Upper Deel Priority Area for Action

Desk Study

(AFA0180)

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Acknowledgements

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Summary

The Upper Deel Area for Action consists of six waterbodies: DEEL (NEWCASTLEWEST) 010, 020, 030, 040, 050 and 060. The Ahavarraga 010 and Finglasha 010 streams also flow into DEEL (NEWCASTLEWEST) 050. DEEL (NEWCASTLEWEST) 010 and 020 are currently Unassigned and at *Review*, however, work by Cork Co Co in the area indicates that they are likely to be at risk.. DEEL (NEWCASTLEWEST) 030, 040 and 050 are at moderate ecological status (2010-2015) and NEWCASTLEWEST) 060 is at poor status (2010-2015). These four waterbodies are *At Risk* of not reaching their WFD objective (good status). The status of two waterbodies: DEEL (NEWCASTLEWEST) 030 and 060 dis improved from the first WFD cycle. The ecological status of DEEL (NEWCASTLEWEST) 030, 040 and 050 is determined by the Q value (benthic macro invertebrate). The status of DEEL (NEWCASTLEWEST) 060 is driven by the fish community.

Phosphate is the main issue in the PAA, along with sediment and ammonia. Water chemistry indicates that elevated phosphate is an issue in DEEL (NEWCASTLEWEST) 030, 040, 050 and 060. Ammonia is an issue in DEEL (NEWCASTLEWEST) 030, 040 and 050. Moderate and heavy siltation was observed at EPA monitoring points in DEEL (NEWCASTLEWEST) 030, 040, 050 and 060 and the substrate was 'calcareous to compacted' at DEEL (NEWCASTLEWEST) 040, 050 and 060 in 2014 and 2017.

DEEL (NEWCASTLEWEST) 010, 020 and 034 are characterised by poorly draining mineral soils – consisting of two types: fine loamy drift with siliceous stones and clayey drift with limestones. The loamy soil tends to lie west of the R522 road with the calcareous soil in the east. There are areas of fine alluvial soil at the outlet of DEEL (NEWCASTLEWEST) 010, 020 and along the main channel. There is a small area of peat in DEEL (NEWCASTLEWEST) 010 (the red bog). A band of well-drained soil runs across the of the PAA across parts of Ahavarraga stream 010 and DEEL (NEWCASTLEWEST) 040. DEEL (NEWCASTLEWEST) 050 and 060 consist primarily of heavy clayey drift with limestones. Bedrock consists of locally important (Ll) and poorly productive (Pu) aquifers, with a band of regionally important karstified aquifer (Rkd) across the northern half. However, groundwater recharge is limited by the thick poorly permeable subsoils.

The main pressures are agriculture, UWWTP and channel maintenance (OPW arterial drainage scheme). Agriculture (pasture) is the main land use. Surface water PIP (pollution impact potential) maps for phosphate indicate high risk (rank 1 and 2) from diffuse runoff across most of the PAA. Pathways for diffuse phosphate are land drains and surface runoff. There are wastewater treatment plants at Dromina (DEEL (NEWCASTLEWEST)_010)) and Milford (DEEL (NEWCASTLEWEST)_040), Feenagh (DEEL (NEWCASTLEWEST)_050) and Kilmeedy (NEWCASTLEWEST)_060). The WWT plant at Tullylease (DEEL (NEWCASTLEWEST)_030) appears to be operating adequately. Ahavarraga Stream 010 flows into (DEEL (NEWCASTLEWEST)_050) (poor status) and is a potential source of phosphate and ammonia into the area for action. Field assessment will focus on diffuse and point sources of phosphate from agriculture, UWWTP as well sediment from agriculture and the OPW drainage scheme.

1 Background

Table 1-1: Background information on the Upper Deel PAA

Priority Area for Action	Catchment Number	Catchment Name	Sub catchment	Region	Local Authority
Upper Deel	24	Shannon Estuary South	24_15 Deel[Newcastlewest]_SC_010	Southwest	Limerick Cork

Priority Area for Action	No of *At Risk* WBs	No of *Review* WBs	No of dRBMP Prioritised WBs	No of WBs for Status Improvement:		
				2021	2027	Beyond 2027
Upper Deel	4	2	2	0	4	2

Reason for selection	• Multi-agency approach between Cork and Limerick. • Pilot project for the very poorly draining soils in Limerick • There is the potential for a rivers trust here • Community involvement, including active tidy towns group. • The Deel is a good trout fishery • Two deteriorated water bodies.

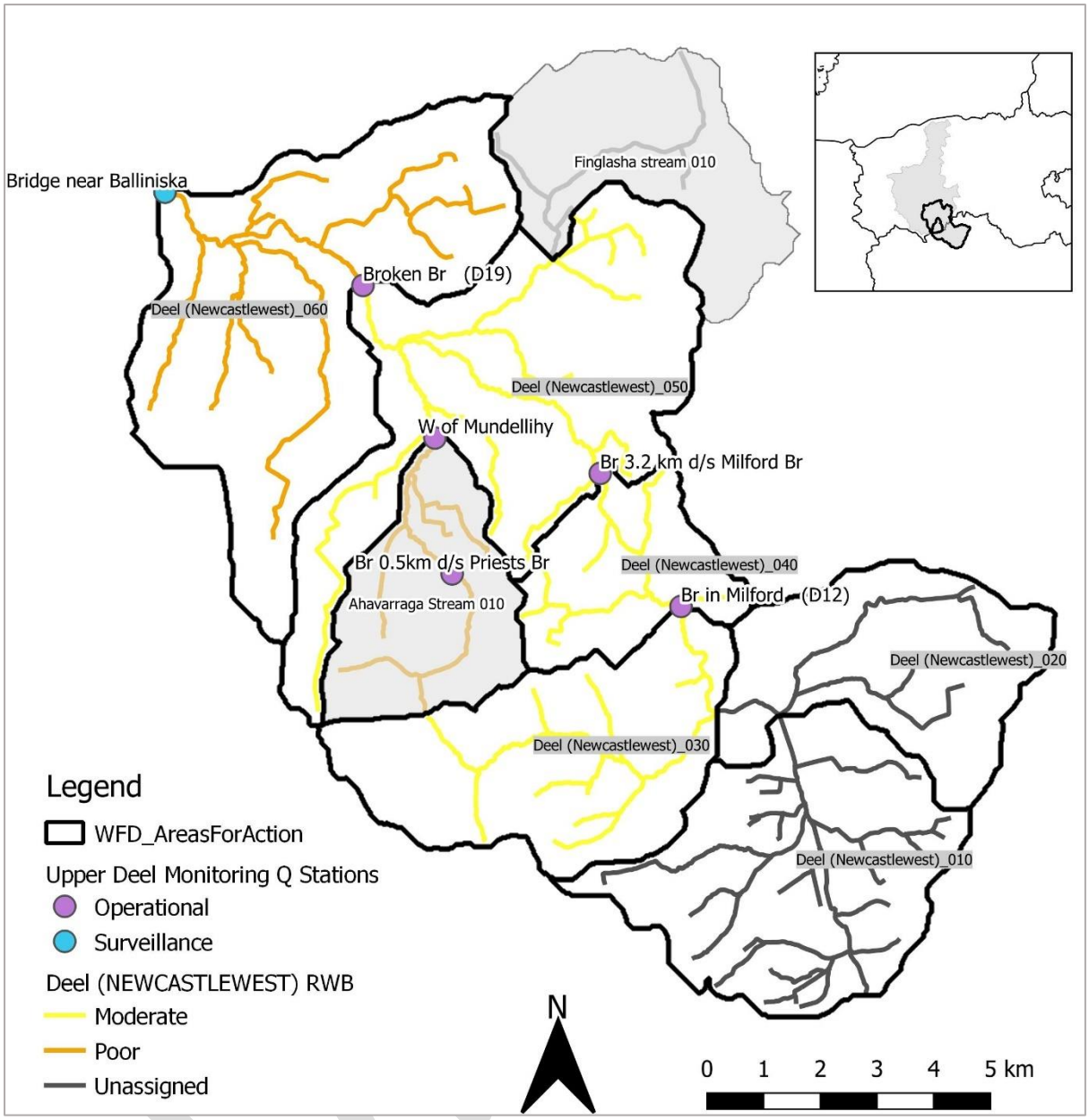


Figure 1-1: Upper Deel Priority area for Action ecological status 2015. Inset Deel River system.

Note: the shaded waterbodies Ahavarraga Stream 010 and Finglasha stream 010 are not part of the PAA. Direction of flow

Table 1-2: Summary table of individual waterbodies within the Upper Deel PAA (local river names in parentheses)

				Ecological Status			Pressures		
Water body Code	**Water body Name**	**Risk**	**Obj.**	**2009**	**2012**	**2015**	**Category**	**Subcategory**	**Sig?**
IE_SH_24D020070	DEEL (NEWCASTLEWEST)_010	Review	Good	Unassigned	Unassigned	Unassigned	Agriculture	Pasture	N
							Forestry	Forestry	N
							Urban Wastewater	Agglomeration PE < 500	N
							Anthropogenic Pressures	Unknown	N
IE_SH_24D020090	DEEL (NEWCASTLEWEST)_020 (Bealanablaya river)	Review	Good	Unassigned	Unassigned	Unassigned	Agriculture	Pasture	N
IE_SH_24D020100	DEEL (NEWCASTLEWEST)_030 (Mullaheera River)	At risk	Good	Good	Moderate	Moderate	Agriculture	Agriculture	Y
							Forestry	Forestry	Y
							Extractive Industry	Quarries	Y
IE_SH_24D020200	DEEL (NEWCASTLEWEST)_040	At risk	Good	Moderate	Good	Moderate	Agriculture	Agriculture	Y
							Urban Wastewater	Agglomeration PE < 500	Y
							Hydromorphology	Land Drainage	Y
IE_SH_24D020300	DEEL (NEWCASTLEWEST)_050	At risk	Good	Poor	Moderate	Moderate	Agriculture	Agriculture	Y
IE_SH_24D020400	DEEL (NEWCASTLEWEST)_060	At risk	Good	Moderate	Moderate	Poor	Agriculture	Agriculture	Y
							Urban Wastewater	Agglomeration PE < 500	Y

Source: National Surface Water Characterisation Spreadsheet 06122017

2 Receptor information

2.1 Overview table

Table 2-1: Receptor information for DEEL (NEWCASTLEWEST)_010, 020, 030 and 040

		Figures Tables	DEEL (NEWCASTLEWEST)_010	DEEL (NEWCASTLEWEST)_020	DEEL (NEWCASTLEWEST)_030	DEEL (NEWCASTLEWEST)_040
Risk Category			*Review*	*Review*	*At risk*	*At risk*
Biological Status (Inverts)	**2010-2015**		Unassigned	Unassigned	Moderate	Moderate
	2016-2018		Unassigned	Unassigned	Moderate	Moderate
	trends in Q values				Disimproved (was good 2005-2008)	No Change. Historic Q fluctuated between poor and moderate until 2014 when it rose to good.
Biological Status (Fish)	**2010-2015**		no data	no data	no data	no data
Hydrochemistry						
Ortho-P (mg/l P)	**baseline 2010-2015**		no data	no data	0.087	0.068
	indicative quality				Poor	Poor
	Trends - significant?				no	no
	Dist to threshold				Far	Far
NH4-N (mg/l N)	**baseline 2010-2015**				0.078	0.056
	indicative quality				Moderate	Good
	Trends - significant?				no	no
	Dist to threshold				Far	Far
TON (mg/l N)	**baseline 2010-2015**				1.65	1.835
	indicative quality				Good	Moderate
	Trends - significant?				no	no
	Dist to threshold				Near	Far
Other water quality data					Spikes in BOD (2009-2014) (Apr 2018 5.9 mg/l)	

	Figures Tables	DEEL (NEWCASTLEWEST)_010	DEEL (NEWCASTLEWEST)_020	DEEL (NEWCASTLEWEST)_030	DEEL (NEWCASTLEWEST)_040
Hydromorphology					
RHAT score **Arterial drainage**	Y Y	Yes	Yes	Yes	Yes
Siltation		Small pocket of peat mid-channel		Mod siltation in 2011. Heavy siltation (compacted) in 2014.	Siltation was slight to moderate (calcareous) in 2011 and mod (calcareous to compacted) in 2014
Ecological status					
2010-2015 **Element driving status** **change (since 1st cycle)**	Y	Unassigned	Unassigned	Moderate inverts Disimproved	Moderate inverts No change
Protected areas		No	No	No	No
WFD objective		Good	Good	Good	Good
Relevant info. from notes of EPA biologist		Suggest DEEL (NEWCASTLEWEST)_030, which is at risk, as a donor for 010	Suggest DEEL (NEWCASTLEWEST)_030, which is at risk, as a donor for 020	RWB drains a lot of improved pasture and tillage	
Significant issue/impact for receptor (e.g. PO_4)		unknown	unknown	ortho P, siltation, ammonia, BOD	ortho P, siltation, ammonia,

Table 2-2: Receptor information for Ahavarraga 010, DEEL (NEWCASTLEWEST) 050, Finglasha 010 and DEEL (NEWCASTLEWEST) 060.

