Annexe 12 – Springhead Weir, DP2022-22714058 & DP2022-22714009

A. Summary of the proposal

Yorkshire Water Services Limited (YW) is applying for drought powers under the Water Resources Act 1991 (as amended by Environment Act 1995) to replace the conditions on licences 2/27/14/058 (Ponden) and 2/27/14/009 (Lower Laithe).

Licence 2/27/14/058 permits abstraction of water from Ponden Reservoir and requires a compensation release to the River Worth. Licence 2/27/14/009 permits abstraction from Lowe Laithe Reservoir and requires a compensation release to the Sladen Beck. Under both abstraction licences, YW must ensure that flow is maintained at Springhead Weir, which is located downstream of the confluence of the River Worth and Sladen Beck (see below for quantities).

The proposed reduced compensation releases to the River Worth (under licence 2/27/14/058 at Ponden Reservoir) and the Sladen Beck (under licence 2/27/14/009 at Lower Laithe Reservoir) will conserve water levels within the two reservoirs to maintain public water supply during winter 2022–23 and increase the chance of returning to normal reservoir levels by April 2023.

The drought permit has been requested until 31st March 2023.

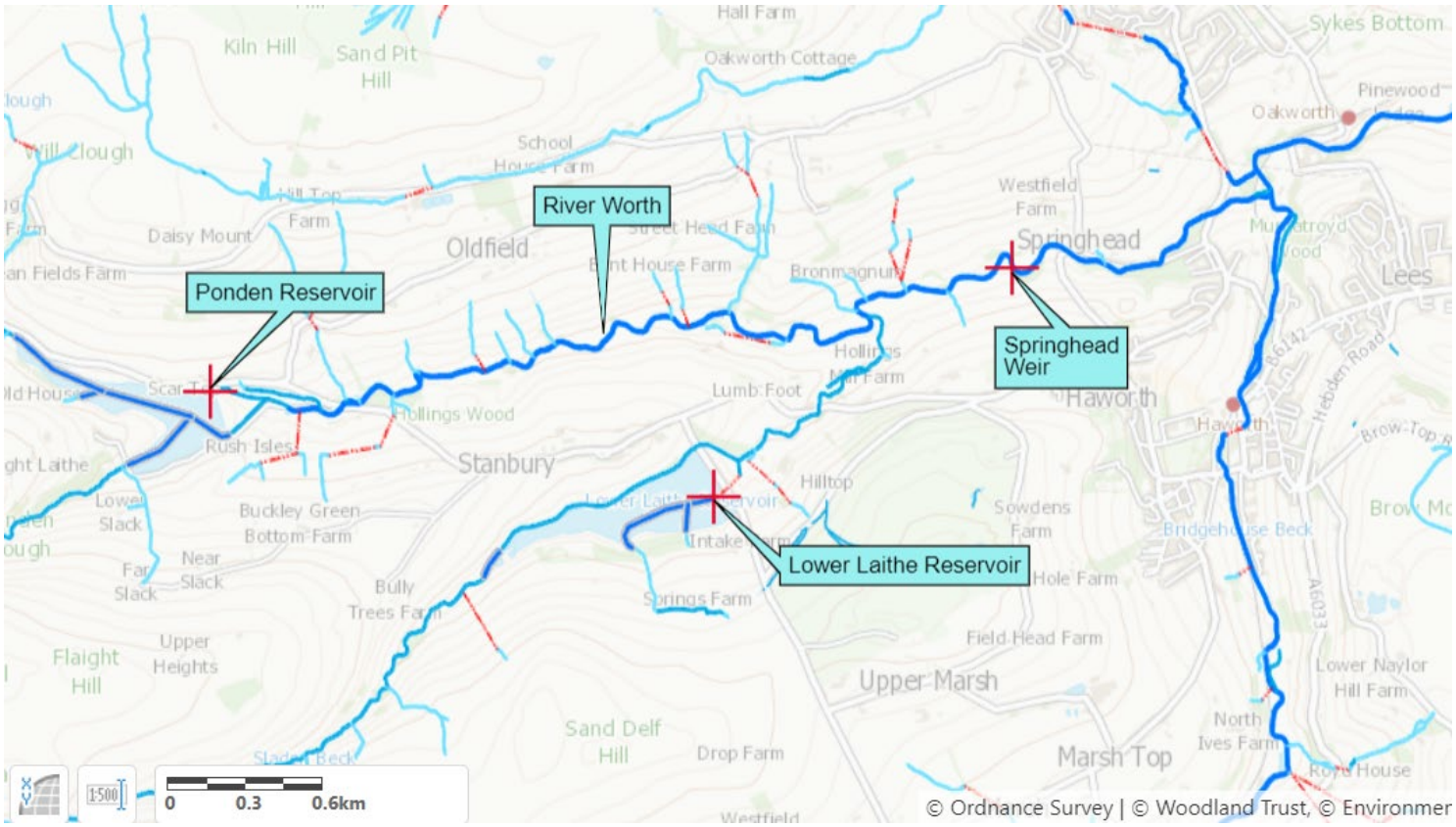

Figure 1: Ponden and Lower Laithe Reservoirs and Springhead Weir

B. Details of proposal

Abstraction details	Existing licence 2/27/14/058 (Ponden)	Existing licence 2/27/14/009 (Lower Laithe)	Drought permit application changes
Location of abstraction	Ponden Reservoir, Keighley, West Yorkshire	Lower Laithe Reservoir, Keighley, West Yorkshire	No changes
Point of abstraction	SD 99475 37268	SE 01438 36857	No changes
Purpose of abstraction	Public water supply	Public water supply	No changes
Period of abstraction	All year	All year	No changes
Quantities and rates	1,000 m^3/hour 24,000 m^3/day 6,951, 230 m^3/year	1,000 m^3/hour 24,000 m^3/day 6,951, 230 m^3/year	No changes
