (e.g., Nitrates, Phosphates, Abstractions):	Diffuse		Typical Contaminants:		Nitrates & Phosphates			
Risk Category:	At risk, high confidence		GWB Status:		Good			
Impact Potential within ZOC (% area):	Extreme:	High:	Moderate:		Low:	Negligible:		
	0.00	90.89	0.00		0.00	9.11		
OTHER INFORMATION								
---								



Boreholes from road access



Boreholes along the river



Borehole Housing and Sampling Point



## Data Summary Sheet - July 2011

**Disclaimer:** The data in this document are based on the best available information and understanding at time of writing. Neither the Environmental Protection Agency, nor the individual bodies supplying data for this document and accompanying maps will be responsible for any loss or damage from the use or interpretation of these data.

**Rock Unit Geology Map:** GSI, 2009

**Aquifer Type Map:** GSI, 2009

**Groundwater Vulnerability Map:** GSI, 2009

**Soils & Subsoils Type:** Teagasc, 2007

**Recharge Map:** GSI, 2009

**Impact Potential Map:** EPA, 2009

**Risk Assessment Map:** EPA WFD Risk Assessment, 2006

**Groundwater Body Status:** EPA WFD Status Assessment, 2008

**Water Quality Data:** EPA WFD Monitoring, 2008

### Groundwater Threshold Values

Groundwater threshold values for selected parameters:

Nitrate - General Chemical Test/ Drinking Water Test (37.5 mg/l NO<sub>3</sub>)

Ammonium - Drinking Water Test (0.175 mg/l N) / Surface Water Test (0.065 mg/l N)

Molybdate Reactive Phosphorus (MRP) - Surface Water Test (0.035 mg/l P)

Chloride -Saline/Intrusive Test (24 mg/l) / Drinking Water Test (175 mg/l Cl)

Electrical Conductivity -Saline/Intrusive Test (800 µS/cm) / Drinking Water Test (1,875 µS/cm)

Further information on groundwater threshold values is contained in the Groundwater Regulations (S.I. No.9 of 2010).