		Figures Tables	AHAVARRAGA STREAM_010	Finglasha stream_010	DEEL (NEWCASTLEWEST)_050	DEEL (NEWCASTLEWEST)_060
Risk Category			*At risk*	*Review*	*At risk*	*At risk*
Biological Status (Inverts)	**2010-2015**		Poor	Unassigned	Moderate	Good
	2016-2018		Bad	Unassigned	Moderate	Moderate
	trends in Q values		Hist Q is consistently bad with one fluctuation to poor.		Improved. Historic Q fluctuated between poor and moderate until 2014 when it rose to good.	No Change. Hist Q fluctuates between mod & poor, more recently between good & moderate.
Biological Status (Fish)	**2010-2015**		no data	no data	no data	Poor
Hydrochemistry						
Ortho-P (mg/l P)	**baseline 2010-2015**		0.55		0.058	0.066
	indicative quality		Bad		Poor	Poor
	Trends - significant?		no		no	no
	Dist to threshold		Far		Far	Far
NH4-N (mg/l N)	**baseline 2010-2015**		2.775		0.046	0.058
	indicative quality		Moderate		Good	Good
	Trends - significant?		no		no	no
	Dist to threshold		Far		Far	Far
TON (mg/l N)	**baseline 2010-2015**		1.976		1.958	1.8
	indicative quality		Moderate		Moderate	Moderate
	Trends - significant?		no		no	no
	Dist to threshold		Far		Far	Far
Other water quality data			BOD spike Apr 2018 (5.8 mg/l)		BOD spike Apr 2018 (6.1 mg/l)	BOD spike Apr 2018 (6.4 mg/l)
Hydromorphology						
RHAT score		Y				Moderate
Arterial drainage		Y	No	Yes	Yes	Yes
Siltation			Siltation was slight to moderate (calcareous) in 2011 and mod (calcareous to compacted) in 2014.		Siltation was slight to moderate (calcareous) in 2011 and mod (calcareous to compacted) in 2014	Siltation was slight to moderate (calcareous) in 2011 and mod (calcareous to compacted) in 2014

	Figures Tables	AHAVARRAGA STREAM_010	Finglasha stream_010	DEEL (NEWCASTLEWEST)_050	DEEL (NEWCASTLEWEST)_060
Ecological status					
2010-2015	Y	Poor		Moderate	Poor
Element driving status		inverts		inverts	fish
change (since 1st cycle)		Improved (Poor to bad)		Improved	Disimproved
Protected areas		No	No	No	No
WFD objective		Good	Good	Good	Good
Relevant info. from notes of EPA biologist		hydraulic loading exceeds x3 treatment capacity of UWWTP in Dromcolliher. SWO activated 10 times in 2014.	Suggest DEEL (NEWCASTLEWEST)_050, which is at risk, as a donor for the Finglasha 010		
Significant issue/impact for receptor (e.g. PO_4)		BOD, ortho P, ammonia	unknown	ortho P, ammonia, siltation	ortho P, siltation

2.2 Biological status

Table 2-3: Table of Q values (EPA, 2018)

Water body Name	Monitoring point	1971	1975	1978	1980	1982	1984	1986	1989	1993	1996	1999	2002	2005	2008	2011	2014	2017
DEEL (NEWCASTLEWEST)_010																		
DEEL (NEWCASTLEWEST)_020																		
DEEL (NEWCASTLEWEST)_030	Br in Milford (D12)	Bad	Bad	Bad	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Mod	Mod	Good	Good	Mod	Mod	Mod
DEEL (NEWCASTLEWEST)_040	Br 3.2 km d/s Milford Br	Good	Good	Poor	Mod	Poor	Poor	Poor	Poor	Poor	Mod	Mod	Good	Good	Good	Good	Mod	Mod
DEEL (NEWCASTLEWEST)_050	Broken Br (D19)	Poor	Mod	Mod	Mod	Poor	Mod	Mod	Poor	Poor	Mod	Poor	Poor	Poor	Poor	Mod	Mod	Mod
DEEL (NEWCASTLEWEST)_060	Bridge near Balliniska	Good	Mod	Mod	Mod	Poor	Mod	Mod	Poor	Poor	Mod	Mod	Good	Good	Mod	Good	Good	Mod

Table 2-4: Ecological status for IFI WFD surveillance DEEL (NEWCASTLEWEST) 060

Water body Name	River (Site)	2008	2009	2010	2011	2012	2013	2014
DEEL (NEWCASTLEWEST)_060	Ballygulleeen_A							Poor
DEEL (NEWCASTLEWEST)_060	Br. near Balliniska_A	Mod			Mod			Mod

Source: *Sampling Fish for the Water Framework Directive, Rivers 2014*
Fiona L. Kelly, Lynda Connor, Ronan Matson, Rory Feeney, Emma Morrissey, John Coyne and Kieran Rocks
Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24

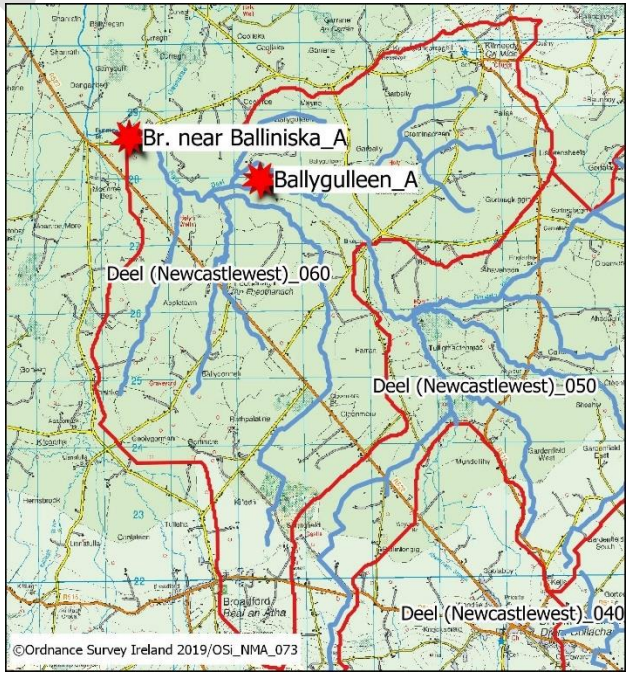


Figure 2-1: Location of IFI WFD fish surveys.

2.3 Hydromorphology

Table 2-5: River Hydromorphology Assessment Technique (RHAT) DEEL (NEWCASTLEWEST)_060

Assessment Year	2011	2014	2017
Easting	132518	132518	132518
Northing	128606	128606	128606
Fieldsheet Date	26/07/2011	25/08/2014	01/08/2017
Visibility Upstream		150	150
Visibility Downstream		250	250
Hydromorphology Class	Moderate	Moderate	Moderate
Hydromorphology Score	0.4375	0.59375	0.59375
Sum Attribute Score	14	19	19
Channel Form Score	1	2	2
Channel Form Comments			
Channel Vegetation Score	2	3	3
Channel Vegetation Comments			
Channel Substrate Condition Score	2	2	2
Channel Substrate Condition Comments		Heavy siltation	Heavy siltation
Channel Barriers To Continuity Score	3	3	3
Channel Barriers To Continuity Comments		Bridge	Bridge
Bank Structure Left Score	1	1	1
Bank Structure Right Score	1	1	1
Bank Structure Comments			Erosion, see photos
Bank Vegetation Left Score	1	1	1
Bank Vegetation Right Score	1	1	1
Bank Vegetation Comments			Willowherb and bramble dominant in large sections, trees relatively sparse. Japanese knotweed on LH bank d/s, one large clump.
Riparian Landcover Left Score	0.5	1	1
Riparian Landcover Right Score	0.5	1	1
Riparian Landcover Comments		Mostly improved pasture	Mostly improved pasture
Floodplain Connectivity Left Score	0.5	1.5	1.5
Floodplain Connectivity Right Score	0.5	1.5	1.5
Floodplain Connectivity Comments			
total spot check score	0.4375	0.59375	0.59375

2.4 Hydrochemistry

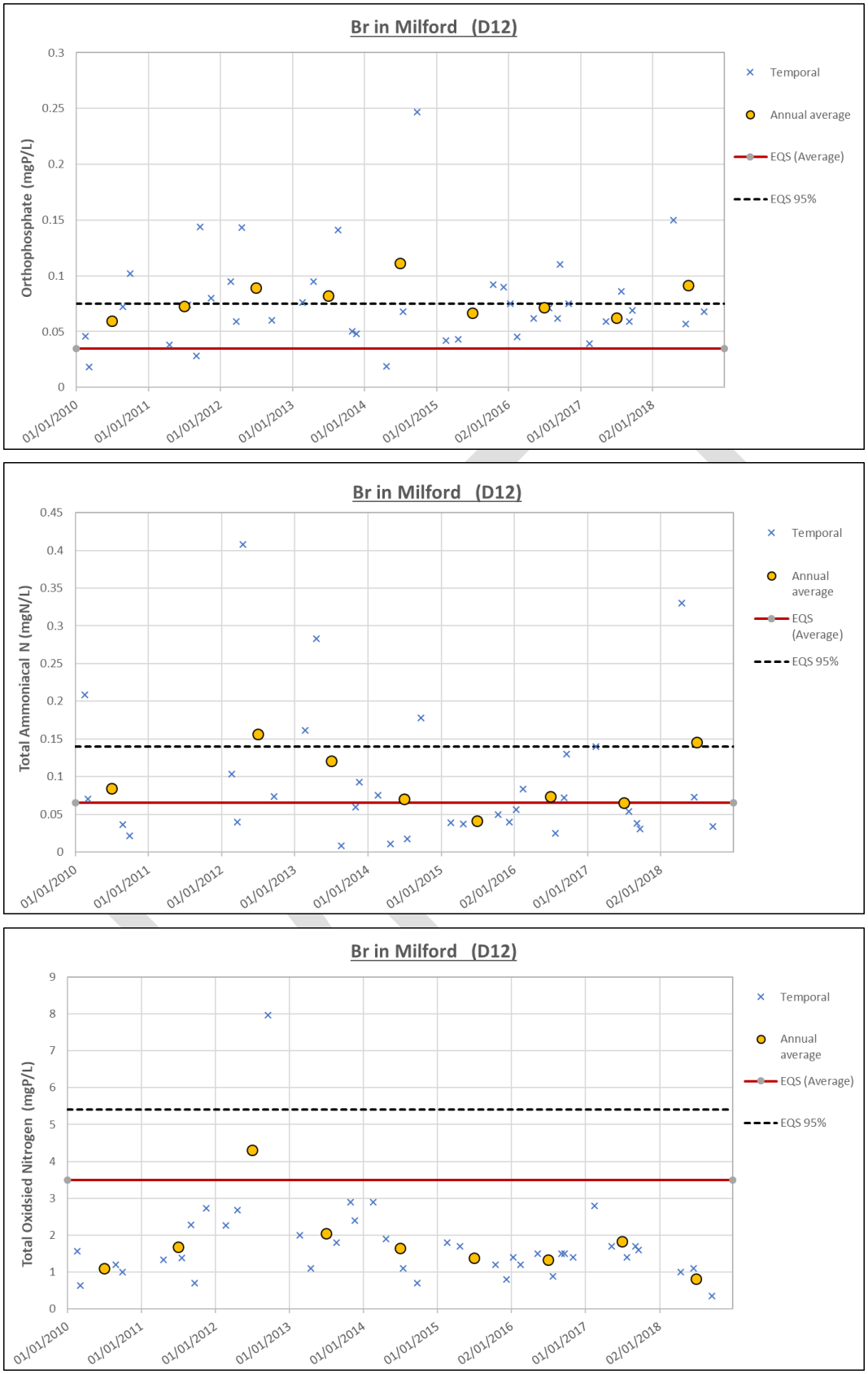
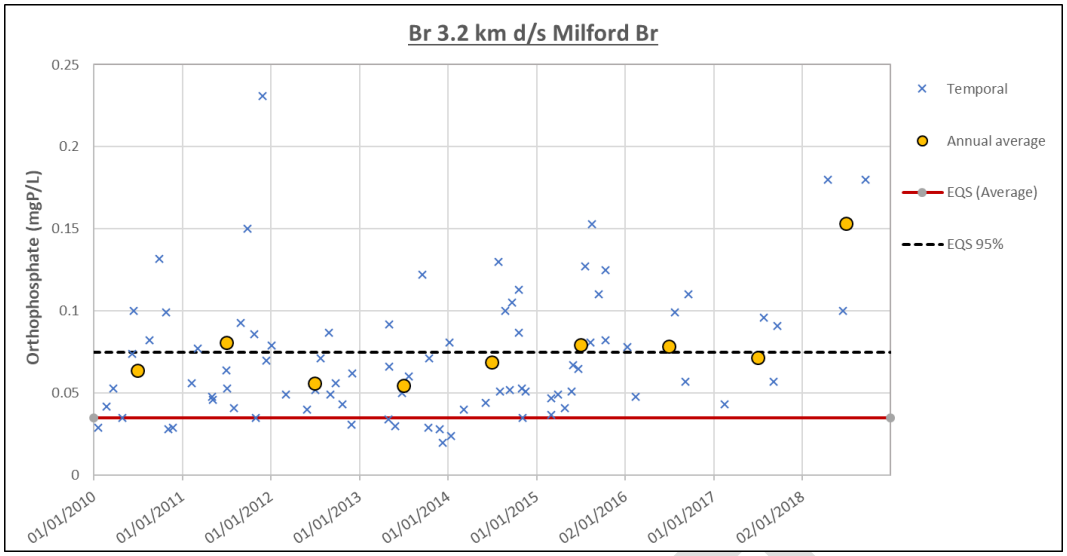
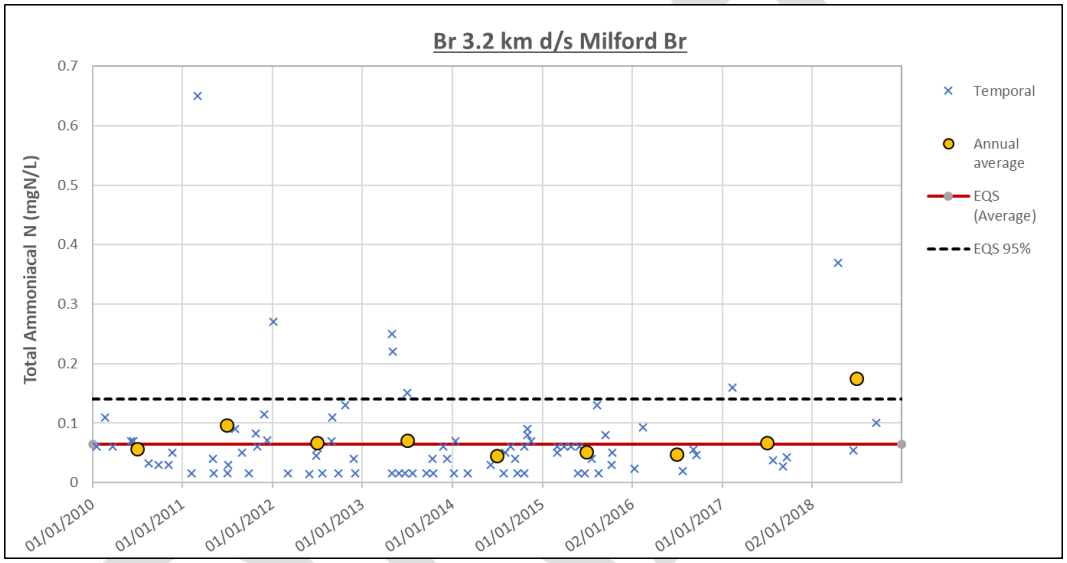