Aggregate conditions	Aggregate quantity under this licence and licences 2/27/14/009 (Lower Laithe), 2/27/14/010 and 2/27/15/041 shall not exceed: 1,000 m^3/hour 24,000 m^3/day 6,951, 230 m^3/year	Aggregate quantity under this licence and licences 2/27/14/010, 2/27/14/058 (Ponden) and 2/27/15/041 shall not exceed: 1,000 m^3/hour 24,000 m^3/day 6,951, 230 m^3/year	No changes
Means of abstraction	Gravity feed pipe	Gravity feed pipe	No changes
Measurement of abstraction	Meter – daily readings	Meter – daily readings	No changes
Further conditions	See below for details.	See below for details.	Proposed reduced compensation release – see below for details.

Existing further conditions

Licence 2/27/14/058 (Ponden Reservoir):

9. FURTHER CONDITIONS

9.1 The Licence Holder shall make a continuous release of compensation water of not less than 0.5 megalitres from Ponden Reservoir to the River Worth at National Grid Reference SD 99550 37278. This flow shall be known as the Compensation Flow.

9.2 (a) Subject to condition 9.2(b), the Licence Holder shall maintain a flow of no less than 6 megalitres per day at Springhead Weir at National Grid Reference SE 02608 37753, marked 'Springhead Weir' on the map. This shall be known as the Maintained Flow.

9.2 (b) On each day that the combined Compensation Flow required to be released from licence serial numbers NE/027/0014/010 and NE/027/0014/011 (under conditions 4.1-4.3 and 4.1-4.2 respectively) decreases from no less than 8 megalitres per day no less than 6 megalitres per day, the Maintained Flow at Springhead Weir shall increase to no less than 8 megalitres per day.

9.3 The Licence Holder shall use appropriate measuring devices to measure the rate of flow the River Worth at National Grid References SD 99550 37278 and SE 02608 37753.

9.4 The Licence Holder shall maintain the flow measuring devices in such a condition, and if necessary replace them, so as to ensure that accurate measurements of flows are recorded at all times.