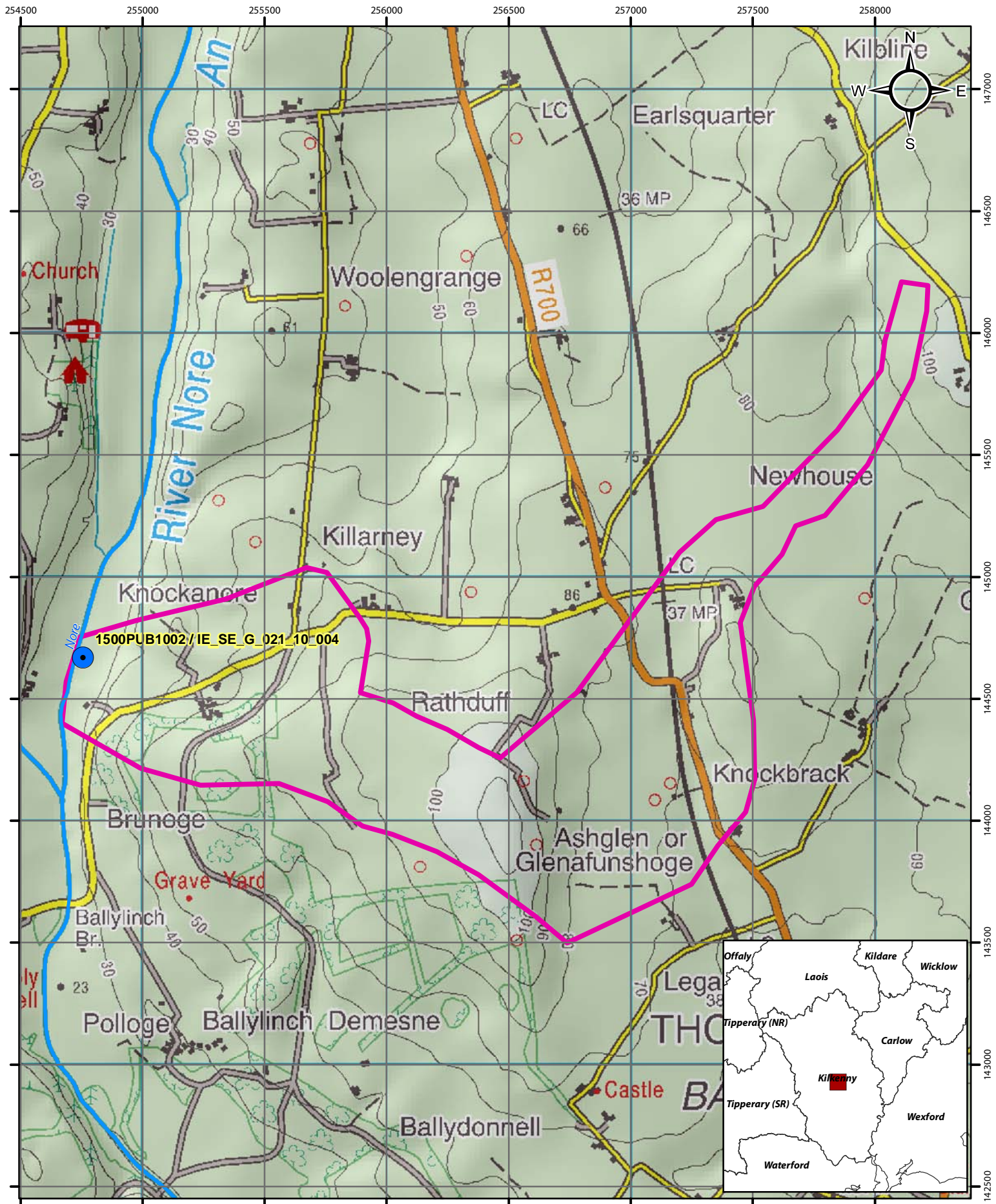
### General Downgradient Distances

General Downgradient Distances (XL) applied to boreholes sourced in bedrock aquifers are constrained to estimate approximate limits based on data at the GSI. In some cases they may be higher or lower depending on local conditions.




Rk, Rkd, Lk	225 m
Lm	150 m
LI, PI	60 m

It is assumed that groundwater downgradient of a spring cannot flow back up to the spring, however a precautionary 30m buffer is generally applied which allows for instances where pumping under dry weather periods may induce a drawdown or where the ground may be sloping toward the spring from the downgradient side.

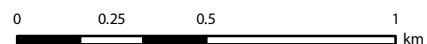
Version 0:	Prepared by	GSI	Date:	
Version 1:	Prepared by	OCM (DC)	Date:	Feb 2011
Version 2:	Prepared by		Date:	
Version 3:	Prepared by		Date:	
Version 4:	Prepared by		Date:	



