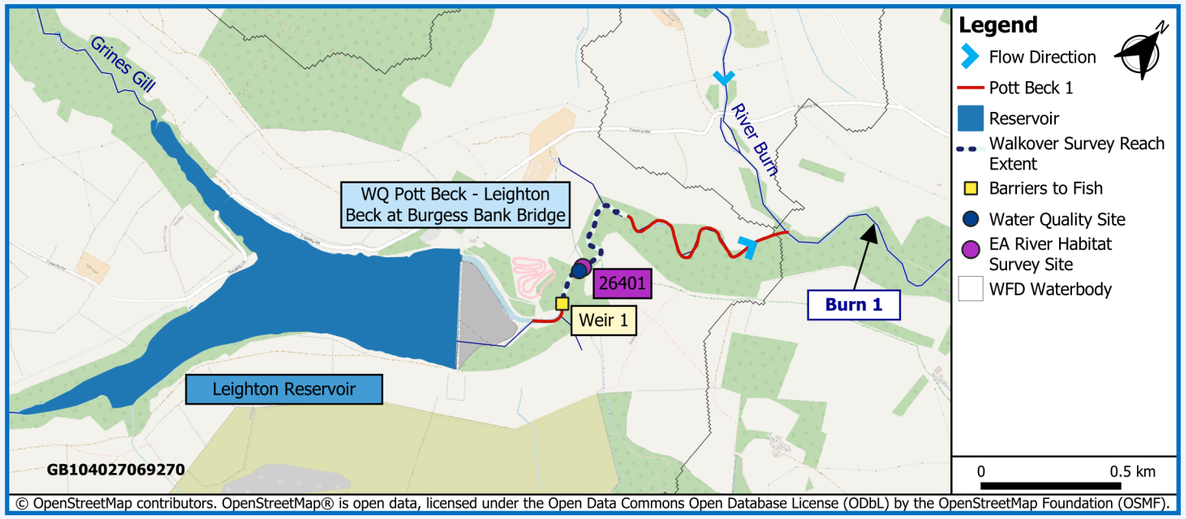
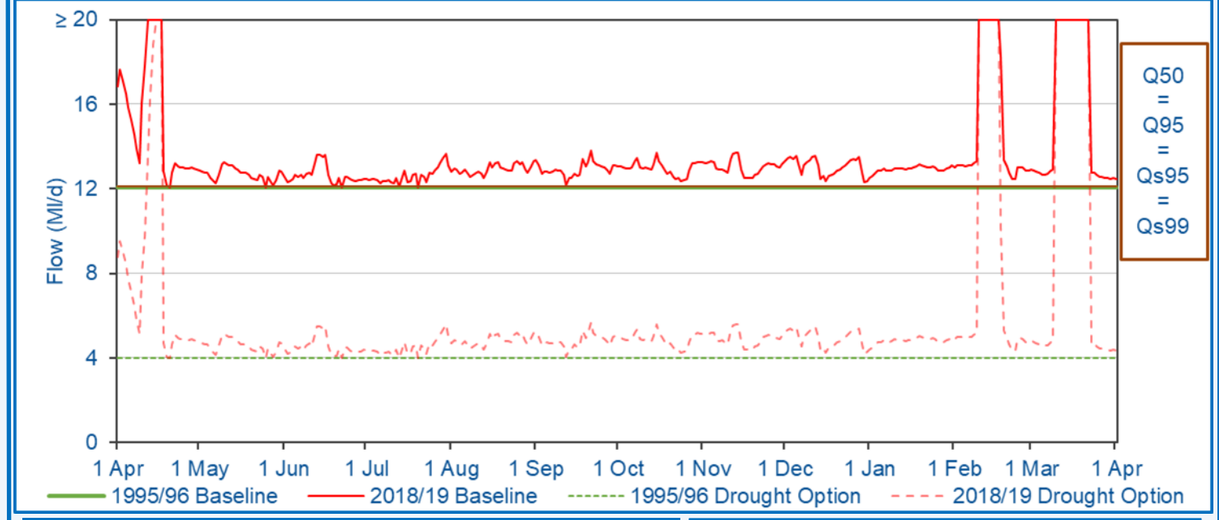
Reach Setting



River Flow Regime



Reach Setting Information:

The bedrock geology is comprised of the Millstone Grit Group (mudstone, sandstone, siltstone) and superficial geology is predominantly alluvium. Soil types along the reach are composed of slowly permeable, seasonally wet and slightly acid loamy and clayey soils. Urbanisation is rare along this reach.

	Supplementary Information
Catchment Area at Assessment Point	23.4km^2
Mean Slope Gradient	0.88°
Length of Reach	1.7km
Additional Catchment Area	1.2km^2
Upstream Reach	N/A
Downstream Reach	River Burn 1

-	Reference Conditions (Ml/d)	Drought Option Conditions (Ml/d)	% Reduction	Impact
Q_s95	12.10	3.99	67	Summer Major
Q_s99	12.10	3.99	67	
Q95	12.10	3.99	67	Winter Major
Q50	12.10	3.99	67	

There are no significant flow additions/ reductions associated with this reach

River Habitats

River Water Quality

There are no significant water quality pressures associated with this reach

One water quality monitoring site is present in this reach: Leighton Beck at Burgess Bank Bridge (NE-49105205). The average pH between 2014-2024 was 7.7 with a maximum temperature of 17.7°C for the same period

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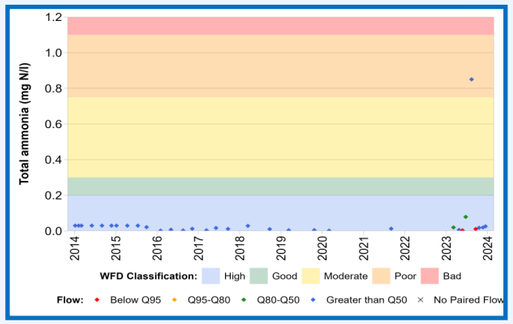
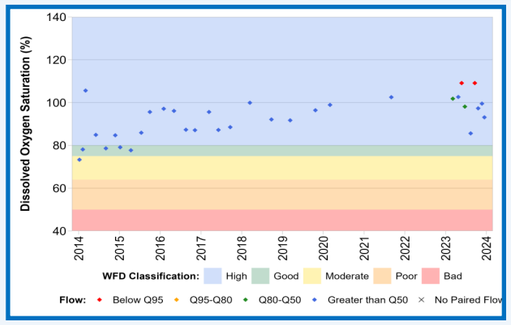
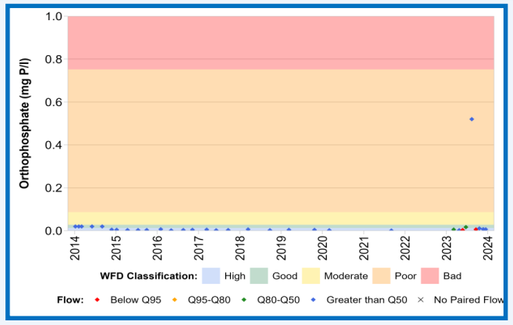
Figure A4.1