Figure 2-2: Nutrient concentrations at Milford Bridge in DEEL (NEWCASTLEWEST) 030





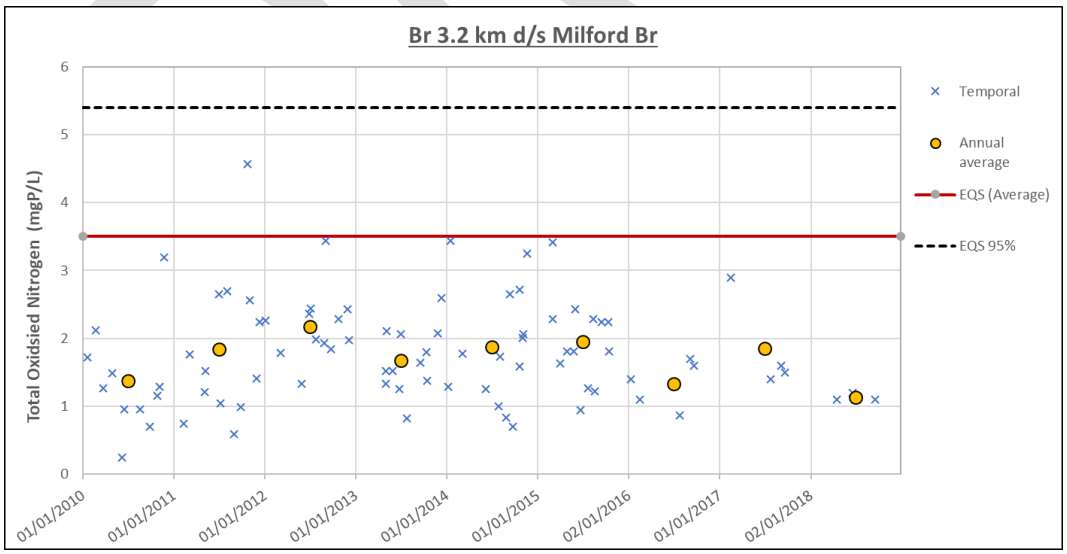
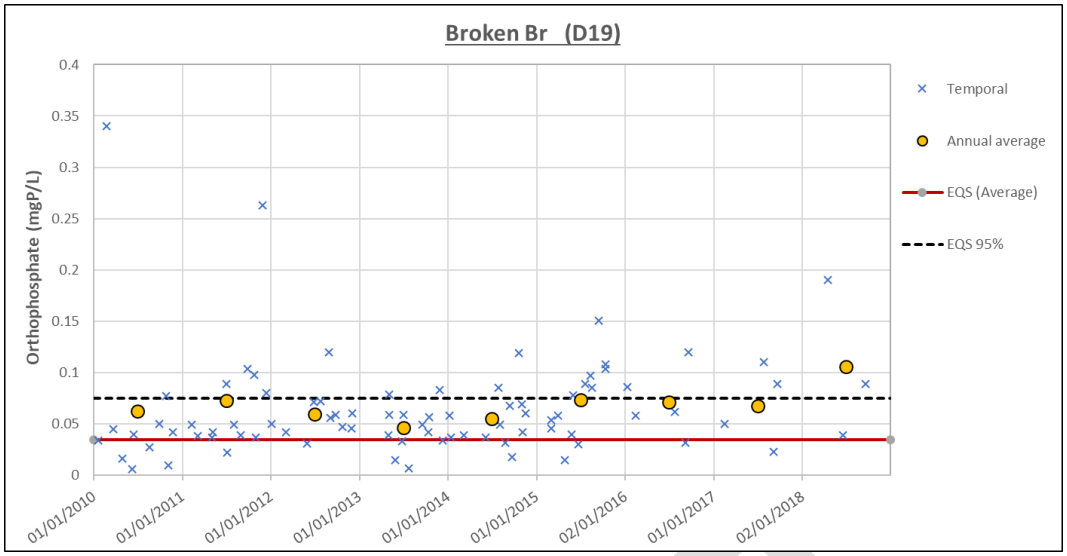
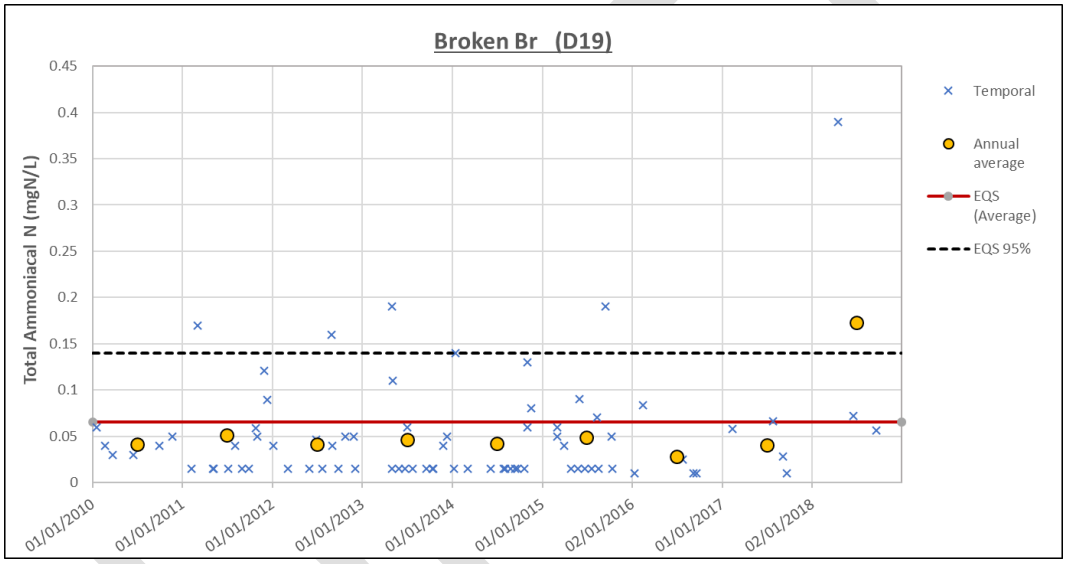


Figure 2-3: Nutrient concentrations at 3.2 km d/s Milford Br in DEEL (NEWCASTLEWEST) 040





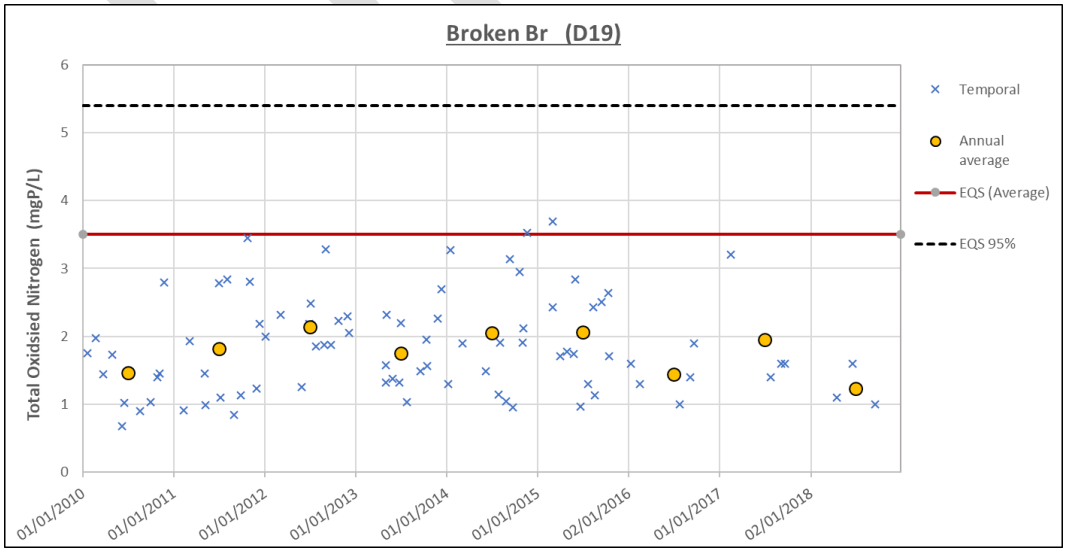
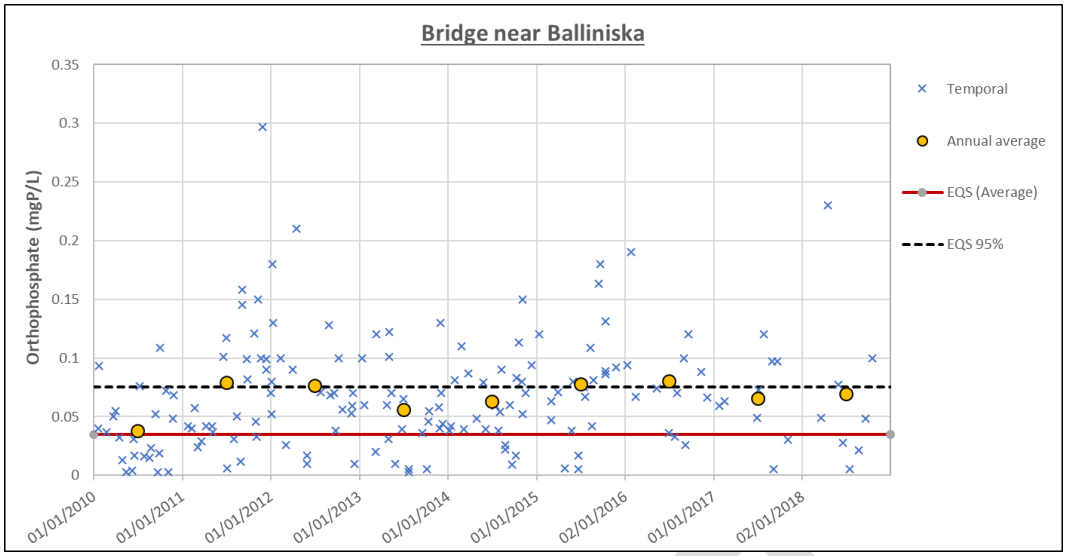
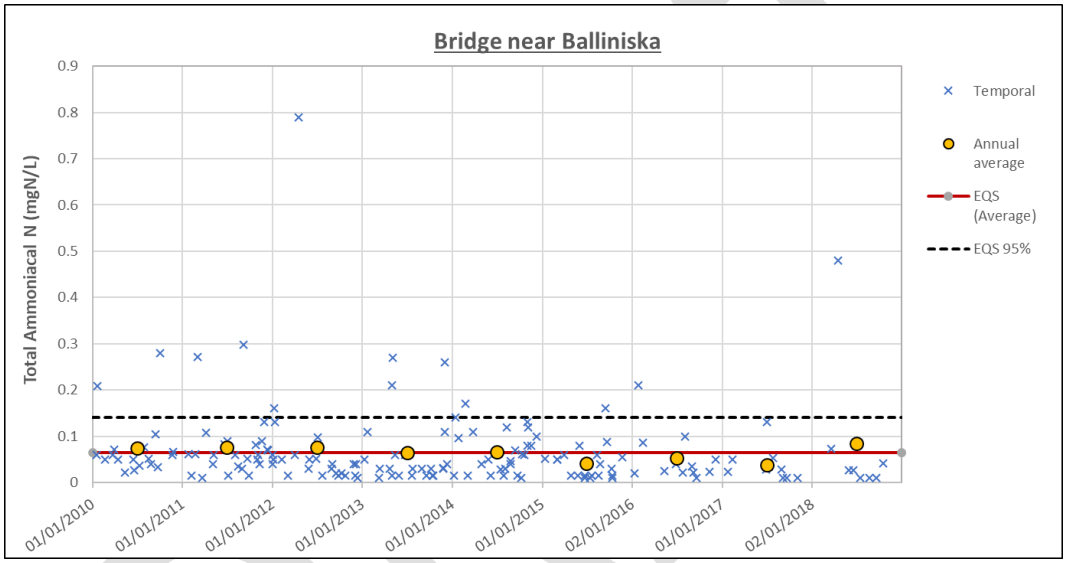