FURTHER CONDITIONS (continued)

9.5 The Licence Holder shall use the measuring devices specified in condition 9.3 to record the flow at the same time each day during the whole of the period during which abstraction is authorised or as otherwise approved in writing by the Agency.

9.6 The Licence Holder shall keep each record required by condition 9.5 and make them available during all reasonable hours for inspection by the Agency for at least 6 years.

9.7 No abstraction shall take place unless the volume of water in the Ponden Reservoir as measured at SD 99485 37267 is equal to or greater than 159,110 cubic metres.

9.8 Abstraction shall not exceed 3,410 cubic metres per day when the volume of water in the Ponden Reservoir as measured at SD 99485 37267 is equal to or less than 845,556 cubic metres.

9.9 No abstraction shall take place when the flow in the River Worth at SD 99550 37278 is equal to or less than 545.5 cubic metres per day (0.5455 megalitres per day).

Licence 2/27/14/009 (Lower Laithe Reservoir):

9. FURTHER CONDITIONS

9.1 The Licence Holder shall make a continuous release of compensation water of not less than 0.2 megalitres from Lower Laithe Reservoir to Sladen Beck at National Grid Reference SE 01543 37003. This flow shall be known as the Compensation Flow.

9.2 (a) Subject to condition 9.2(b), the Licence Holder shall maintain a flow of no less than 6 megalitres per day at Springhead Weir at National Grid Reference SE 02608 37753, marked 'Springhead Weir' on the map. This shall be known as the Maintained Flow.

9.2 (b) On each day that the combined Compensation Flow from licence serial numbers NE/027/0014/010 and NE/027/0014/011 (under conditions 4.1-4.3 and 4.1-4.2 respectively) decreases from no less than 8 megalitres per day to no less than 6 megalitres per day, the Maintained Flow at Springhead Weir shall increase to no less than 8 megalitres per day.

9.3 The Licence Holder shall use appropriate measuring devices to measure the rate of flow in Sladen Beck at National Grid Reference SE 01543 37003 and the River Worth at National Grid Reference SE 02608 37753.

FURTHER CONDITIONS (continued)

9.4 The Licence Holder shall maintain the flow measuring devices in such a condition, and if necessary replace them, so as to ensure that accurate measurements of flows are recorded at all times.

9.5 The Licence Holder shall use the measuring devices specified in condition 9.3 to record the flow at the same time each day during the whole of the period during which abstraction is authorised or as otherwise approved in writing by the Agency.

9.6 The Licence Holder shall keep each record required by condition 9.5 and make them available during all reasonable hours for inspection by the Agency for at least 6 years.

Drought permit proposed changes

The proposed drought permits are to reduce the maintained flow at Springhead Weir, which is supported by compensation releases from the Ponden and Lower Laithe Reservoir licences.

A summary of the existing and proposed compensation releases is in the table below. Springhead has been highlighted yellow, however as the maintained flows are closely linked to the Leeming and Leeshaw control lines, these have also been included for reference.

	Business as Usual			**Option 1**			**Option 2**		
Compensation Site	Leeshaw above CL, Leeming above or below CL	Leeshaw below CL, Leeming above CL	Leeshaw & Leeming below CL	Leeshaw above CL, Leeming above or below CL	Leeshaw below CL, Leeming above CL	Leeshaw & Leeming below CL	Leeshaw above CL, Leeming above or below CL	Leeshaw below CL, Leeming above CL	Leeshaw & Leeming below CL
Leeming	4	5.25	3.25	2	2.63	1.63	1.33	1.75	1.08
Leeshaw	4	2.75	2.75	2	1.38	1.38	1.33	0.92	0.92
Springhead Weir	6	6	8	3	3	4	2	2	2.67
Ponden	Min 0.5			Min 0.5			Min 0.5		
Lower Laithe	Min 0.2			Min 0.2			Min 0.2		

Table 1: Summary of changes to maintained flow proposed under this drought permit

C. Quantities

There are no changes in abstraction quantities under both licences.