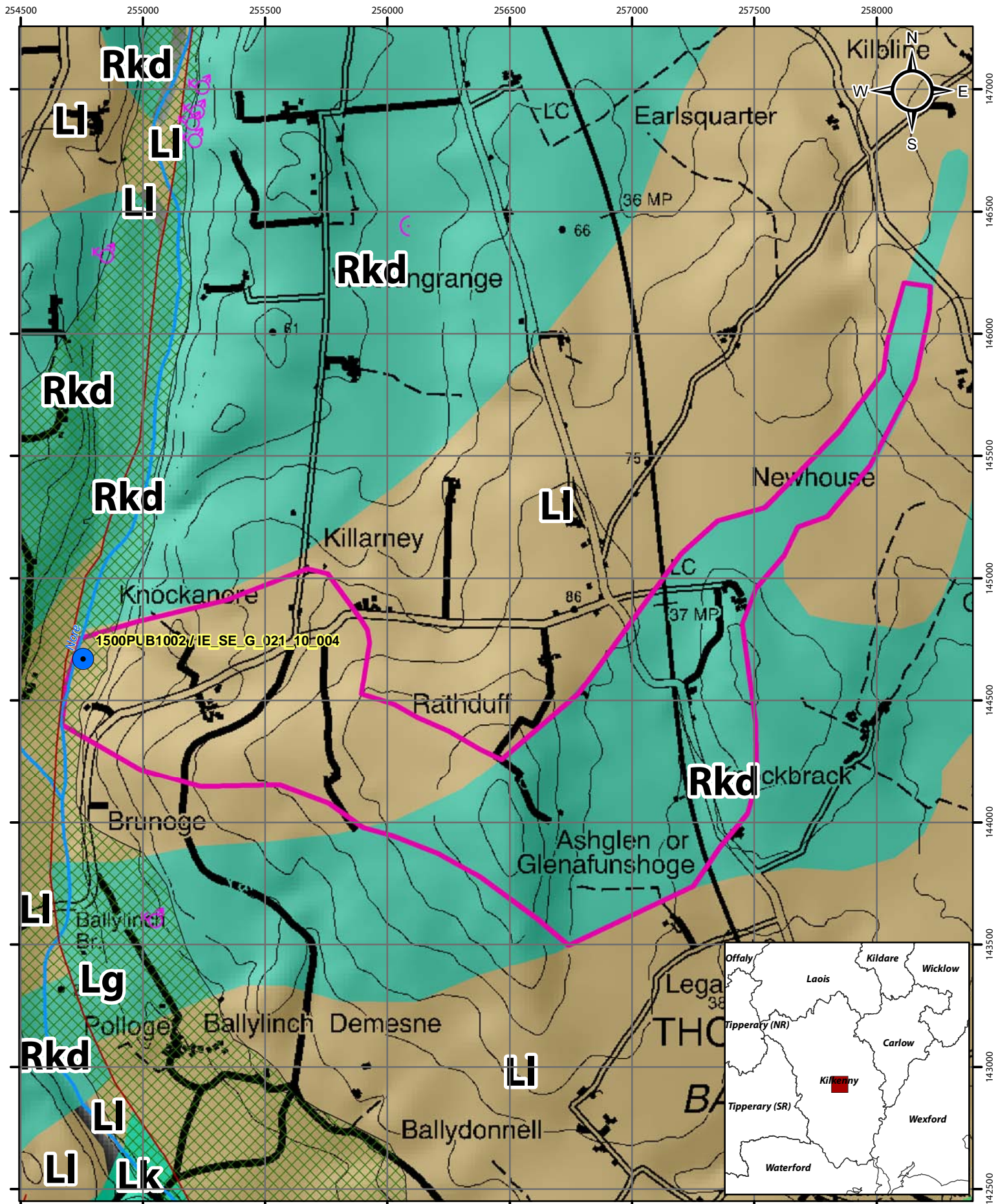
## Location Map for Bennettsbridge RWS

-  Abstractions
-  River
-  Zone of Contribution












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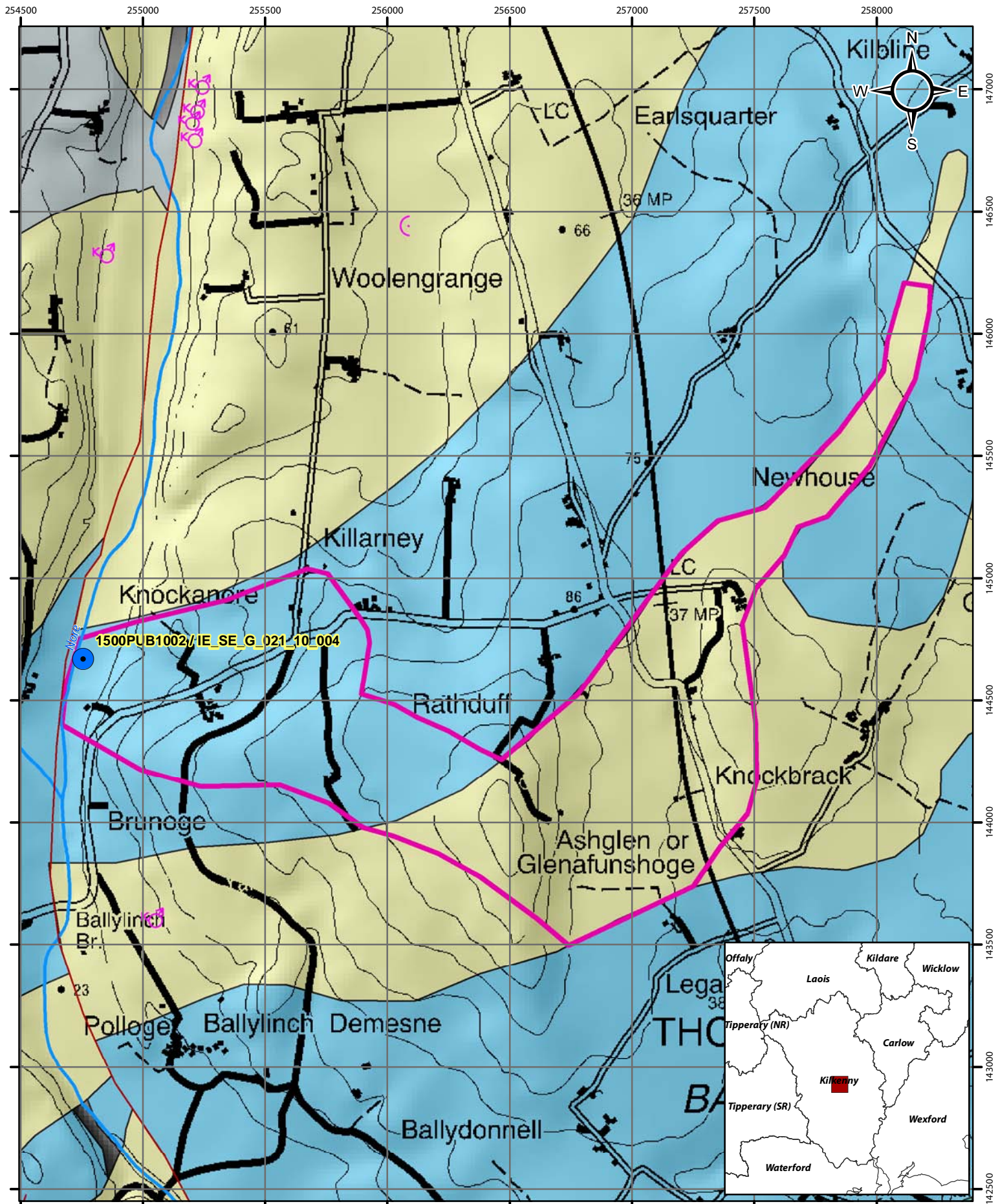
## Aquifer Category Map for Bennettsbridge RWS

- |   |  |  |   |
|---|--|--|---|
|  Abstractions         |  Fault        |  Lg |  Rf  |
|  River                |  Spring       |  Lk |  Rkd |
|  Zone of Contribution |  Swallow Hole |  LI |   |