Figure 2-4: Nutrient concentrations at Broken Br in DEEL (NEWCASTLEWEST) 050





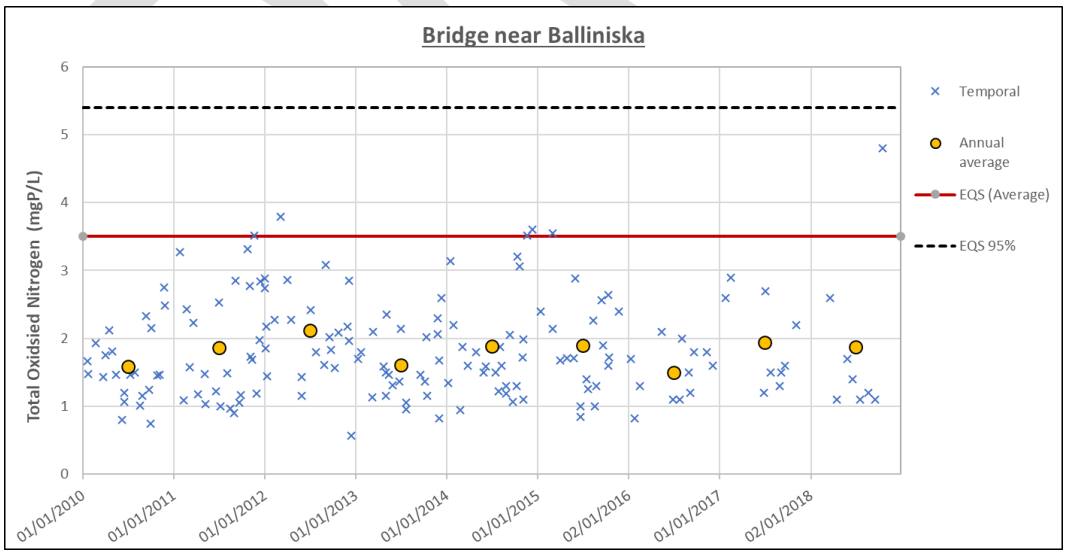
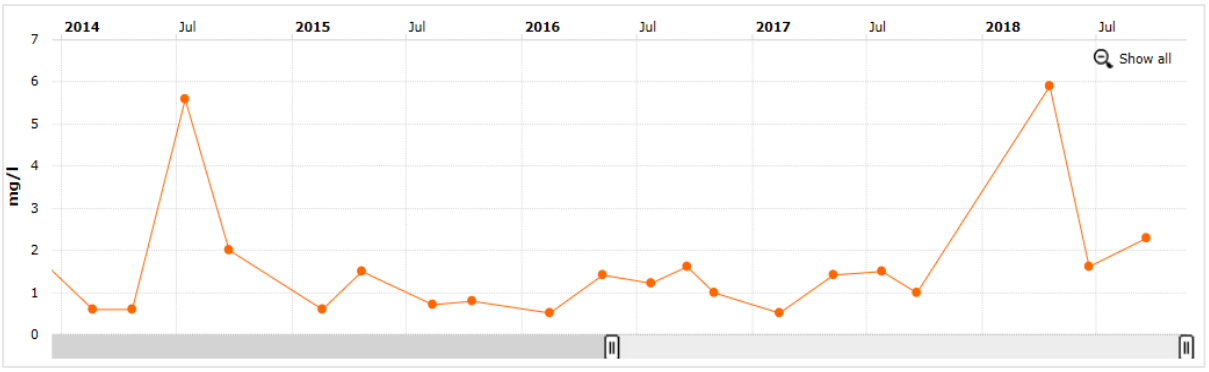
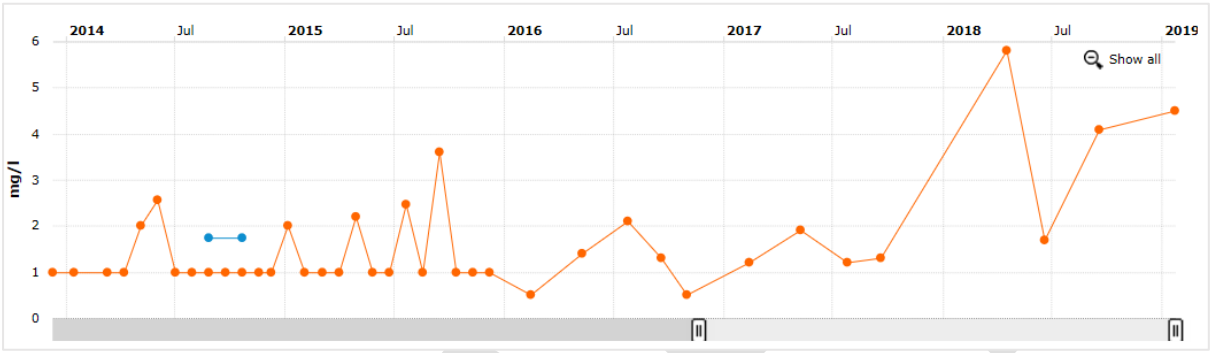


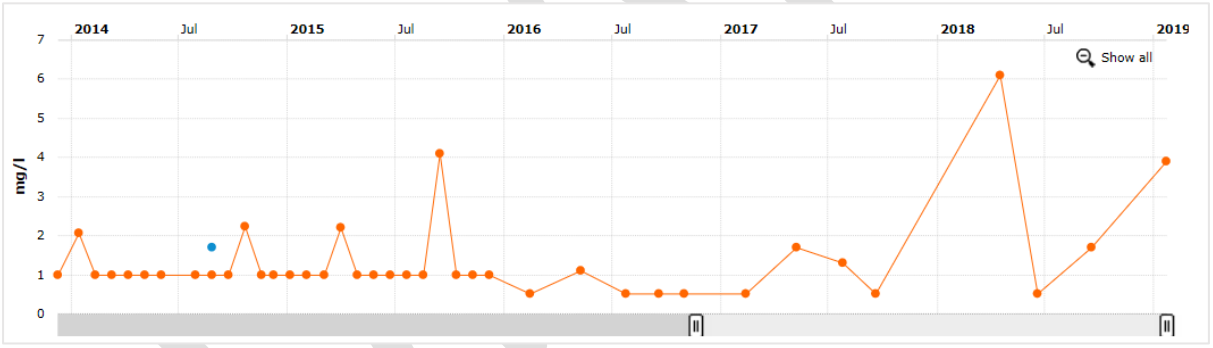
Figure 2-5: Nutrient concentrations at Bridge near Balliniska in DEEL (NEWCASTLEWEST) 060



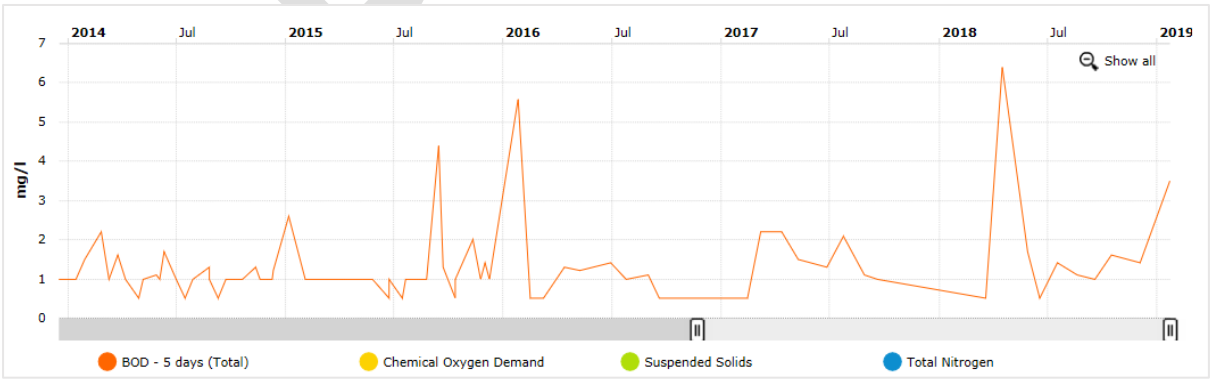
DEEL (NEWCASTLEWEST) 030 (Bridge in Milford)



DEEL (NEWCASTLEWEST) 040 (3.2 km d/s Bridge in Milford)



DEEL (NEWCASTLEWEST) 050 (Broken Bridge)



DEEL (NEWCASTLEWEST) 060 (Bridge near Balliniska)

Figure 2-6: BOD (mg/l) values for Upper Deel PAA (from 2014)