Please see section B above for details on proposed flow conditions at Springhead Weir.

D. WFD

This application is outside the Abstraction Licensing Strategy process. This is because it relies on drought powers to address exceptional circumstances. However, the proposal still needs to be Water Framework Directive (WFD) compliant. The proposal will be assessed against the WFD statuses, including identifying the risk of any temporary deterioration of status.

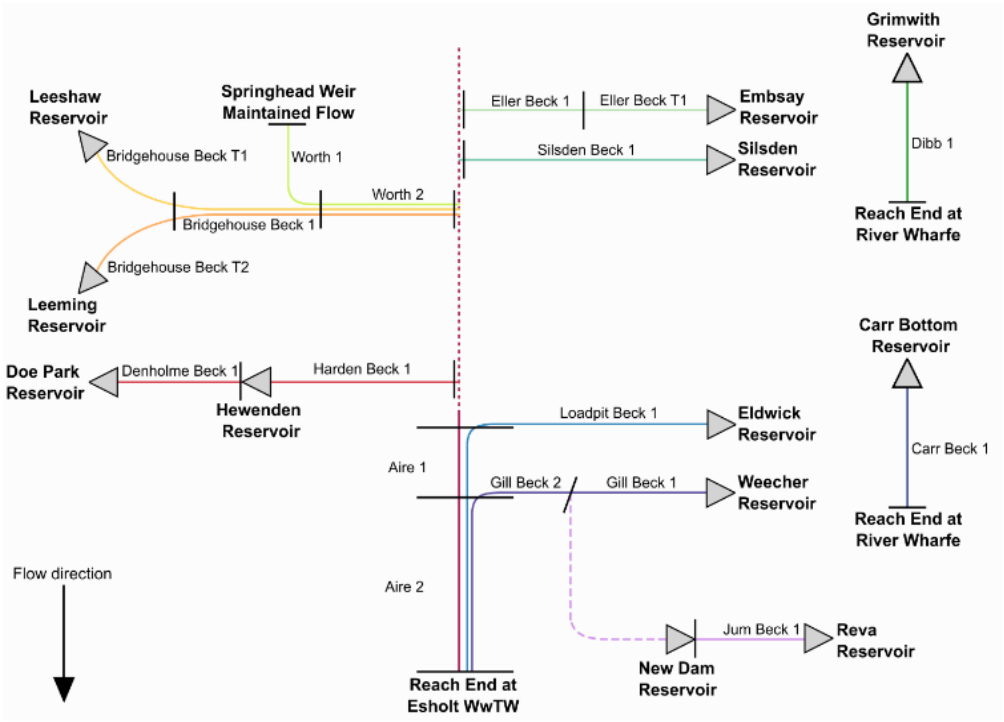

Figure 2: North West Area reservoirs drought permits reach schematic

Springhead Weir is linked to the following reaches (as shown above in Figure x):

- Worth 1 - Worth from Source to Bridgehouse Beck GB104027064210
- Worth 2 - Worth from Bridgehouse Beck to River Aire GB104027062891
- Aire 1 - Aire (River Worth to Gill Beck) GB104027063034
- Aire 2 - Aire from Gill Beck (Baildon) to River Calder GB104027063032

Worth from Source to Bridgehouse Beck GB104027064210

Worth from Source to Bridgehouse Beck GB104027064210 is classed as a heavily modified waterbody. These are water bodies where there is a significant risk of failing to achieve a good ecological status because of modifications to their hydro-morphological characteristics. Therefore, they have a target of achieving Good Ecological Potential (GEP) rather than Good Ecological Status (GES). For heavily modified water bodies, flow is the first element assessed as part of the classification. If flow standards are passed, then potential is based on a combination of mitigation measures and ‘non-sensitive’ quality elements. For river water bodies, these consist of the physico-chemical, specific pollutants and phytobenthos elements. If flow standards fail, then potential is based on the worst result of either the mitigation measures assessment or any of the quality element assessments.