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0 0.25 0.5 1 km





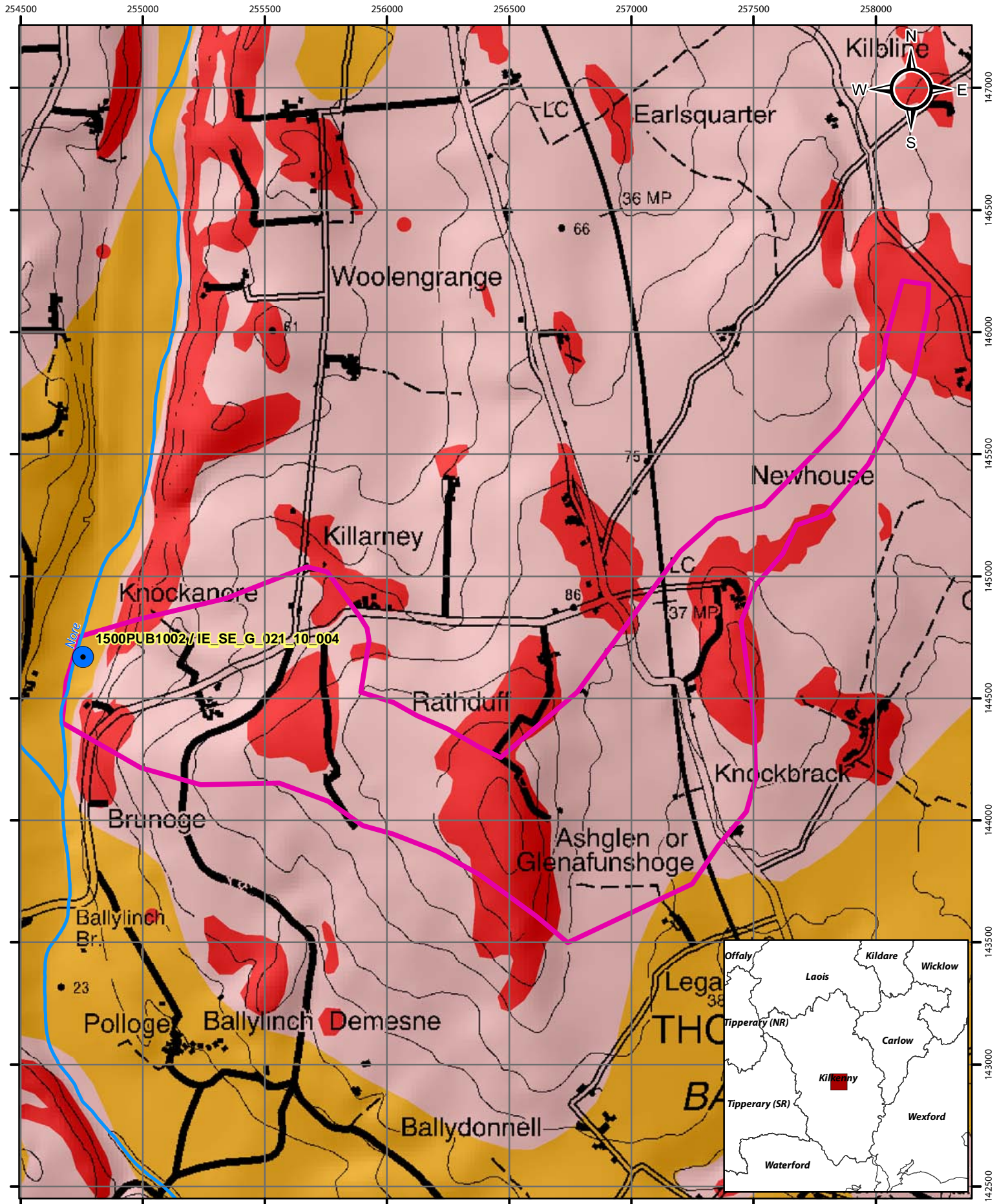
## Bedrock Map for Bennettsbridge RWS

- |                      |              |   |                                   |
|----------------------|--------------|---|-----------------------------------|
| Abstractions         | Fault        | Dinantian (early) Sandstones, Shales and Limestones | Dinantian Lower Impure Limestones |
| River                | Spring       | Dinantian Dolomitised Limestones                    | Dinantian Upper Impure Limestones |
| Zone of Contribution | Swallow Hole |   |                                   |