3 Significant pressures

3.1 Tier 2 EPA characterisation

Table 3-1: Tier 2 EPA characterisation

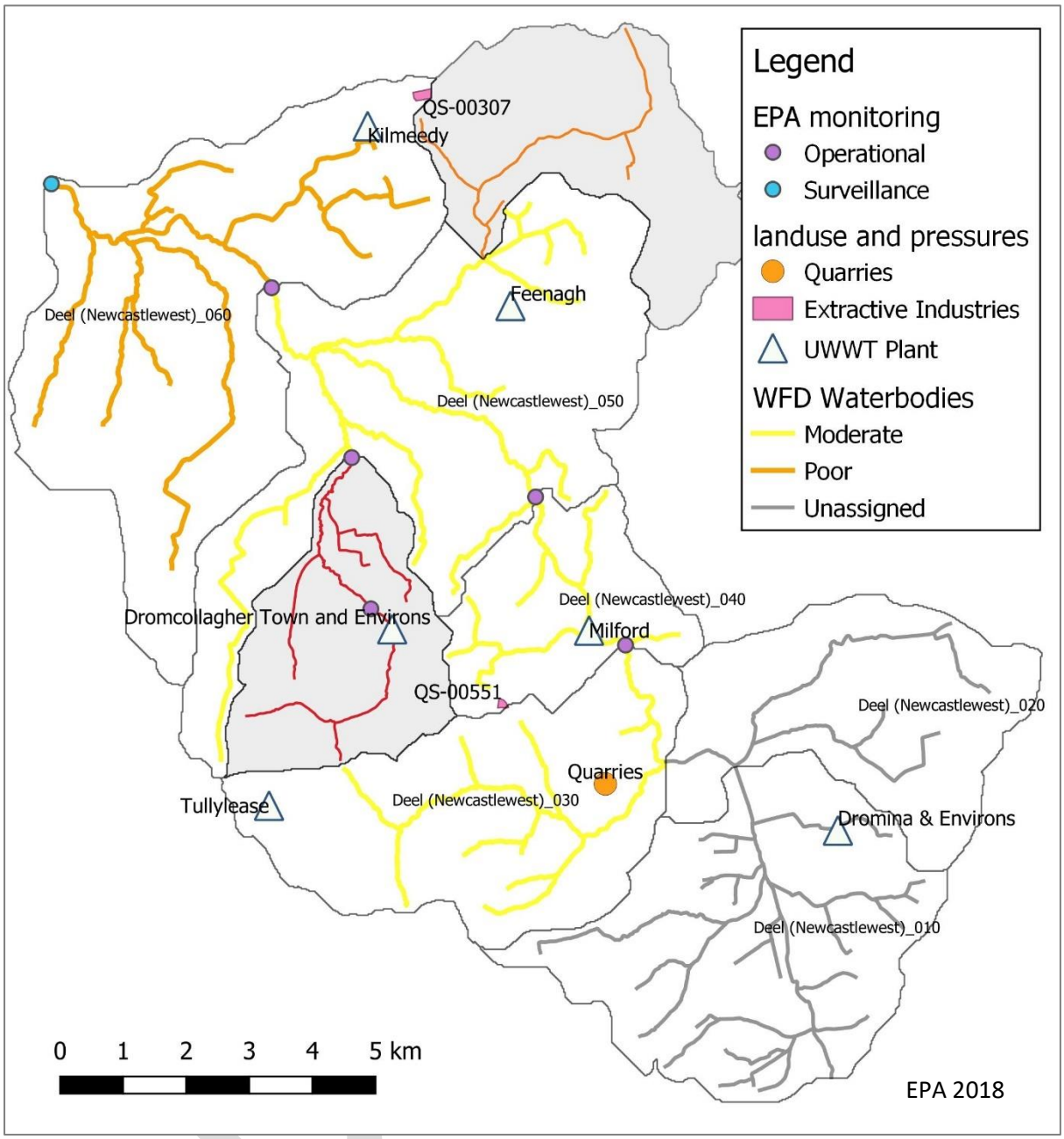
Waterbody Name	Id	Category	Sub Category	Name	Significant	Pressure & Impact details
DEEL (NEWCASTLEWEST)_010	WBP0001664	Agriculture	Pasture	n/a	No	
	WBP0005701	Forestry	Forestry	n/a	No	
	WBP0005702	Urban Waste Water	Agglomeration PE < 500	Dromina & Environs	No	
	WBP0006981	Anthropogenic Pressures	Unknown	n/a	No	
DEEL (NEWCASTLEWEST)_020	WBP0001665	Agriculture	Pasture	n/a	No	
	WBP0006982	Anthropogenic Pressures	Unknown	n/a	No	
DEEL (NEWCASTLEWEST)_030	WBP0001666	Agriculture	Agriculture	n/a	Yes	Nutrient Pollution Organic Pollution
	WBP0005703	Forestry	Forestry	n/a	Yes	Altered habitat due to Morphological changes
	WBP0006261	Extractive Industry	Quarries	n/a	Yes	Altered habitat due to Morphological changes
DEEL (NEWCASTLEWEST)_040	WBP0001668	Agriculture	Agriculture	n/a	Yes	Nutrient Pollution Organic Pollution Altered habitat due to Morphological changes
	WBP0001669	Urban Waste Water	Agglomeration PE < 500	Milford	Yes	Nutrient Pollution Organic Pollution
	WBP0005704	Hydromorphology	Land Drainage	n/a	Yes	Altered habitat due to Morphological changes Altered habitat due to Hydrological changes
DEEL (NEWCASTLEWEST)_050	WBP0001670	Agriculture	Agriculture	n/a	Yes	Nutrient Pollution Organic Pollution
DEEL (NEWCASTLEWEST)_060	WBP0001671	Agriculture	Agriculture	n/a	Yes	Nutrient Pollution Organic Pollution
	WBP0005038	Urban Waste Water	Agglomeration PE < 500	Kilmeedy	Yes	Nutrient Pollution Organic Pollution

Source: WFD Application

3.2 Urban Waste Water Treatment Plants

Table 3-2: Urban Waste Water Treatment Plants

Waterbody	WWTP Name	Subcategory	Emission Point Code	Point Category
DEEL (NEWCASTLEWEST)_010	Dromina & Environs	Agglomeration PE < 500	TPEFF0500A0329SW002	Storm Water Overflow
			TPEFF0500A0329SW001	Primary Discharge Point
DEEL (NEWCASTLEWEST)_030	Tullylease	Agglomeration PE < 500	TPEFF0500A0338SW001	Primary Discharge Point
DEEL (NEWCASTLEWEST)_040	Milford	Agglomeration PE < 500	TPEFF0500A0321SW003	Storm Water Overflow
			TPEFF0500A0321SW002	Storm Water Overflow
			TPEFF0500A0321SW001	Primary Discharge Point
AHAVARRAGA STREAM_010	Dromcollagher Town & Environs	Agglomeration PE of 1,001 to 2,000	TPEFF1900D0316SW004	Storm Water Overflow
			TPEFF1900D0316SW003	Storm Water Overflow
			TPEFF1900D0316SW002	Storm Water Overflow
			TPEFF1900D0316SW001	Primary Discharge Point
DEEL (NEWCASTLEWEST)_050	Feenagh	Agglomeration PE < 500	TPEFF1900A0220SW001	Primary Discharge Point
DEEL (NEWCASTLEWEST)_060	Kilmeedy	Agglomeration PE < 500	TPEFF1900A0212SW002	Storm Water Overflow
			TPEFF1900A0212SW001	Primary Discharge Point



*Figur*e 3-1 Licensed point pressures Upper Deel PAA.

3.3 Diffuse pollution pressures

Table 3-3: Surface water and near surface phosphorus source load apportionment modelling

Waterbody	Pasture	UWW	Septic tanks	Forestry	Diffuse urban
DEEL (NEWCASTLEWEST)_010	78	15	4		
DEEL (NEWCASTLEWEST)_020	95				
DEEL (NEWCASTLEWEST)_030	72	9	3	11	
DEEL (NEWCASTLEWEST)_040	57	38			
AHAVARRAGA STREAM_010	39	52			7
Finglasha stream_010	99				
DEEL (NEWCASTLEWEST)_050	83	11	5		
DEEL (NEWCASTLEWEST)_060	85	6	5		

EPA 2018

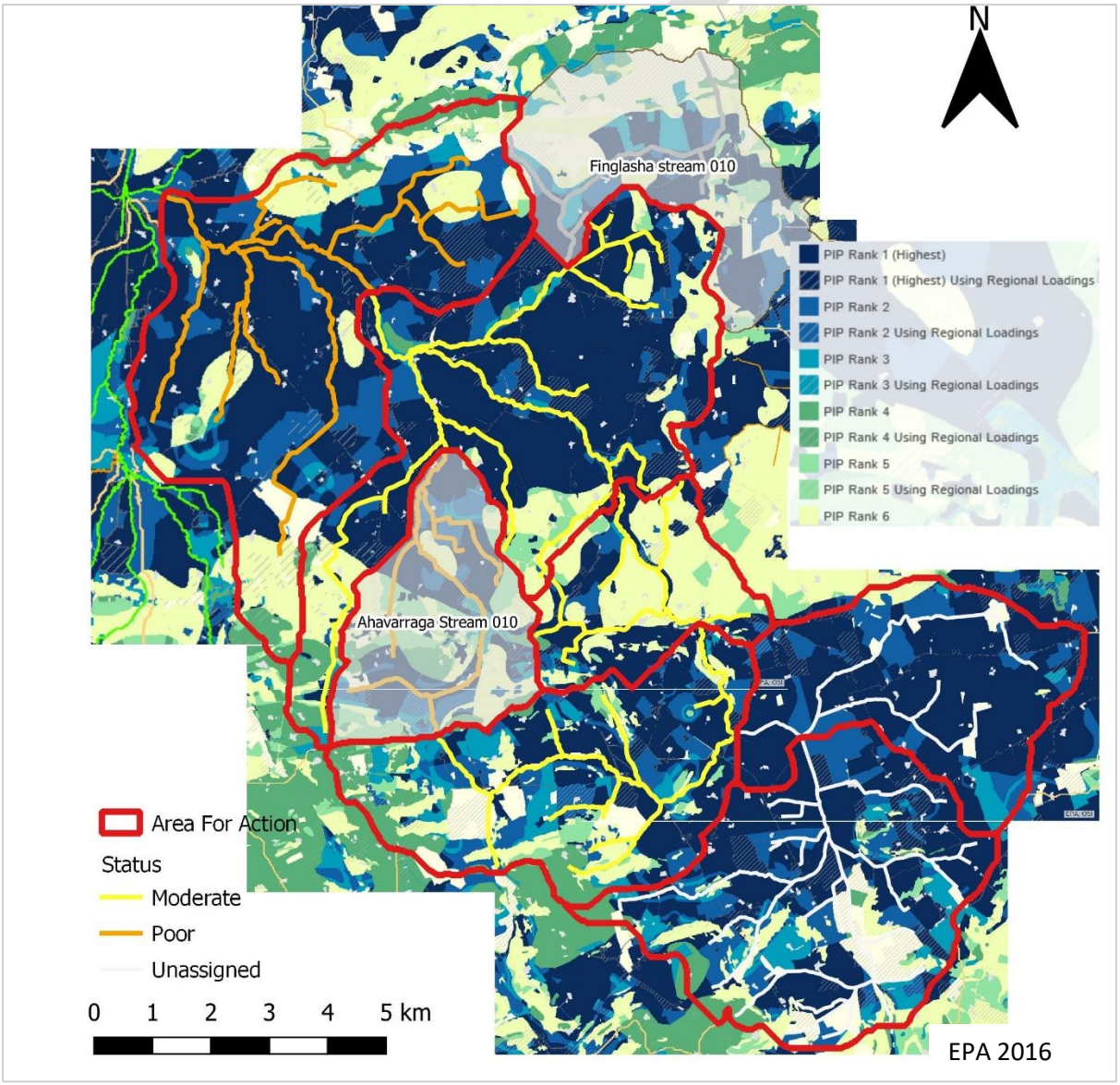


Figure 3-2 Pollution impact potential map for phosphate to surface waters.

4 Pathway information

4.1 Pathways for diffuse pollution

	Compartment 1	Compartment 2
Soil drainage	mostly poor; some well drained locally	well drained
Subsoil permeability	low	Low/moderate
Aquifer type	Ll/Pu/Rkd	Ll/Pu/Rf
Flowpath	Drains, surface runoff & shallow gw.	Near surface & shallow gw. Some shallow g/w recharge via rock outcrops
PO4 PIP	High	Low (except rock outcrops)
NO3 PIP	Low (except rock outcrops)	Low (except rock outcrops)

Overview: With the exception of a band of well drained soils in the middle and very northern extremity of the subcatchment, soils are poorly draining. The sub catchment mostly consists of locally important (Ll) and poorly productive (Pu) aquifers, with a band of regionally important (Rkd) across the northern half. Groundwater recharge is limited by the thick poorly permeable subsoils. Phosphate, ammonia and sedimentation are the main issues in the river. Pathways for nutrient loss are primarily from land drains and surface runoff.