Consideration	Status		
	Baseline status (2015)	**Cycle 2 current status (2019)**	**Cycle 2 Objective**
Overall WB status	Moderate (Quite Certain)	Moderate (Quite Certain)	Moderate by 2015
Ecological potential	Moderate (Quite Certain)	Moderate (Quite Certain)	Moderate by 2015
Fish	Good	Good	Good by 2015
Invertebrates	Good	Good	Good by 2015
Macrophytes and Phytobenthos combined	Good	Good	Good by 2015
Phytobenthos	Good	Good	-
Hydrological regime	No data	Not assessed	Not set
Mitigation measures	Moderate/Less	Moderate/Less (Uncertain)	Good by 2027
Physico-chemical	Moderate (Quite Certain)	Moderate (Quite Certain)	Moderate by 2015
Chemical	Good	Fail (Uncertain)	Good by 2015

Table 2: Worth from Source to Bridgehouse Beck, GB104027064210 (Heavily modified)

Reasons For Not Achieving Good:

Ecological Potential – The ecological potential is at moderate status and does not meet Good WFD status due to several contributing factors explained below.

Hydrological regime – The hydrological regime element is not assessed for this surface water body, and therefore classification follows the pathway of flow conditions fail. Certain heavily modified waterbodies are no longer classified for hydrological regime where the hydrological regime test is not sufficient due to the nature of the waterbody. In this instance, ecological potential is based on the worst result of either the mitigation measures assessment or any of the quality elements.

Mitigation measures – The mitigation measures is currently assessed as Moderate/Less. This is due to confirmed physical modification by the water industry for the purposes of drinking water supply and water regulation.

Physico-chemical quality elements – The Physico-chemical element of this waterbody is assessed as Moderate (Quite Certain). This is due to a suspected diffuse source due to poor livestock management in the agricultural industry.

Chemical – The chemical status for this water body is Fail. This is due to Perfluorooctane sulphonate (PFOS), for reasons pending investigation. It can also

be attributed to Polybrominated diphenyl ethers (PBDE) (measures delivered to address reason, awaiting recovery). Mercury and its compounds have also played a role with measures delivered to address the reason for this.

WFD objectives assessment:

- The objective for hydrology regime has not been set has the waterbody has not been assessed for flow.

- The objectives of Good by 2027 indicates the long-term ambition for the waterbodies as it is technically feasible to fix the issues, but these were not funded in the Cycle 2 plan. In the Cycle 3 plan these objectives will be revised and if the required fixes are still not funded the deadline could be extended again.

- Where we have a baseline (2015) status of 'Good' then our objective has been set as Good by 2015. This is because the waterbody is already meeting its default objectives, and nothing less than good can be predicted as this would go against the directive.

- Where we have an objective of 'Moderate by 2015' this particular waterbody cannot reach good status, only moderate. As the objective is already at moderate for physico-chemical it has an objective of 'Moderate by 2015'. This means the Ecological Potential and Overall Waterbody objectives are 'Moderate by 2015' as, because of the physico-chemical status, they cannot achieve higher than moderate.

Risk of deterioration of elements:

Worth 1 - Worth from Source to Bridgehouse Beck GB104027064210

Fish – There are multiple risks to the fish status due to this drought option. Reductions in wetted width, depth and flow velocity may lead to stranding of individuals. Spawning and juvenile nursery habitat is considered likely to be present, the integrity of these important habitats identified as potentially present may become compromised (e.g. siltation of spawning gravels), the significance of barriers may become more significant and higher densities of fish will attract increased predation. The combined physical environment changes (river flows, river habitat and water quality) as a result of the implementation of the drought option are predicted to present a major risk to the fish component of the WFD GB104027064210 Worth from Source to Bridgehouse Beck (associated with Worth 1).