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0 0.25 0.5 1 km

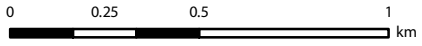




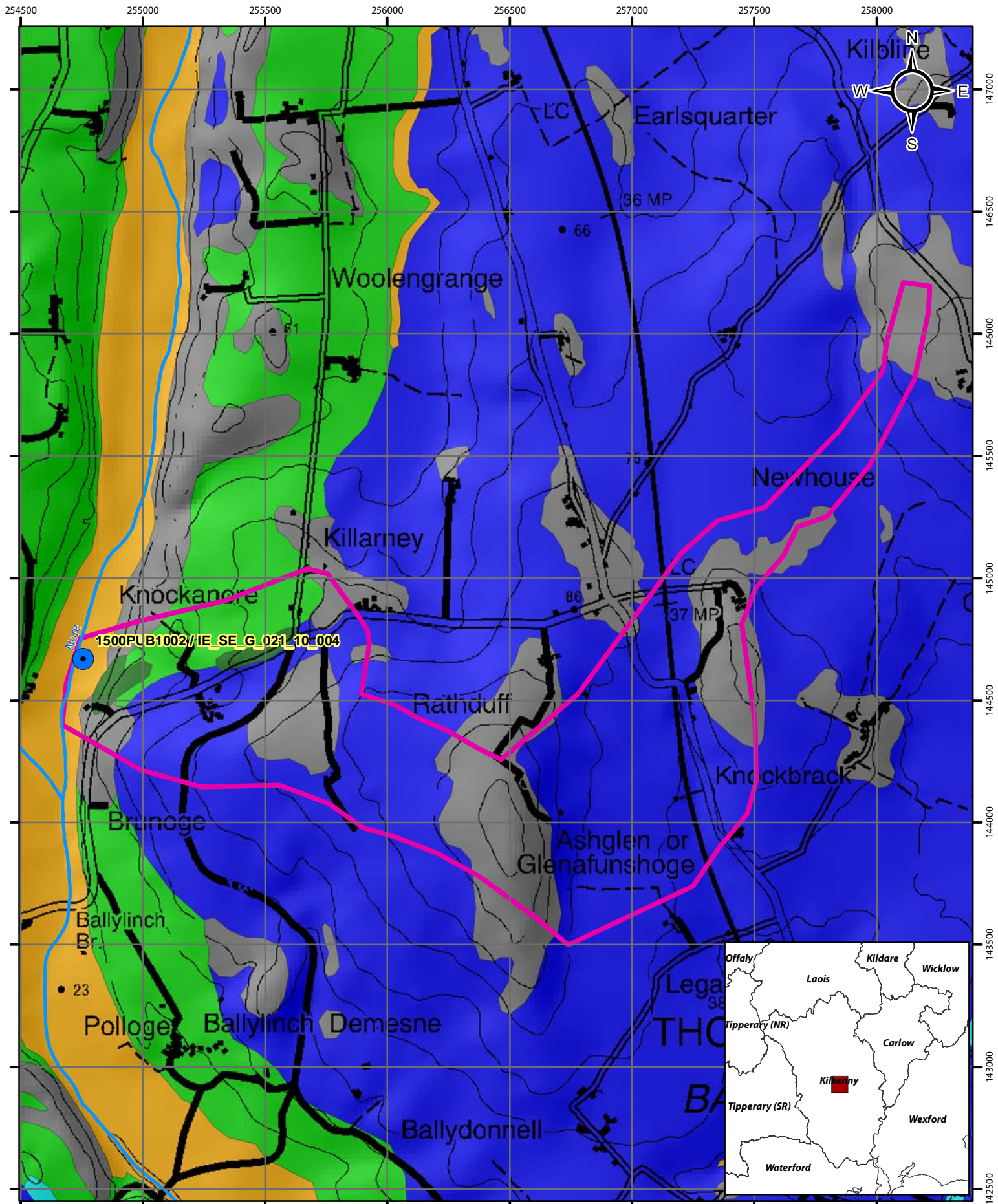
# Groundwater Vulnerability Map for Bennettsbridge RWS

- |                      |                                |                             |         |
|----------------------|--------------------------------|-----------------------------|---------|
| Abstractions         | E (Rock near surface or Karst) | M (Moderate)                | Water   |
| River                | E (Extreme)                    | L (Low)                     | No Data |
| Zone of Contribution | H (High)                       | HL (unmapped - High to Low) |         |