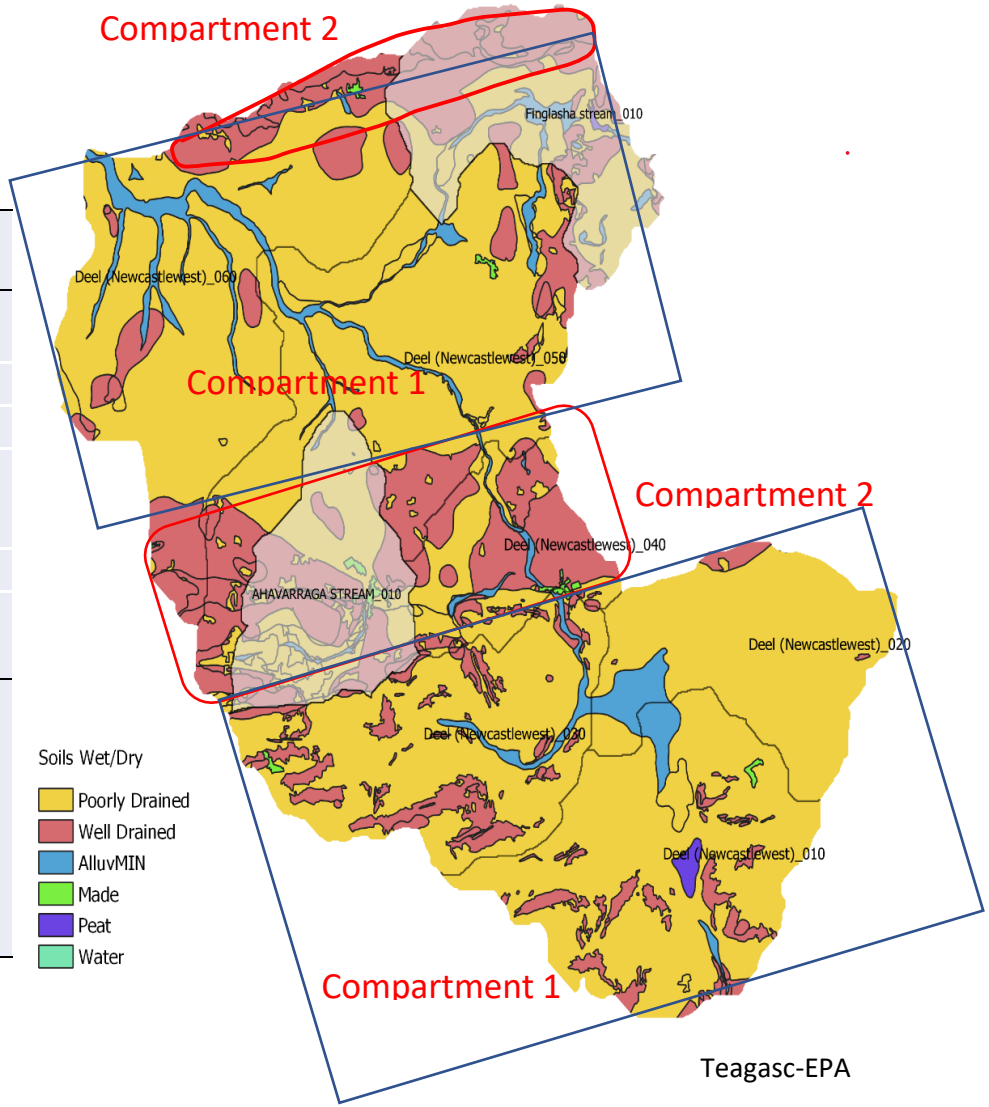


Figure 4-1 Compartments for diffuse nutrient runoff (right).

4.2 Soil texture

Although the majority of the soil is classified as poorly draining there are three main soil types: 'fine loamy drift with siliceous stones', 'clayey drift with limestones' and alluvial soil (Figure 4-2 below). Surface water draining the 'clayey drift' will have higher conductivity than that draining the 'silicate loamy drift soils.

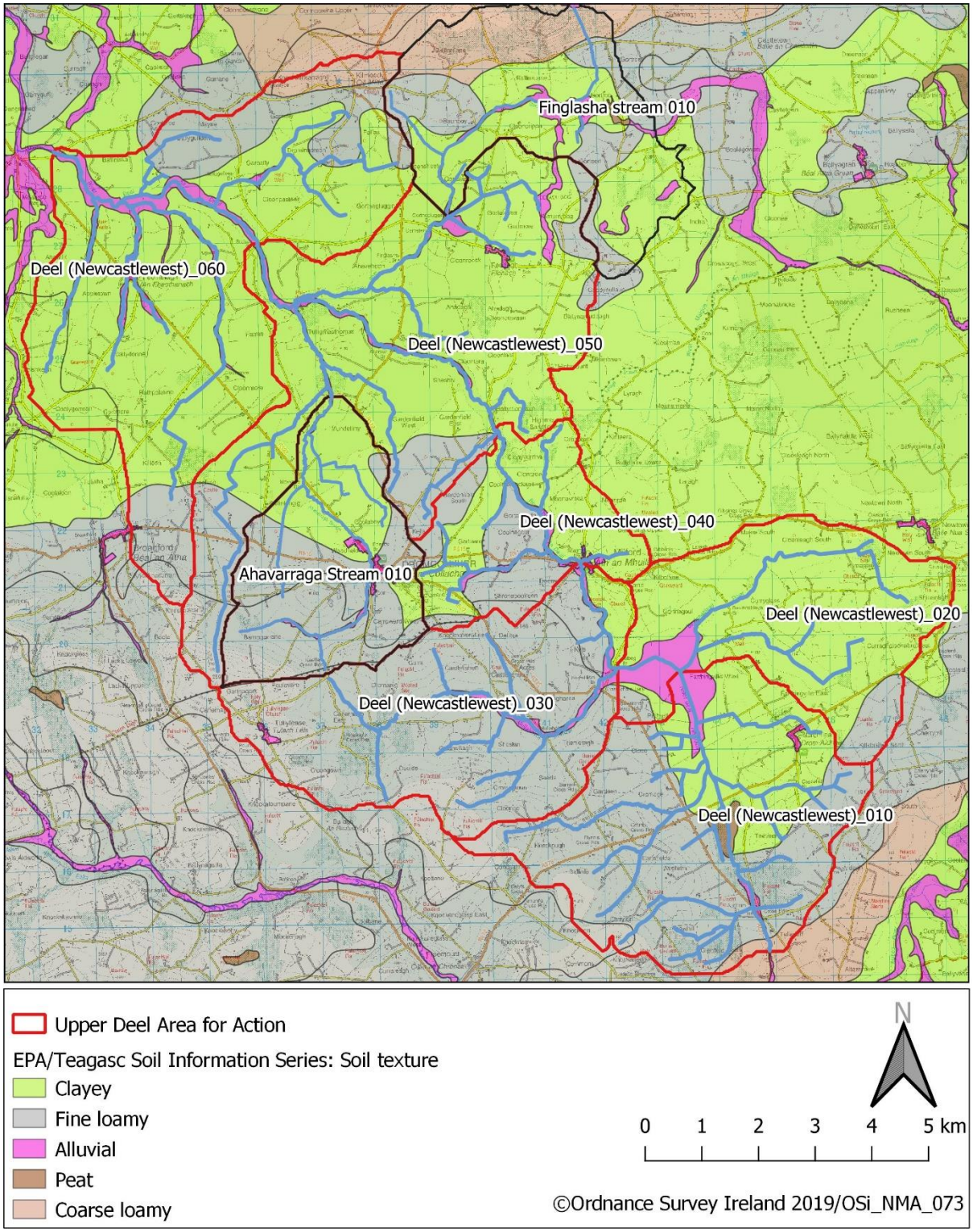


Figure 4-2 Soil texture class for the area for action.

5 Interim conclusions on the PAA based on desk study

Phosphate, ammonia and siltation of the river channel are the main issues. Average phosphate concentrations are almost double mean EQS for good quality (0.035 mg/l P) across the four monitored waterbodies. Ammonia concentrations are also elevated, average values are close to the mean EQS for good quality (0.065 mg/l N). Siltation and compaction of the substrate is an issue at the four EPA monitored sites the PAA (as indicated by EPA biologists' notes). Most of the area for action is included in the Deel arterial drainage scheme. MCPA exceedances are an issue further downstream at Newcastle West Public Water Supply. In addition, an outbreak of Crayfish plague was reported further downstream of the PAA around Newcastlewest in June 2017.

5.1 Deel (Newcastlewest) 010

- The ecological status of Deel (Newcastlewest) 010 has not been assigned but it is considered at risk from elevated nutrients (phosphate, ammonia) and sediment.
- Soils in the waterbody are poorly draining and primarily two types: a fine loamy drift and a clayey drift with limestones. The fine loamy drift is west of the R522 and in the very south of the sub-basin, while the clayey drift is in the eastern half (Appendix A). There is a small area of peat (the red bog) to the south, which has been afforested. Groundwater recharge is limited by the thick poorly permeable clay subsoils. The pip (pollution impact potential) maps indicate a high risk of phosphate runoff to surface waters.
- The waterbody outlet is located on some fine alluvial soil and has been heavily channelised. The waterbody is part of the OPW Deel arterial drainage scheme and channel maintenance works are ongoing.
- The assessment will focus on point and diffuse sources of phosphate from agriculture and the UWWTP in Dromina village. The assessment will also focus on assessing sediment from forestry, agriculture and OPW drainage scheme.

5.2 Deel (Newcastlewest) 020

- The ecological status of Deel (Newcastlewest) 020 has not been assigned but it is considered at risk from elevated nutrients (phosphate, ammonia) and sediment.
- The soil is primarily a clayey drift with limestone with some fine textured alluvial soil at the outlet. Both soil types are poorly draining. The pip (pollution impact potential) maps indicate a high risk of phosphate runoff to surface waters. Groundwater recharge is limited by the thick poorly permeable clay subsoils.
- The waterbody is part of the OPW Deel arterial drainage scheme and channel maintenance works are ongoing.
- The field assessment will focus on diffuse and point sources of phosphate from agriculture as well sediment from agriculture and the OPW drainage scheme.

5.3 Deel (Newcastlewest) 030

- Deel (Newcastlewest) 030 is at moderate ecological status and *At Risk* of not meeting its WFD objectives. It was at Good status in 2005 and 2008 but dropped to Moderate in 2011 and has remained Moderate since.
- The waterbody consists of a headwater stream and a section of the main Deel river. The headwater drains most of the sub basin joining the Deel river just north of Kilbeg bridge.
- The main issues are phosphate and ammonia and siltation. Average values in 2017 were 0.062 (mg/l P) for phosphate and 0.066 (mg/l N) for ammonia. Heavy siltation was recorded at the monitoring point in Milford in 2014 and 2017.

- The waterbody is part of the OPW Deel arterial drainage scheme and channel maintenance works are ongoing.
- Soils are poorly draining consisting of a 'fine loamy drift with siliceous stones' and a band of alluvial soil along the channel. The pip (pollution impact potential) maps indicate a gradient in phosphate runoff risk –increasing from west (moderate) to east (high).
- The field assessment will focus on nutrients from agriculture (point and diffuse and sediment from land drainage, quarry and OPW channel maintenance.

5.4 Deel (Newcastlewest) 040

- Deel (Newcastlewest) 040 is at moderate ecological status and *At Risk* of not meeting its WFD objectives. Historically the Q value fluctuated between moderate and poor until 2004 when it rose to good. It remained good until 2011 when it dropped to moderate and has remained moderate since.
- The main issues are phosphate and ammonia and siltation. Average values in 2017 were 0.092 (mg/l P) for phosphate and 0.086 (mg/l N) for ammonia. Siltation levels were moderate (calcareous to compacted) in 2017.
- Soils are a mixture of well and poorly draining. PIP (pollution impact potential) maps indicate high phosphate runoff risk on wet soils (rank 1 and 2) and low risk on well-draining soils (rank 5 and 6).
- Field assessment will focus on nutrient sources from agriculture and the WWTP in Milford village as well as sediment from agriculture and OPW channel maintenance

5.5 Deel (Newcastlewest) 050

- Deel (Newcastlewest) 050 is at moderate ecological status and *At Risk* of not meeting its WFD objectives. Historically, the Q value has alternated between poor and moderate and since 1971 has never been good.
- There are three inputting waterbodies: Deel (Newcastlewest) 040 (moderate), Ahavarraga Stream 010 (bad) and Finglasha stream 010 (unassigned).
- The main issues are phosphate, ammonia and siltation. Average concentrations for ortho-P and ammonia-N in 2017 were 0.079 and 0.069 mg/l respectively. Siltation was moderate in 2011 and heavy in 2014 and 2017. The substrate was also calcareous to compacted in 2014 and 2017. Most of the sub basin is poorly draining and risk of phosphate runoff to surface waters is high (pip rank 1 and 2).
- Field assessment will focus on nutrient and sediment sources from agriculture, sediment and channelisation from OPW channel maintenance. An assessment of the contribution of the WWTP in Dromcolliher to Deel (Newcastlewest 050) will also be carried out.

5.6 Deel (Newcastlewest) 060

- Deel (Newcastlewest) 060 is at poor ecological status and *At Risk* of not meeting its WFD objectives. The status is driven by the fish status/potential. The fish status deteriorated from moderate to poor in 2014 due to the fish status at the Ballygulleen site. The Q value was good in 2011 and 2014 and dropped to moderate in 2017.
- Phosphate and siltation are the main issues. The average ortho-p concentration was 0.073 mg/l in 2017. Siltation was moderate in 2011, heavy in 2014 and moderate to heavy in 2017. The substrate was calcareous to compacted in 2014 and calcareous in 2017.
- Most of the sub basin is poorly draining and risk of phosphate runoff to surface waters is high (pip rank 1 and 2).
- Field assessment will focus on nutrient sources from agriculture and the WWTP in Feenagh as well as sediment from agriculture and OPW channel maintenance.