Pott Beck 1:

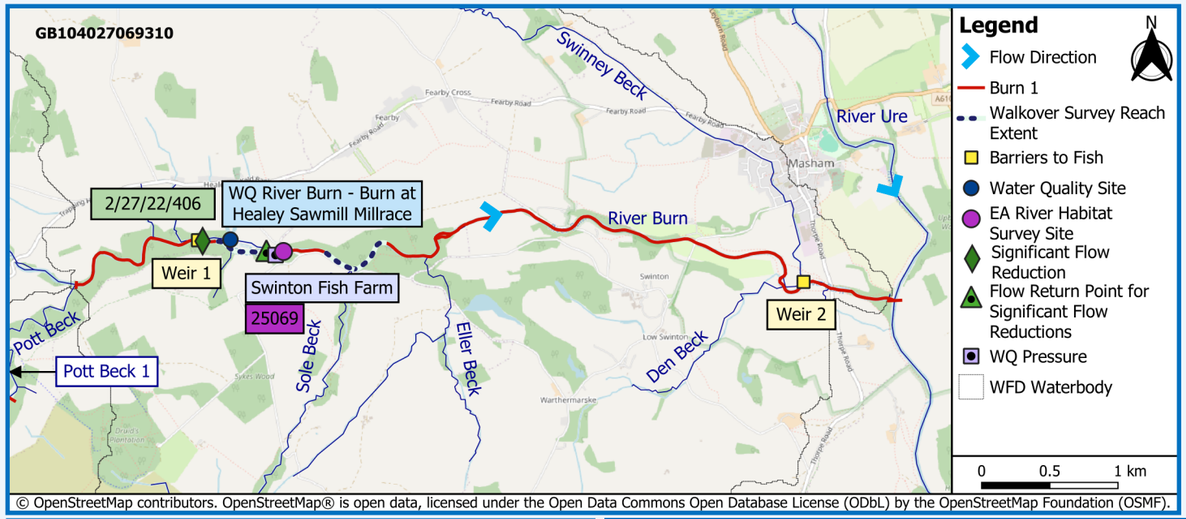
Physical Environment Information







Reach Setting

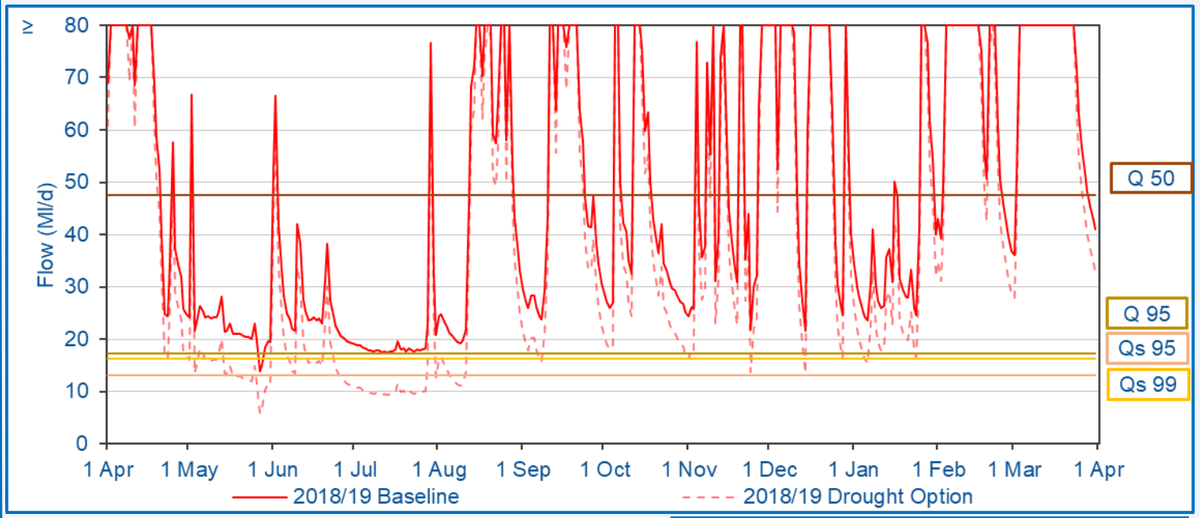


Reach Setting Information:

The bedrock geology is comprised of the Millstone Grit Group (mudstone, sandstone, siltstone) and superficial geology is predominantly alluvium with some river terrace deposits flanking the river towards the end of the reach at the confluence with the River Ure. Soil types along the reach are composed of slowly permeable, seasonally wet and slightly acid loamy and clayey soils in the upper to mid sections of the reach, with freely draining slightly acid to loamy soils in the mid to lower sections of the reach. There is rare urbanisation along the reach.

	Supplementary Information
Catchment Area at Assessment Point	60.6km^2
Mean Slope Gradient	0.53°
Length of Reach	7.3km
Additional Catchment Area	33.3km^2
Upstream Reach	Pott Beck 1
Downstream Reach	N/A

River Flow Regime



-	Reference Conditions (Ml/d)	Drought Plan Conditions (Ml/d)	% Reduction	Impact
Q_s95	16.32	8.21	50	Summer Major
Q_s99	13.16	5.05	62	
Q95	17.18	9.07	47	Winter Major
Q50	47.47	39.36	17	

Significant Flow Additions/Reductions	Flow Rate (Ml/d)	Abstraction/ Discharge
River Burn-Healy–	12.1	Abstraction

River Habitats

Dominant riparian tree cover

Abundant gentle earth banks

Dominant low energy flows

Occasional side bars

Dominant cobble substrate

Occasional mid-channel bars

Abundant exposed boulders

Riffle-pool sequence

Abundant channel shading

Good flow diversity

Occasional woody debris

Abundant vegetated shallow banks

Occasional poaching

Abundant unvegetated mid-channel bars

Occasional ponded flow between boulders

River Water Quality

Significant Water Quality Pressures	Permit Conditions
Swinton Trout Farm 3391	5mg/l DO 2mg/l BOD ATU 0.5mg/l Ammonia 5mg/l Suspended Solids 459m^3/h Flow

Three water quality monitoring sites are present in this reach. For this assessment the furthest upstream sites in the reach, Burn At Healey Sawmill Millrace -U/S T/F (NE-49100346), was used due to its position in the reach and it's data quality. The average pH between 2014-2024 was 7.61 with a maximum temperature of 15.2°C for the same period.