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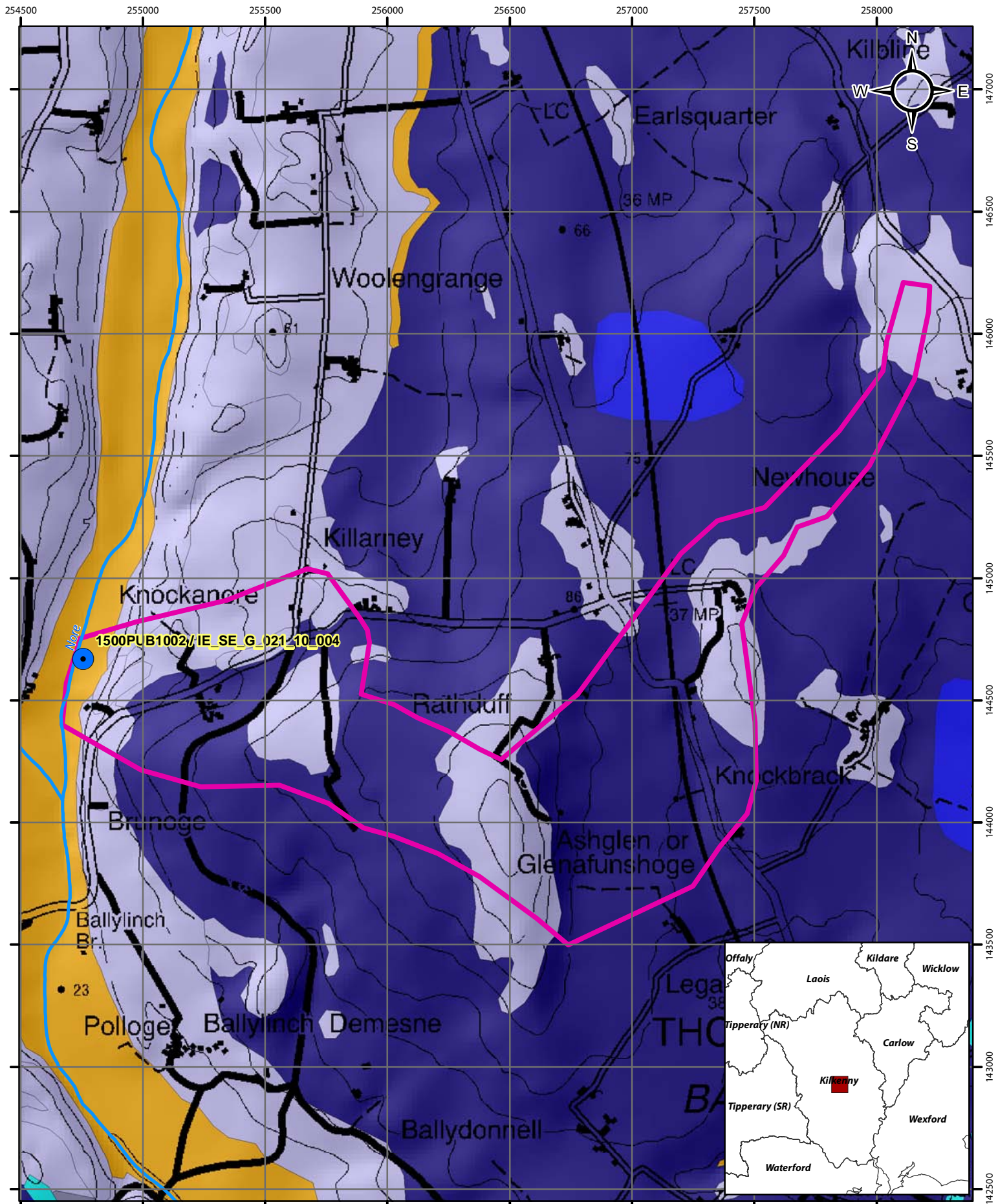
## Subsoils Map for Bennettsbridge RWS

- |   |  |  |
|---|--|--|
|  Abstractions         |  Alluvium                                     |  Bedrock outcrop or subcrop   |
|  River                |  Esker comprised of gravels of basic reaction |  Made ground                  |
|  Zone of Contribution |  Gravels derived from limestones              |  Till derived from limestones |










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0 0.25 0.5 1  
km





## Soils Map for Bennettsbridge RWS

- |   |  |  |
|---|--|--|
|  Abstractions         |  Basic Deep Well Drained Mineral    |  Basic Shallow Poorly Drained Mineral |
|  River                |  Basic Deep Poorly Drained Mineral  |  Mineral Alluvium                     |
|  Zone of Contribution |  Basic Shallow Well Drained Mineral |  Made                                 |

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0 0.25 0.5 1 km