6 Workplan

6.1 EPA further characterisation actions

WB Name	Id	Action	Responsible Organisation	Further Characterisation Action details
DEEL (NEWCASTLEWEST)_010	FC002843	IA7 Multiple Sources in Multiple Areas	Cork County Council	Start with IA3[1] at the sub basin outlet. Then progress to IA7[2] with a focus on nutrients and siltation from potential sources such forestry, wastewater discharges and agriculture.
DEEL (NEWCASTLEWEST)_020	FC002844	IA7 Multiple Sources in Multiple Areas	Cork County Council	Start with IA3 at sub basin outlet. Focus on sources of nutrients and possibly sources of sediment such as land drainage from agriculture.
DEEL (NEWCASTLEWEST)_030	FC002845	IA7 Multiple Sources in Multiple Areas	Cork County Council	Focus on sources of nutrients from agriculture, and sources of sediment from forestry and potentially extraction industry.
	FC002847	IA1[3] Provision of Information	Environmental Protection Agency	Liaison with hydromorphology section on inclusion of water body as part of national hydromorphology assessment: slow moving river with silt build-up and which floods regularly.
DEEL (NEWCASTLEWEST)_040	FC002846	IA7 Multiple Sources in Multiple Areas	Cork County Council	IA7 focus on nutrients from wastewater, and nutrients and sediments from agriculture. Liaise with Limerick County Council.
DEEL (NEWCASTLEWEST)_050	FC002292	IA7 Multiple Sources in Multiple Areas	Limerick City & County Council	Aim: determine significant pressures and sources, with particular focus on agriculture and land spreading activities. Phosphate susceptibility is high throughout and extensive gley soil cover results in run-off.
	FC002293	IA2[4] Point Source Desk Based Assessment	Environmental Protection Agency	EPA to investigate load apportionment for the Deel Main Channel.
DEEL (NEWCASTLEWEST)_060	FC002294	IA7 Multiple Sources in Multiple Areas	Limerick City & County Council	Aim: determine the significant pressures, with particular focus on agriculture. Catchment walk and water quality sampling required. Spikes in orthophosphate indicates that rainfall-dependent phosphate run-off is impacting the whole Deel channel.

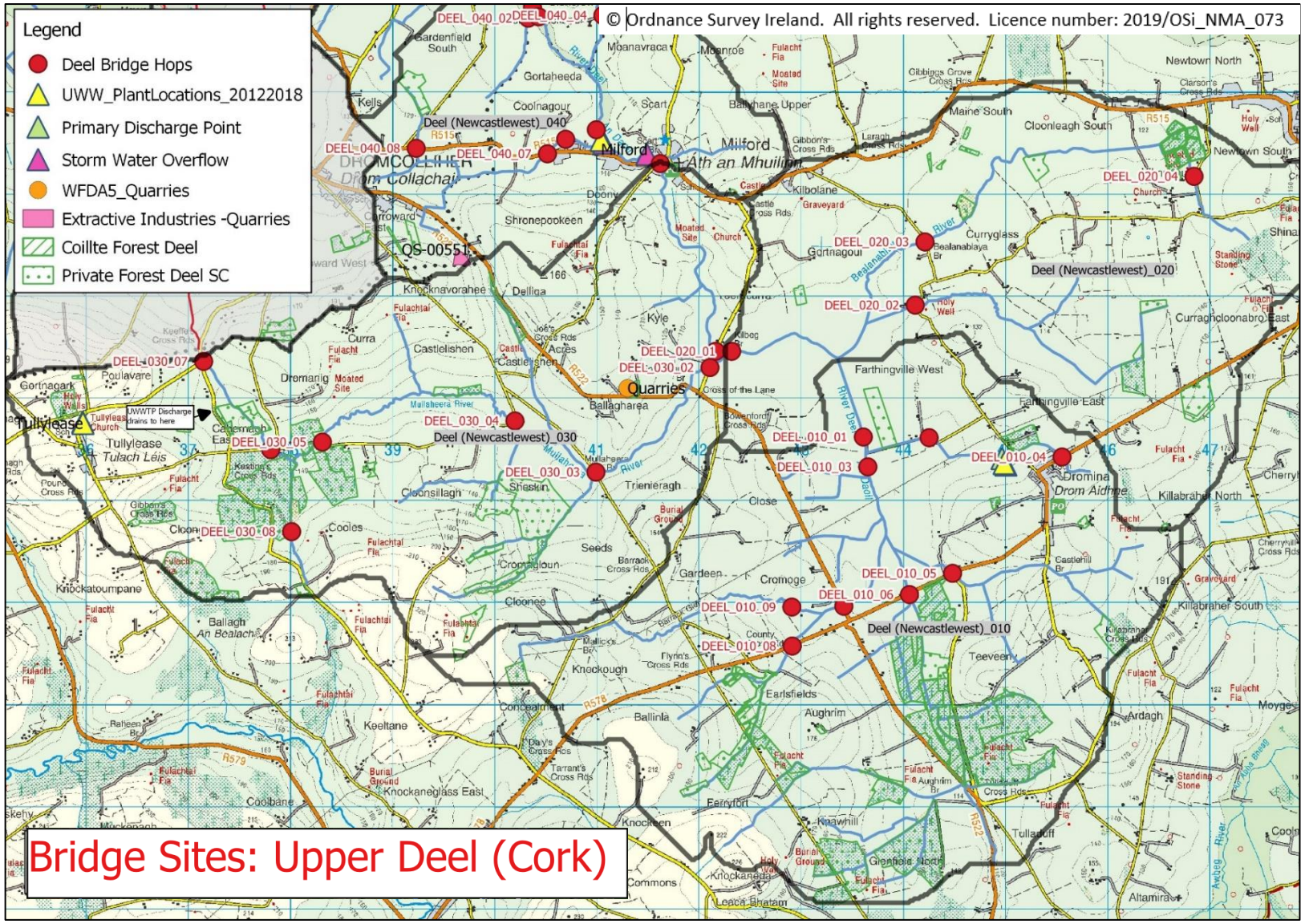
[1]IA3: Unassigned status and Review risk category waterbodies, requiring field visits.
[2]IA7: Catchment (stream) walk in rural areas for streams that are >1km in length
[3]IA1: Provision and further evaluation of existing information
[4]IA2: Point source desk-based assessment

6.2 Local Catchment Assessment

Start with unassigned waterbodies DEEL (NEWCASTLEWEST)_010 and DEEL (NEWCASTLEWEST)_020.
Previous work by Cork and Limerick County Council found most sections to be at 'Moderate' or 'Poor' Q values.

DEEL_010_01	SSIS and 3 water samples to assess the condition of the waterbody (currently unassigned). If the ecological condition is less than good –
DEEL_010_02	downstream of Dromina UWWTP – rapid assessment. Look for signs of organic or nutrient pollution
DEEL_010_04	upstream of Dromina UWWTP – rapid assessment.
DEEL_010_03	SSIS to rule in/out this section of the river, if less than good..assess three tributaries below
DEEL_010_05 DEEL_010_07	Draining agricultural land (pasture)..if DEEL_010_07 is not good continue to DEEL_010_08 and DEEL_010_09 upstream
DEEL_010_06	downstream of forestry – rapid assessment. Any evidence of recent felling, debris, siltation or hydromorphological changes due to drainage
DEEL_010_09	previously 'Good' status Q value found here by Cork Co Co.
DEEL_020_01	just upstream of Kilbeg Bridge–this is the outlet of DEEL (NEWCASTLEWEST)_020. SSIS and 3 water samples to assess the condition of the waterbody (currently unassigned).
DEEL_020_02 DEEL_020_03	If the condition of Deel_020_010 is less than good, narrow the focus by carrying out rapid assessments of these tributaries. The only land use in DEEL (NEWCASTLEWEST)_020 is agriculture (along with domestic houses), so this might be a good waterbody to isolate agriculture issues common to the whole area for action.
DEEL_020_04	Limited access to the tributaries in Deel NEWCASTLEWEST 20 – this point is upstream on one of them.
Br. In Milford	rapid assessment EPA monitoring point
DEEL_030_01	at Kilbeg bridge 2km upstream of the monitoring point in Milford
DEEL_030_02	at Kilbeg bridge upstream of confluence between DEEL (NEWCASTLEWEST) 020 and DEEL (NEWCASTLEWEST) 030. Also d/s of quarry.
DEEL_030_03	Mullaheera Br. u/s of quarry. Good status (Q value) previously found.
DEEL_030_04	Mainly agriculture (pasture, farmyards). Good status (Q value) previously found.
DEEL_030_05	Some forestry and agriculture (pasture, farmyards)
DEEL_030_06	d/s of Tullylease WWTP
DEEL_030_07	u/s of Tullylease WWTP
DEEL_030_08	headwater draining agriculture (pasture)
3.2 km d/s Br. In Milford	rapid assessment EPA monitoring point. Check for calcification of substrate

DEEL_040_01 DEEL_040_02 DEEL_040_03	Moving upstream from the EPA monitoring point assess 'good' Q values previously found here (not clear which tributary). Low PIP in this waterbody.
DEEL_040_04	Check condition of this tributary. u/s monitoring point for Milford UWWTP
DEEL_040_05	Just d/s of primary and storm flow discharge point of Milford UWWTP. Previously Q 3-4 (Moderate)
DEEL_040_06 DEEL_040_07	On tributary along housing development. What is contribution to main channel?
DEEL_040_08	Upstream of housing in Milford.
Broken Bridge	assessment at EPA monitoring point
DEEL_050_01 DEEL_050_02 DEEL_050_03	u/s of the EPA monitoring point – these are the three main tributaries. Access might be restricted- have to cross farms. Note – it looks like the confluence of one of the tribs (DEEL_050_01) has been redirected to join the central channel sooner.
DEEL_050_04 DEEL_050_05 DEEL_050_06 DEEL_050_07 Br. W of Mundelihy	bridge hops fanning out from point 01 to 03 above. The EPA monitoring point at bridge west of Mundelihy is the sampling point for the Ahavarraga stream (Poor). Nearly all these sampling points were at Q3-4 (moderate) or Q3 (poor) previously. DEEL_050_04 is d/s of UWWTP in Feenagh.
DEEL_050_08	Drains a lower PIP area.
DEEL_050_09 DEEL_050_10	are upstream of the UWWTP in Feenagh
Finglasha_010_01 Finglasha_010_02	Inflow stream to Deel (NEWCASTLEWEST) 050. Limerick Co Co sampling indicates mostly poor Q values (Q3)
DEEL_050_12	Inflow trib to main channel
DEEL_050_11	Just d/s of a large cattle access point
Bridge near Balliniska	assessment EPA monitoring point. Check for excessive sedimentation of riverbed
DEEL_060_01 DEEL_060_02	bridge hops along main channel and tributaries. DEEL_060_01 requires accessing farmland
DEEL_060_03 DEEL_060_04	d/s of village of Feohanagh
DEEL_060_05 DEEL_060_06 DEEL_060_07 DEEL_060_08 DEEL_060_09	Points DEEL_060_05 and DEEL_060_07 have been found to be in poor (Q3) condition by Limerick Co Co. While the main channel was 'moderate' Q3-4 in places.