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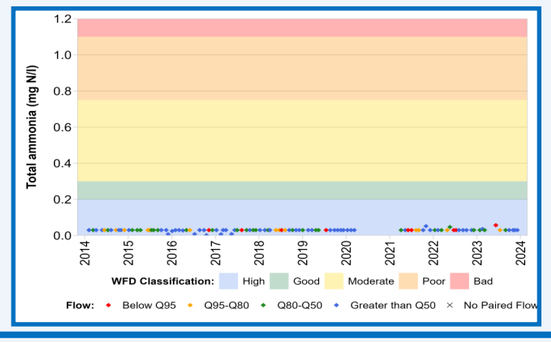
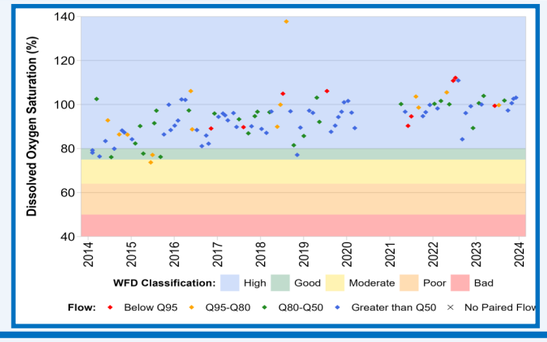
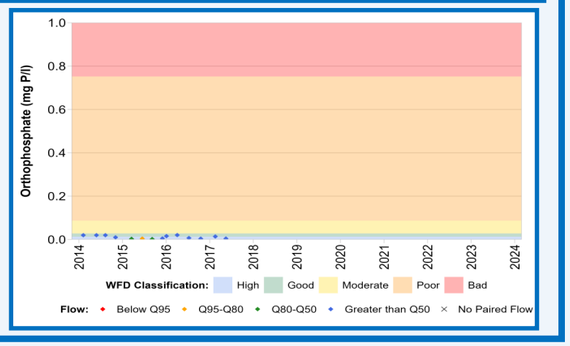
Figure A4.2

River Burn 1:

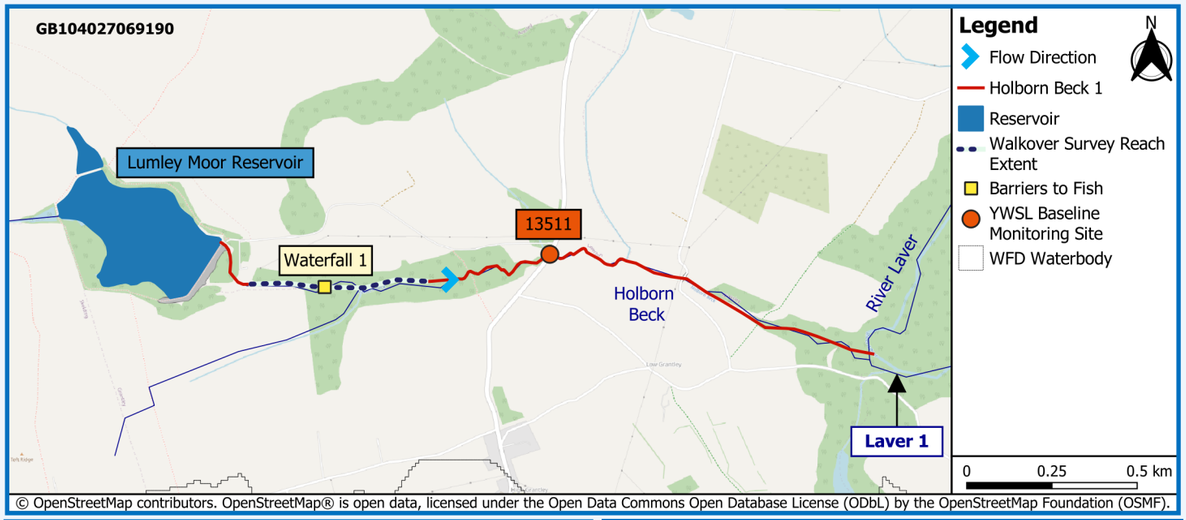
Physical Environment Information







Reach Setting

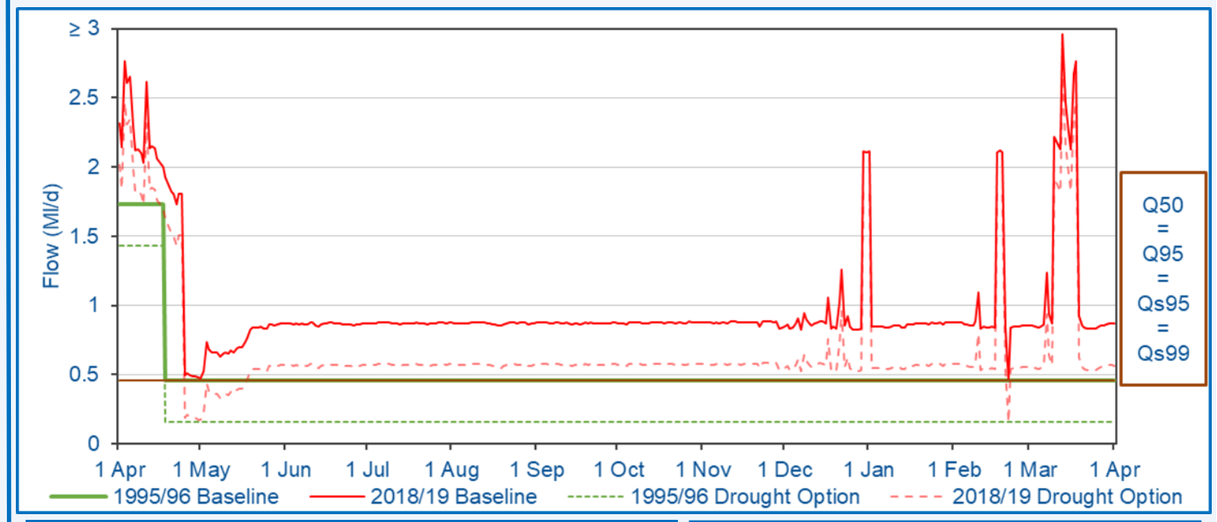


Reach Setting Information:

The bedrock geology of the catchment is predominantly the Millstone Grit Group (mudstone, siltstone, sandstone) and the superficial geology is predominantly glacial tills with peat in the higher areas of the catchment and some glaciofluvial sands to the south of the reservoir. Soil types along the reach are composed predominantly of slowly permeable, seasonally wet and slightly acid loamy and clayey soils. There is very limited urbanisation along this reach.