Invertebrates – YW's EAR explains that there are multiple ways this drought permit could impact upon invertebrates within this waterbody. Reductions in river flow will cause a reduction in wetted width and depth, reducing habitat availability for the invertebrates. Some species are sensitive to changes in velocity and a loss of flow velocity could reduce habitats within the waterbody that require high flow velocities. Furthermore, invertebrates are sensitive to water quality pressures, however YW state that however the water quality changes as a result of the implementation of the drought option are predicted to present a minor risk. YW's EAR has concluded that hydrological and associated water quality changes as a result of this drought option are predicted to present a major risk to the invertebrate WFD status and the duration of impacts could be up to 6 months. However, the macroinvertebrate community recovery is expected to be relatively quick due to effective re-

colonisation strategies in macroinvertebrates. Therefore, the risk to deterioration of the WFD status of the waterbody is considered to be moderate.

Macrophytes and Phytobenthos – This element is screened out of the impact assessment as neither are deemed to be impacted by changes in flow. Wetted width reduction would not result in a deterioration of status due to the way monitoring is carried out. Reduced dilution of phosphate caused by drought option implementation may have an impact if P deterioration is predicted but would be temporary and unlikely to impact on either status. We don't believe this drought option poses any risk to the deterioration of macrophyte or phytobenthos status.

Mitigation measures – Mitigation measures are at Moderate/Less due to physical modification for water regulation by the water industry and urbanisation.

Hydrological Regime – Not assessed.

Physico-chemical quality elements – There is one water quality monitoring site in Worth 1 (River Worth Above Conf Bridgehouse Beck NE-49400825). YW's EAR states that the risk of water quality deterioration as a result of the drought permit is considered minor for dissolved oxygen and total ammonia, and moderate for phosphates (associated with change in dilution of diffuse pollution pressures. There are no continuous water quality pressures identified as presenting increased risk with drought options implemented and no significant intermittent pressures presenting risk.

Chemical – The EAR has not assessed the specific chemical parameters that are the cause of failure in the EA's catchment planning system. However as there is a moderate risk to physico-chemical parameters then it is reasonable to state there may be a risk to chemical parameters due to the same pathway. Although there is a risk of potential further deterioration to this element, it's considered that the mitigation measures will be sufficient to protect against this.

Worth from Bridgehouse Beck to River Aire GB104027062891

Worth from Bridgehouse Beck to River Aire (GB104027062891) is classed as a heavily modified waterbody. The implications of this in relation to the waterbody's ecological status are explained above in 'Worth from Source to Bridgehouse Beck GB104027064210'.

Consideration	Status		
	Baseline status (2015)	**Cycle 2 current status (2019)**	**Cycle 2 Objective**
Overall WB status	Moderate (Very Certain)	Moderate (Uncertain)	Moderate by 2015
Ecological potential	Moderate (Very Certain)	Moderate (Uncertain)	Moderate by 2015
Fish	Good	Good	Good by 2015
Invertebrates	Good	Good	Good by 2015
Macrophytes	Good	Good	Good by 2027 (Combined)

Consideration	Status		
	Baseline status (2015)	**Cycle 2 current status (2019)**	**Cycle 2 Objective**
Phytobenthos	Moderate (Uncertain)	Moderate (Uncertain)	Good by 2027 (Combined)
Hydrological regime	Supports Good	Supports Good	Supports Good by 2015
Mitigation measures	Moderate/Less	Moderate/Less (Uncertain)	Good by 2027
Physico-chemical	Moderate (Very Certain)	Good	Moderate by 2015
Chemical	Good	Fail (Uncertain)	Good by 2015

Table 2: Worth from Bridgehouse Beck to River Aire, GB104027062891 (Heavily Modified)

Reasons For Not Achieving Good:

Ecological Potential – The ecological potential is at Moderate status and does not meet Good WFD status due to several contributing factors explained below.