Legend
Deel Bridge Hops
UWW_PlantLocations_20122018
Primary Discharge Point
Storm Water Overflow
WFDA5_Quarries
Extractive Industries -Quarries
Coillte Forest Deel
Private Forest Deel SC
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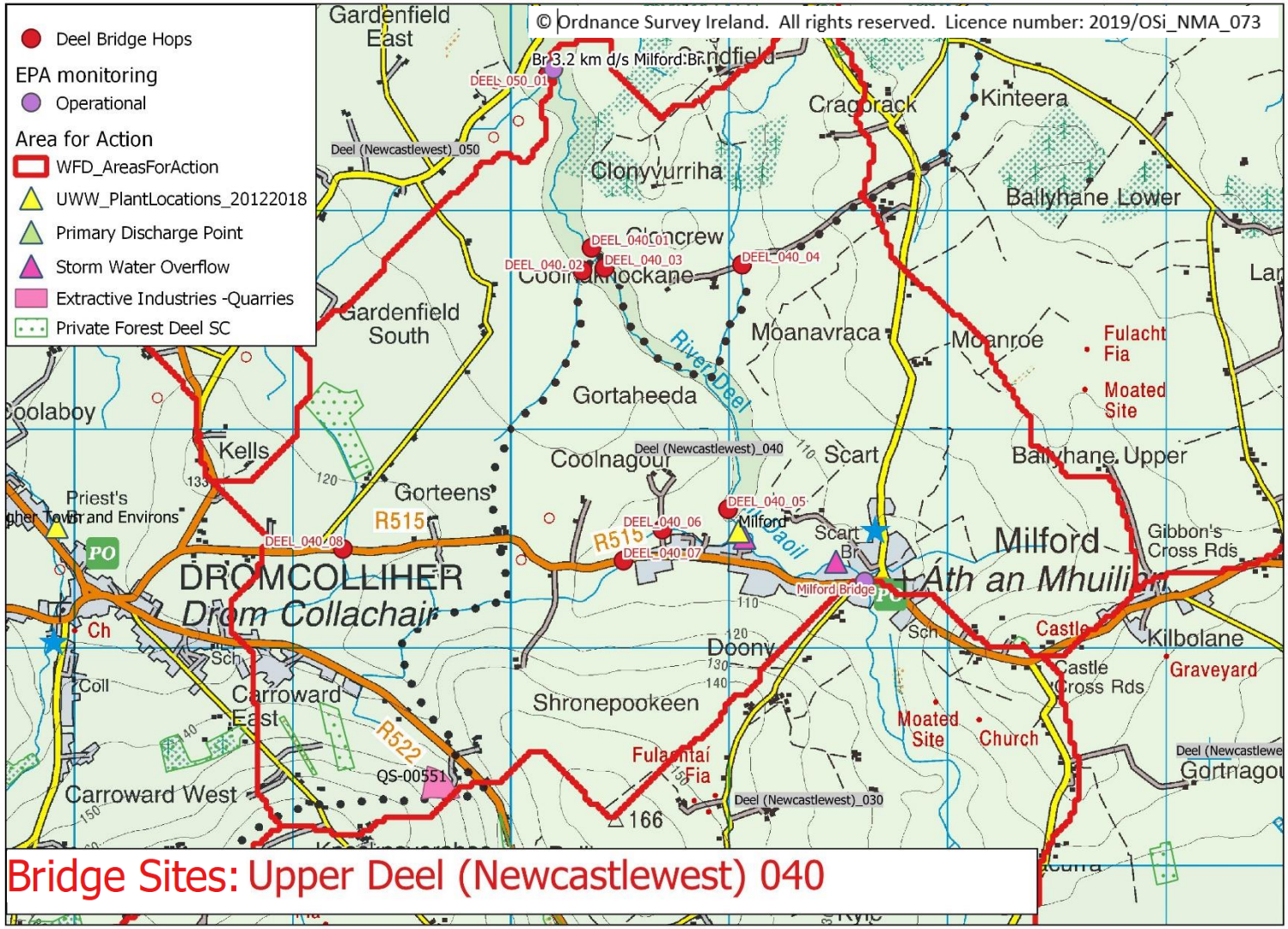
Bridge Sites: Upper Deel (Cork)


Deel Bridge Hops
EPA monitoring
Operational
Area for Action
WFD_AreasForAction
UWW_PlantLocations_20122018
Primary Discharge Point
Storm Water Overflow
Extractive Industries -Quarries
Private Forest Deel SC
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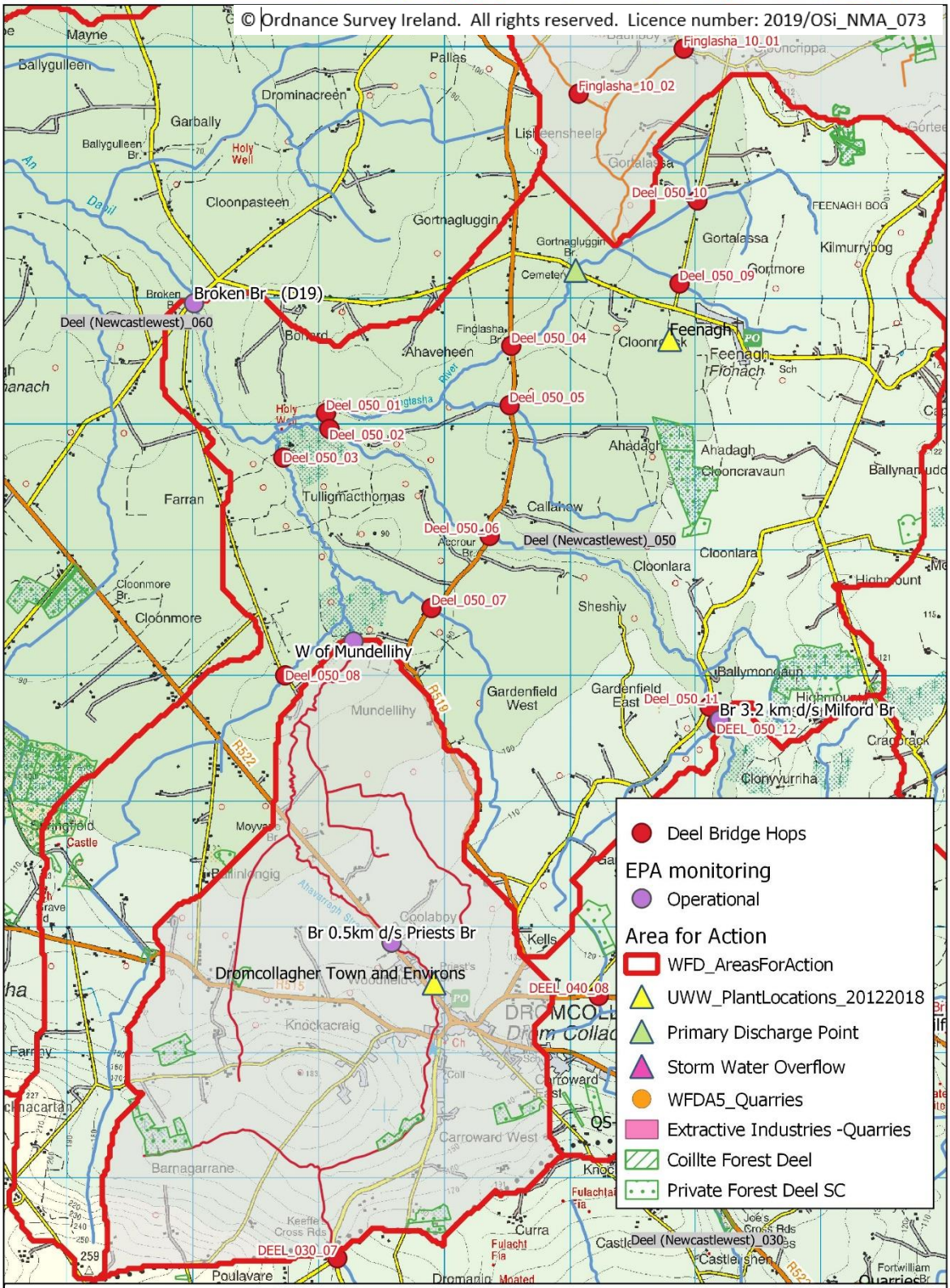
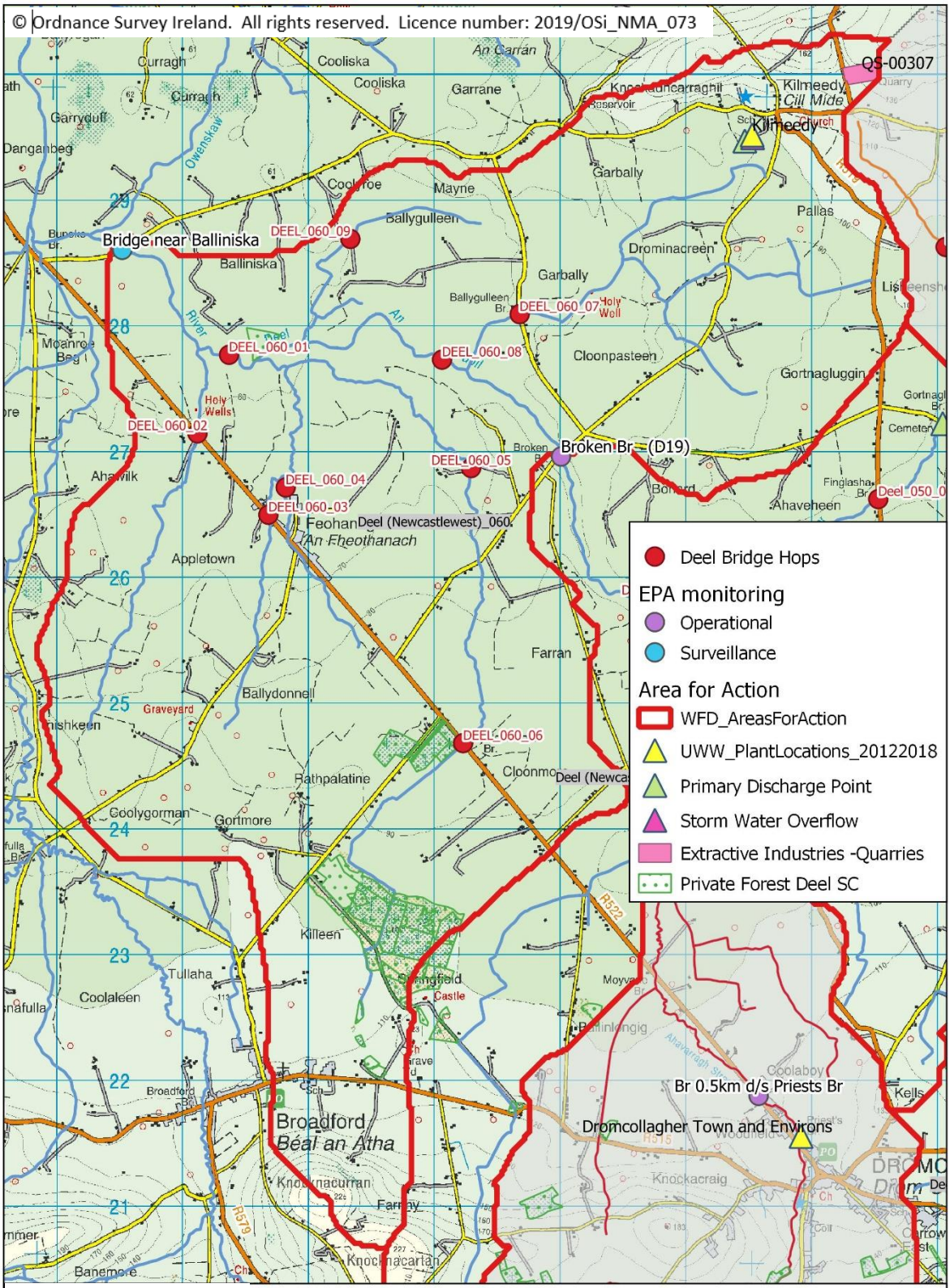
Br 3.2 km d/s Milford Br
DEEL_050_01
Deel (Newcastlewest)_050
Clonyvurriha
Craggrack
Kinteera
Ballyhane Lower
DEEL_040_01
DEEL_040_02
DEEL_040_03
DEEL_040_04
Gardenfield South
Moanavraca
Moanroe
Fulacht Fia
Moated Site
River Deel
Gortaheeda
Coolaboy
Kells
Coolnagour
Deel (Newcastlewest)_040
Scart
Ballyhane Upper
Priest's
Gorteens
R515
DEEL_040_05
DEEL_040_06
DEEL_040_07
DEEL_040_08
Milford
Scart Br
Milford
Gibbon's Cross Rds
DROMCOLLIHER
Drom Collachair
Milford Bridge
Áth an Mhuilinn
Castle
Kilbolane
Graveyard
Castle Cross Rds
Doony
Shronepookeen
Moated Site
Church
Coll
Carroward East
R522
QS-00551
Fulachtaí Fia
Carroward West
Deel (Newcastlewest)_030
166
Bridge Sites: Upper Deel (Newcastlewest) 040



Bridge Sites: Upper Deel (Newcastlewest) 050



Bridge Sites: Upper Deel (Newcastlewest) 060

7 Review of possible mitigation options

Measures are needed to address the sources of nutrients and sediment to the river. The focus of the Local Catchment Assessment will be identifying the significant sources of these. Mitigation options are likely to centre on the main pressures in the catchment: dairy farming and OPW drainage as well as point sources from UWWTP. At the farm scale possible mitigation measures might involve nutrient management plans, farmyard management and land management. In terms of the OPW drainage works, best practice guidelines should be followed.

8 Communications

Community information meeting held on the 22nd January 2019 in the community centre, Dromina in County Cork and on the 24th January 2019 in Feenagh Community Hall, Feenagh, County Limerick. Number of attendees excluding LAWPRO and ASSAP representatives: 35

Date of completion of the desk study: 21 September 2018

Appendix A location of white clawed crayfish and plague outbreak 2017