	Supplementary Information
Catchment Area at Assessment Point	2.4km^2
Mean Slope Gradient	1.56°
Length of Reach	2.2km
Additional Catchment Area	3.3km^2
Upstream Reach	N/A
Downstream Reach	River Laver 1

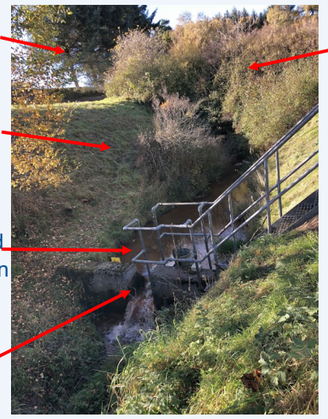
River Flow Regime



-	Reference Conditions (Ml/d)	Drought Option Conditions (Ml/d)	% Reduction	Impact
$Q_{s}95$	0.46	0.15	67	Summer Major
$Q_{s}99$	0.46	0.15	67	
Q95	0.46	0.15	67	Winter Major
Q50	0.46	0.15	67	

There are no significant flow additions/ reductions associated with this reach

River Habitats



Close to reservoir

Heavily modified section. Embanked.

Disconnected from floodplain

Flow gauge weir

Abundant dense shrub cover

Dominant woodland and shading

Downstream change in morphology

Abundant fine substrate

Range of flow types

Frequent woody debris

Occasional eroding and stable earth banks.

Deep v-shaped valley

Dominant woodland and shading

Abundant cobble substrate

Frequent exposed tree roots

River Water Quality

There are no significant water quality pressures associated with this reach

There are no water quality monitoring sites in this reach. As such, for this assessment the furthest upstream site in the downstream reach (River Laver 1), Laver At Galphay Mill Road Bridge, as this is considered representative of the conditions in Holborn Beck 1 due to the absence of any known water quality pressures between Lumley Moor Reservoir and this location. The average pH between 2014-2024 was 7.92 with a maximum temperature of 17.8°C for the same period.

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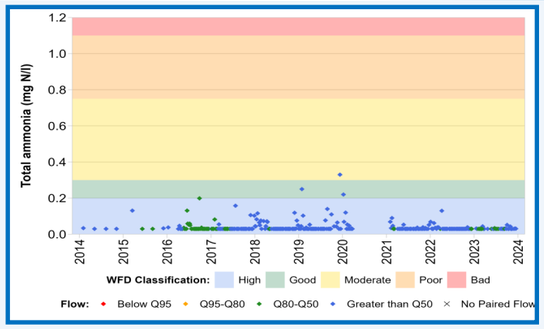
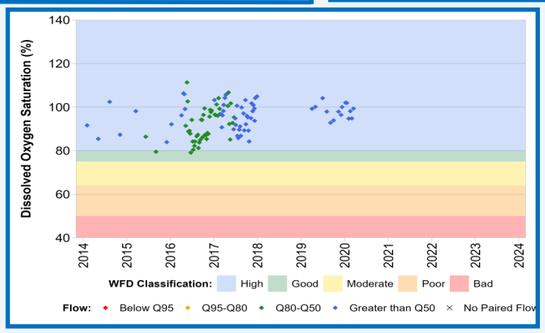
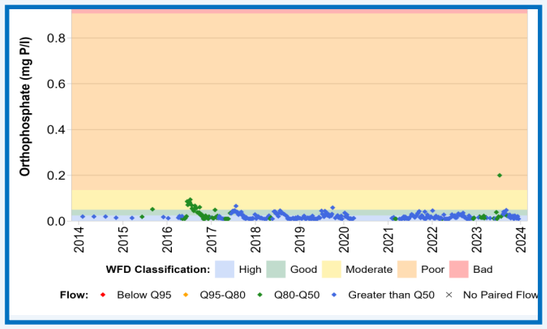
Figure A4.3

Holborn Beck 1:

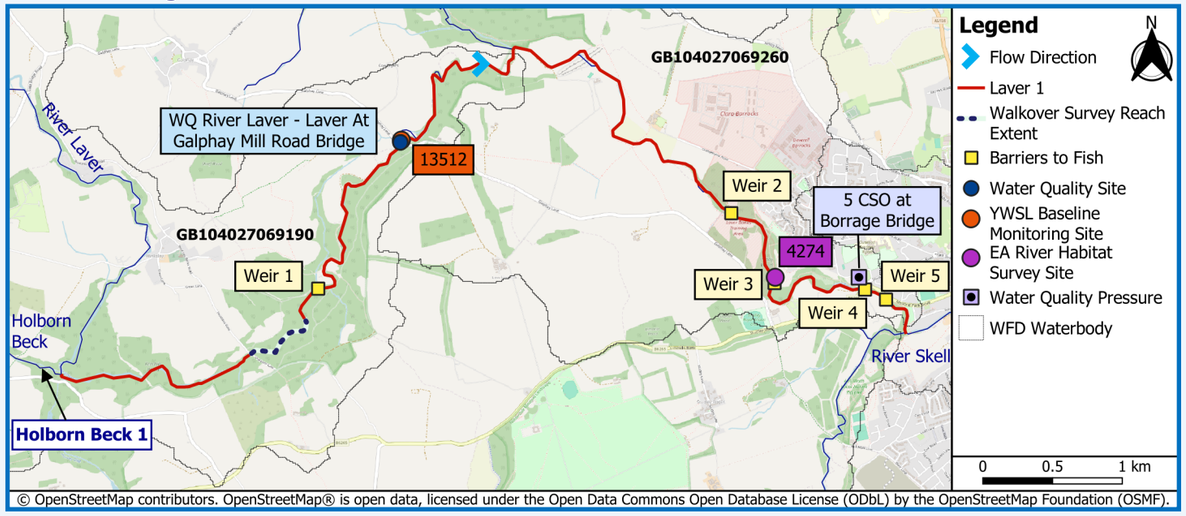
Physical Environment Information



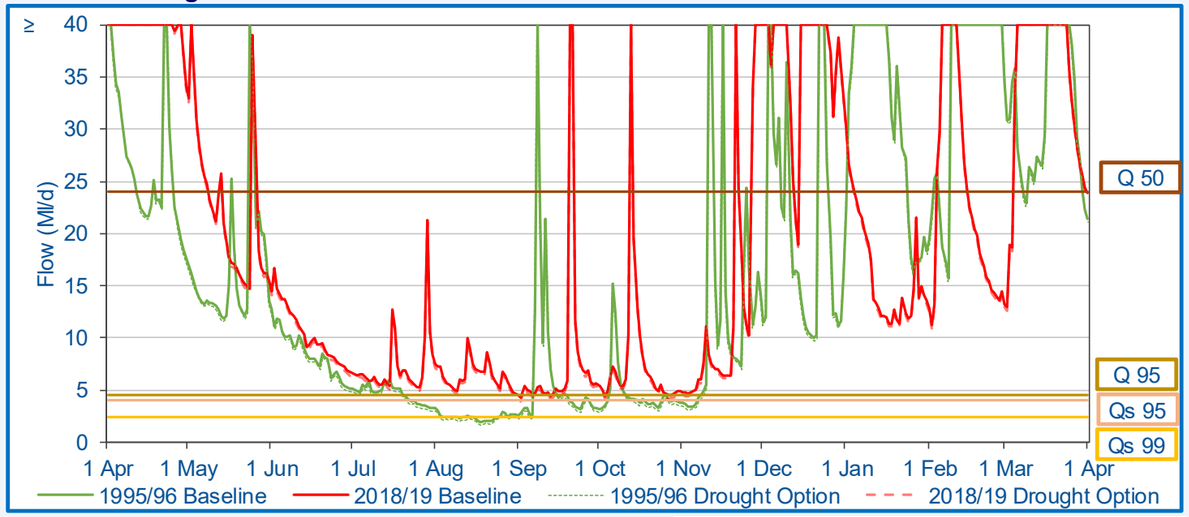




Reach Setting



River Flow Regime



Reach Setting Information:

The superficial geology is predominantly glacial till with alluvium along the channel path. There are scattered deposits of glaciofluvial sands and gravels and river terrace deposits along the entire reach, these becoming particularly extensive near to Ripon and the confluence with the River Skell. The upper half of the reach soils are slowly permeable, seasonally wet and slightly acid loamy and clayey soils in the mid sections of the reach. The lower half of the reach soils are slightly acid, loamy and clayey. Urbanisation is limited but increases in the last 2km of the reach where it passes through the southern boundary of Rippon.

	Supplementary Information
Catchment Area at Assessment Point	43.1km^2
Mean Slope Gradient	0.44°
Length of Reach	10.4km
Additional Catchment Area	35.5km^2
Upstream Reach	Holborn Beck 1
Downstream Reach	N/A

-	Reference Conditions (Ml/d)	Drought Option Conditions (Ml/d)	% Reduction	Impact
Q_s95	4.05	3.74	7.7	Summer Minor
Q_s99	2.38	2.07	13	
Q95	4.58	4.27	6.8	Winter Negligible
Q50	24.45	24.14	1.3	

There are no significant flow additions/ reductions associated with this reach

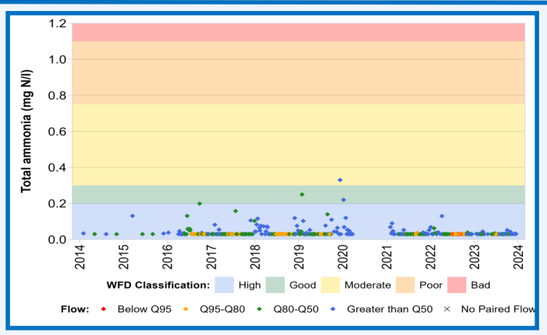
River Habitats

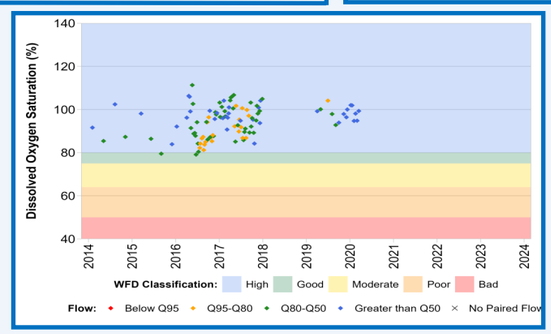
No walkover survey was carried out during the onset of drought in 2018 due to assessment of low hydrological impact in the reach.

River Water Quality

Significant Water Quality Pressures	Permit Conditions
5 CSO at Borrage Bridge 2749	Intermittent discharge

One water quality monitoring site is present in this reach: Laver At Galphay Mill Road Bridge (NE-49105108). The average pH between 2014-2024 was 7.92 with a maximum temperature of 17.8°C for the same period.





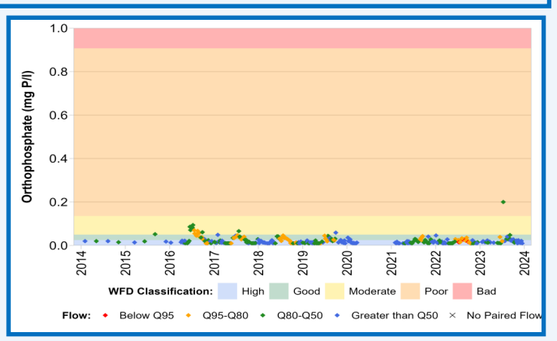
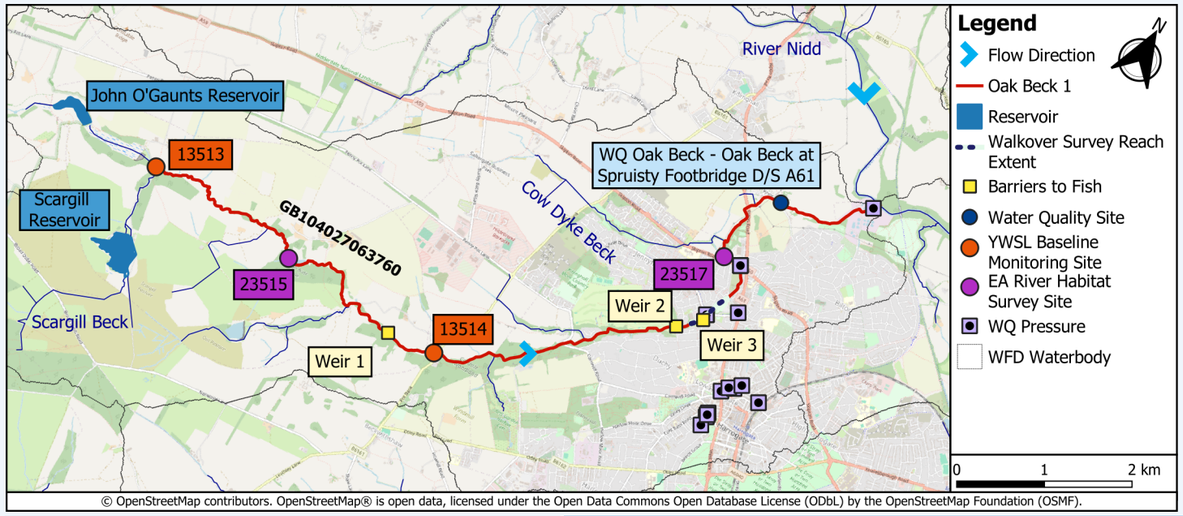