Macrophytes and Phytobenthos combined – Work has been completed on the Oxenhope Wastewater Treatment Works phosphate scheme. Therefore, measures have been delivered for the recovery of this element and for not achieving good status.

Mitigation measures – Mitigation measures are at Moderate/Less due to physical modification in relation to urban and transport reasons as well as flood defence.

Chemical – The chemical status for this water body is Fail. The following hazardous substances have been identified as contributing to the 'fail' status of this element: Benzo(g-h-i)perylene, mercury and it's compounds, Perfluorooctane sulphonate (PFOS) and Polybrominated diphenyl ethers (PBDE).

WFD objectives assessment:

- The objectives of Good by 2027 indicates the long-term ambition for the waterbodies as it is technically feasible to fix the issues, but these were not funded in the Cycle 2 plan. In the Cycle 3 plan these objectives will be revised and if the required fixes are still not funded the deadline could be extended again.

- Where we have a baseline (2015) status of 'Good' then our objective has been set as Good by 2015. This is because the waterbody is already meeting its default objectives, and nothing less than good can be predicted as this would go against the directive.

- Where we have an objective of 'Moderate by 2015' this particular waterbody cannot reach good status, only moderate. As the objective is already at moderate for physico-chemical it has an objective of 'Moderate by 2015'. This means the Ecological Potential and Overall Waterbody objectives are 'Moderate

by 2015' as, because of the physico-chemical status, they cannot achieve higher than moderate.

Risk of deterioration of elements:

Worth 2 - Worth from Bridgehouse Beck to River Aire GB104027062891

Fish – There are multiple risks to the fish status due to this drought option. Reductions in wetted width, depth and flow velocity may lead to stranding of individuals. Spawning and juvenile nursery habitat is considered likely to be present, the integrity of these important habitats identified as potentially present may become compromised (e.g. siltation of spawning gravels), the significance of barriers may become more significant and higher densities of fish will attract increased predation. The combined physical environment changes (river flows, river habitat and water quality) as a result of the implementation of the drought option are predicted to present a major risk to the fish component of the WFD GB104027062891 Worth from Bridgehouse Beck to River Aire (associated with Worth 2) is considered to be major.

Invertebrates –YW's EAR explains that there are multiple ways this drought permit could impact upon invertebrates within this waterbody. Reductions in river flow will cause a reduction in wetted width and depth, reducing habitat availability for the invertebrates. Some species are sensitive to changes in velocity and a loss of flow velocity could reduce habitats within the waterbody that require high flow velocities. Furthermore, invertebrates are sensitive to water quality pressures, however YW state that however the water quality changes as a result of the implementation of the drought option are predicted to present a minor risk. YW's EAR has concluded that hydrological and associated water quality changes as a result of this drought option are predicted to present a major risk to the invertebrate WFD status and the duration of impacts could be up to 6 months. However, the macroinvertebrate community recovery is expected to be relatively quick due to effective re-colonisation strategies in macroinvertebrates. Therefore, the risk to deterioration of the WFD status of the waterbody is considered to be moderate.

Macrophytes and Phytobenthos – This element is screened out of the impact assessment as neither are deemed to be impacted by changes in flow. Wetted width reduction would not result in a deterioration of status due to the way monitoring is carried out. Reduced dilution of phosphate caused by drought option implementation may have an impact if P deterioration is predicted but would be temporary and unlikely to impact on either status. We don't believe this drought option poses any risk to the deterioration of macrophyte or phytobenthos status.

Hydrological Regime – The maximum combined flow reduction on the River Worth downstream of the Bridgehouse Beck 1 confluence, with all three drought permits in place, is therefore 9.35 Ml/d. Based on the estimated flow statistics for this reach, this represents a reduction of 51% and 58% in the summer Q95 and Q99 flow statistics, which is assessed as a major hydrological impact on this reach in summer and autumn months. The reduction in year-round Q95 and Q50 is 48% and 27% respectively, which is assessed as a major hydrological impact during winter months associated with winter refill periods.