Figure A4.4

River Laver 1:

Physical Environment Information

Reach Setting

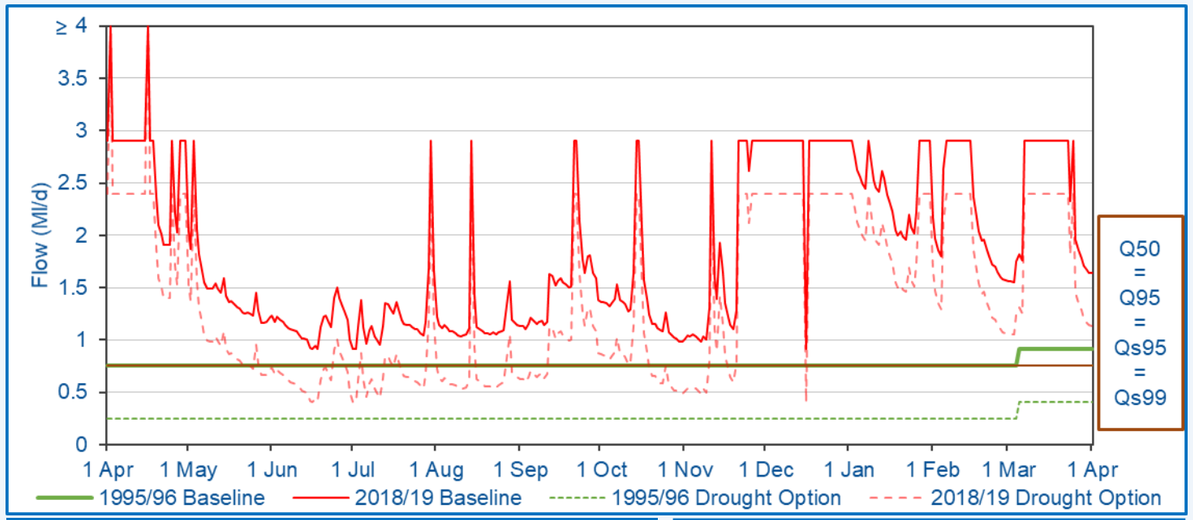


Reach Setting Information:

The bedrock geology is dominated by Millstone Grit (sandstone, siltstone and mudstone) whilst the superficial geology is dominated by glacial till. The soils are composed of a mixture of slowly permeable wet, very acid upland soils and slowly permeable, seasonally wet slightly acid loamy and clayey soils. There is significant urbanisation in the last 4km of the reach as it passes through Harrogate and Knox.

	Supplementary Information
Catchment Area at Assessment Point	7.7km^2
Mean Slope Gradient	0.50°
Length of Reach	11.8km
Additional Catchment Area	29.2km^2
Upstream Reach	N/A
Downstream Reach	N/A

River Flow Regime



-	Reference Conditions (Ml/d)	Drought Option Conditions (Ml/d)	% Reduction	Impact
Q_s95	0.75	0.25	67	Summer Major
Q_s99	0.75	0.25	67	
Q95	0.75	0.25	67	Winter Major
Q50	0.75	0.25	67	

There are no significant flow additions/ reductions associated with this reach

River Habitats

Dominant riparian trees

Dominant low energy flow types

Dominant channel shading

Frequent vertical earth banks

Bridge. Abundant anthropogenic features and barriers along reach

Abundant reinforced banks

Occasional exposed tree roots

Occasional coarse marginal sediment

Rare bars

Abundant urbanisation on the left bank

Abundant low energy flow types and occasional high energy types

Abundant coarse bed substrate

River Water Quality

Significant Water Quality Pressures	Permit Conditions
There are 22 CSOs that could be considered intermittent water quality pressures in this reach, each with descriptive consents.	Intermittent discharges

One water quality monitoring site is present in this reach: Oak Beck @ Spruisty Footbridge D/S A61 (NE-49800075). The average pH between 2014-2024 was 8.46 with a maximum temperature of 17.0°C for the same period.

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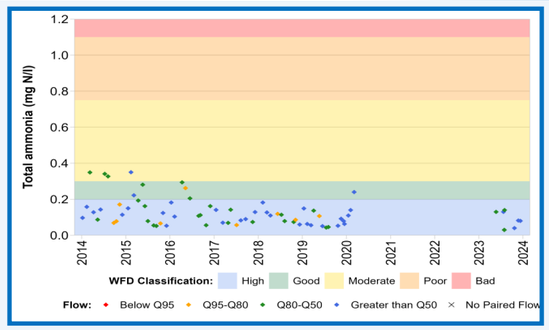
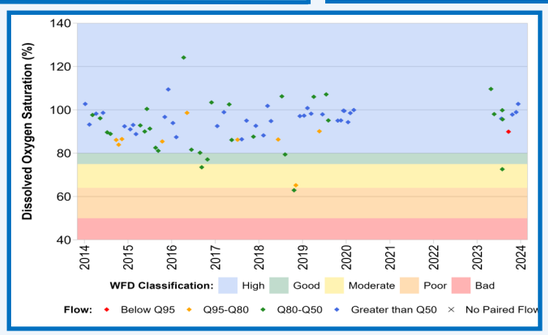
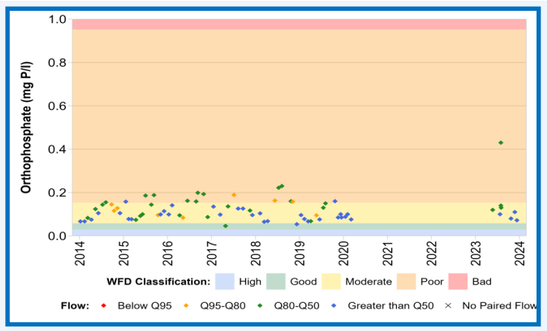
Figure A4.5

Oak Beck 1:

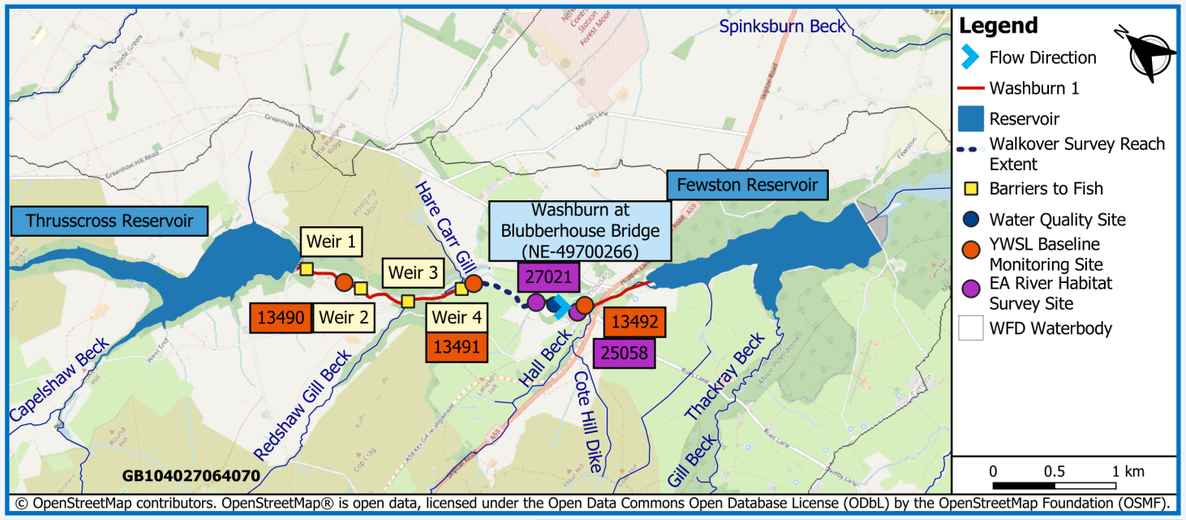
Physical Environment Information



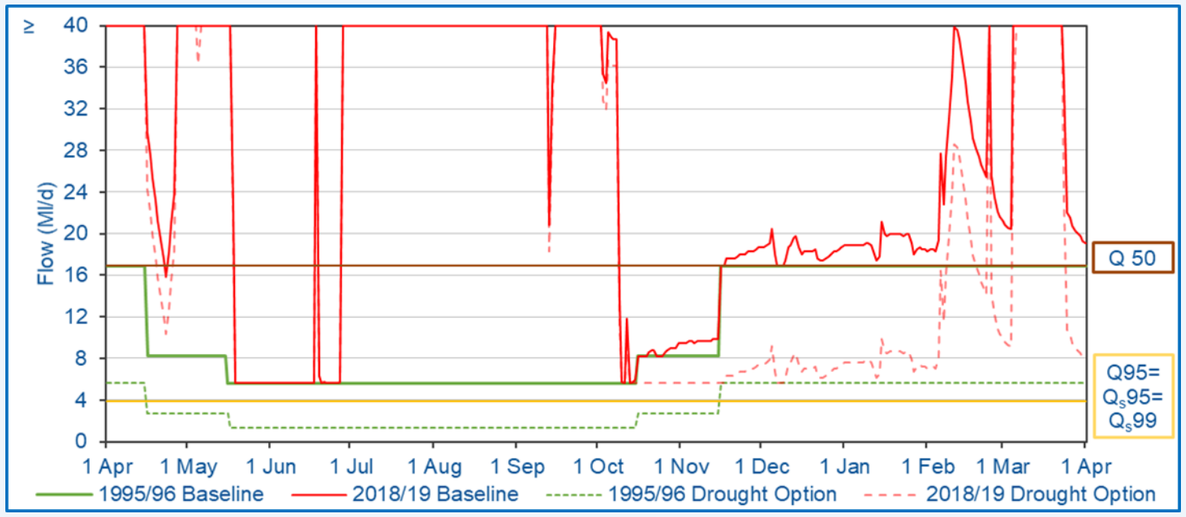




Reach Setting



River Flow Regime



Reach Setting Information:

The bedrock geology of the catchment is dominated by the Millstone Grit Group comprised of sandstone, mudstone and siltstone. The superficial geology of the catchment is predominantly peat and glacial till. Soil within the upstream part of the reach is dominated by freely draining slightly acid loamy soil, downstream the soil is dominated by slowly permeably seasonally wet slightly acid but base rich loamy and clayey soils. There is rare urbanisation on this reach.

	Supplementary Information
Catchment Area at Assessment Point	28.7km^2
Mean Slope Gradient	0.89°
Length of Reach	2.9km
Additional Catchment Area	11.0km^2
Upstream Reach	N/A
Downstream Reach	N/A

-	Reference Conditions (Ml/d)	Drought Plan Conditions (Ml/d)	% Reduction	Impact
Q_s95	3.90	1.29	67	Summer Major
Q_s99	3.90	1.29	67	
Q95	3.90	1.29	67	Winter Major
Q50	16.90	5.58	67	

There are no significant flow additions/ reductions associated with this reach

River Habitats

No walkover survey was carried out during the onset of drought in 2018.

River Water Quality

There are no significant water quality pressures associated with this reach

Two water quality monitoring sites are present in this reach. As such, the site with the longest data set has been utilised for this assessment: Washburn at Blubberhouse Bridge (NE-49700266). At this site the average pH between 2014-2024 was 7.66 with a maximum temperature of 12.2°C for the same period.

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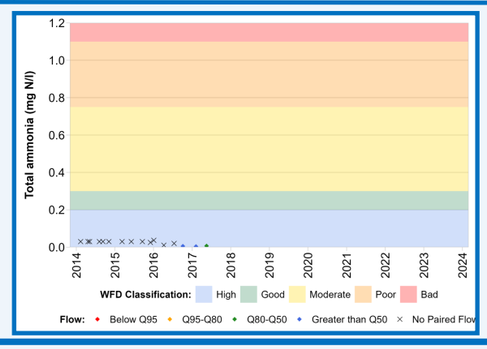
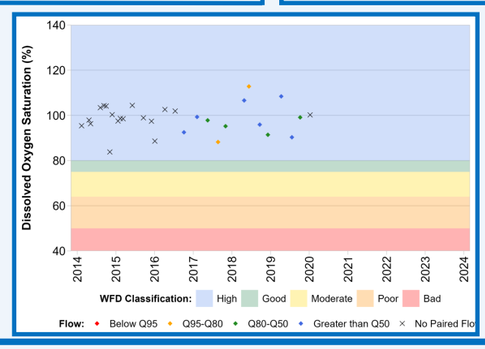
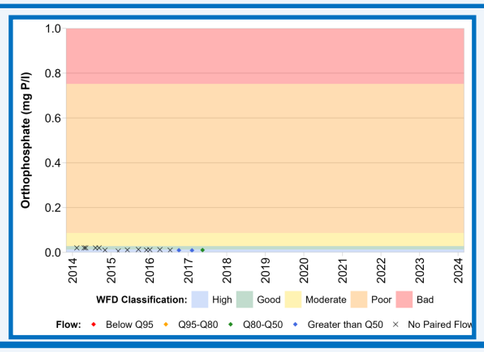
Figure A4.6

River Washburn 1:

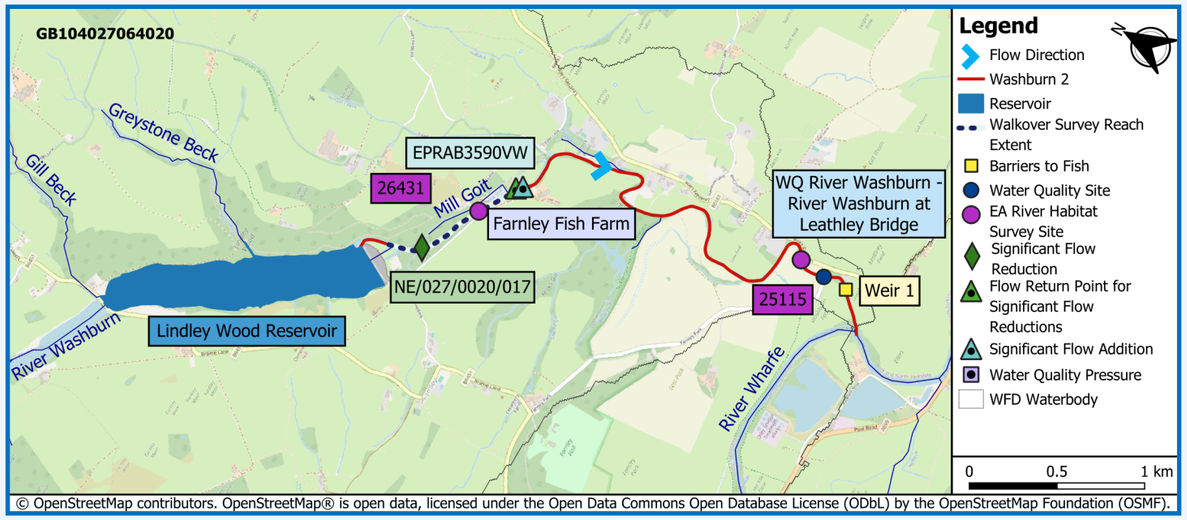
Physical Environment Information







Reach Setting

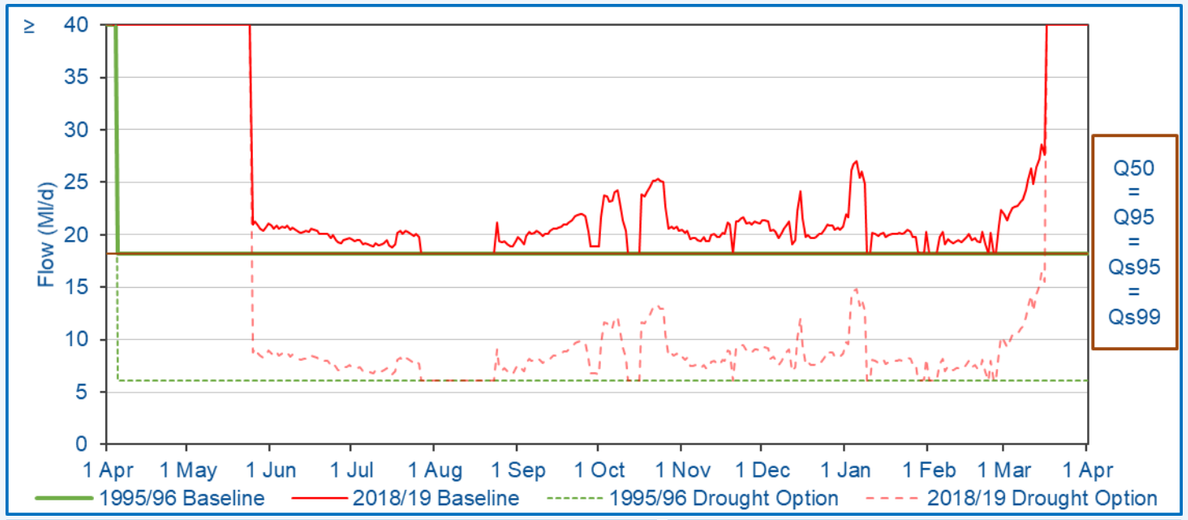


Reach Setting Information:

The bedrock geology is dominated by the Millstone Grit Group comprised of sandstone, mudstone and siltstone. The superficial geology of the reach is predominantly alluvium surrounded by glacial till. In the upper reach freely draining, slightly acid loamy soils are present, changing to slowly permeable, seasonally wet loamy and clayey soils and finally to freely draining floodplain soils. Urbanisation is very limited along the reach, with only small villages of Leathley and Fishpool on the left bank of the reach.

	Supplementary Information
Catchment Area at Assessment Point	87.8km^2
Mean Slope Gradient	0.45°
Length of Reach	4.3km
Additional Catchment Area	5.9km^2
Upstream Reach	N/A
Downstream Reach	N/A

River Flow Regime



-	Reference Conditions (Ml/d)	Drought Option Conditions (Ml/d)	% Reduction	Impact
$Q_{s}95$	18.19	6.00	67	Summer Major
$Q_{s}99$	18.19	6.00	67	
Q95	18.19	6.00	67	Winter Major
Q50	18.19	6.00	67	

Significant Flow Additions/Reductions	Flow Rate (Ml/d)	Abstraction/ Discharge
Mill Goit at Farnley Hall Estate NE/027/0020/017	18.18	Abstraction
Farnley Fish Farm EPRAB3590VW	18	Discharge

River Habitats

Abundant riparian tree cover

Abundant coarse substrate banks

Abundant low energy flow

Dominant channel shading

Dominant coarse substrate

Occasional protruding boulders

Rare finer substrate

Abundant channel shading

Occasional woody debris

Occasional flow variability around substrate

Abundant vegetated banks

Occasional anthropogenic features

Abundant vegetated protruding boulders

Occasional ponded flow between boulders

River Water Quality

Significant Water Quality Pressures	Permit Conditions
Farnley Fish Farm EPRAB3590VW	3mg/l BOD ATU 0.4mg/l Ammonia 5mg/l Suspended Solids 18Ml/d Flow

The most downstream of the two water quality monitoring sites present in this reach has been used to characterise the water quality in this reach: River Washburn at Leathley Bridge. (NE-49700150). The average pH between 2014-2024 was 8.44 with a maximum temperature of 18.5°C for the same period.

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Figure A4.7

River Washburn 2:

Physical Environment Information