Mitigation Measures – The drought permit will not exacerbate this particular classification as it will not result in changes to the physical modification structures.

Physico-chemical quality elements – There is one water quality monitoring site in Worth 2. As such the location, River Worth Below Keighley (NE-49400828) has been used. YW's EAR states that the risk of water quality deterioration as a result of the drought permit is considered moderate for dissolved oxygen, total ammonia and phosphates. Water quality modelling identifies one continuous discharge, YWSL Oxenhope WwTW, presenting a significant risk to both dissolved oxygen and total ammonia downstream from the WwTW for the remainder of the reach and the downstream reach Worth 2. There is one frequently spilling CSO potential presenting an environmental risk in the reach.

Chemical – The EAR has not assessed the specific chemical parameters that are the cause of failure in the EA's catchment planning system. However as there is a moderate risk to physico-chemical parameters associated with a reduction in dilution then it is reasonable to state there may be a risk to chemical parameters due to the same pathway. Although there is a risk of potential further deterioration to this element, it's considered that the mitigation measures will be sufficient to protect against this.

Aire (River Worth to Gill Beck) GB104027063034

Aire (River Worth to Gill Beck) GB104027063034 is classed as a heavily modified waterbody. The implications of this in relation to the waterbody's ecological status are explained above in 'Worth from Source to Bridgehouse Beck GB104027064210'.

Consideration	Status		
	Baseline status (2015)	**Cycle 2 current status (2019)**	**Cycle 2 Objective**
Overall WB status	Moderate (Very Certain)	Moderate	Moderate by 2015
Ecological potential	Moderate (Very Certain)	Moderate (Very Certain)	Moderate by 2015
Fish	Moderate (Very Certain)	Moderate (Very Certain)	Good by 2027
Invertebrates	Moderate (Quite Certain)	Good	Good by 2027
Macrophytes	No data	No data	Not set
Phytobenthos	No data	No data	Not set
Hydrological regime	No data	Not assessed	Not set
Mitigation measures	Moderate/Less	Moderate/Less (Uncertain)	Good by 2027
Physico-chemical	Moderate (Very Certain)	Moderate (Very Certain)	Moderate by 2015
Chemical	Good	Fail (Uncertain)	Good by 2015

Table 3: Aire (R Worth to Gill Beck), GB104027063034 (Heavily modified)

Reasons For Not Achieving Good:

Ecological Potential – The ecological potential is at Moderate status and does not meet Good WFD status due to several contributing factors explained below.

Fish – The fish status is currently at 'Moderate' (very certain)' due to morphology changes from urban development, sediment issues due to poor soil management from agriculture and organic point source pollution (sewage discharge) from the water industry. Nutrients/phosphates which can mostly likely be attributed to continuous discharge from the water industry.

Macrophytes and Phytobenthos – The Macrophytes/Phytobenthos statuses currently have no data. This is due to them not being suitable parameters for this waterbody to assess ecological potential.

Hydrological regime – The hydrological regime element is not assessed for this surface water body, and therefore classification follows the pathway of flow conditions fail. Certain heavily modified waterbodies are no longer classified for hydrological regime where the hydrological regime test is not sufficient due to the nature of the waterbody. In this instance, ecological potential is based on the worst result of either the mitigation measures assessment or any of the quality elements.

Mitigation Measures Assessment – Mitigation measures are Moderate/Less due to physical modification for public water supply and water regulation by the water industry and due to urbanisation by the urban and transport industry.

Physico-chemical –The physico-chemical status is Moderate (very certain) due to phosphate pollution. This is attributed to point source pollution from the water industry (sewage discharge) and diffuse pollution from poor soil management in the agriculture sector.

Chemical – The chemical status is Fail. This is due to levels of PFOS, Perfluorooctane sulphonate (PFOS) Polybrominated diphenyl ethers (PBDE), Mercury. No pressure has been defined for this in Cycle 2.

WFD objectives assessment:

- The objective for hydrology regime has not been set has the waterbody has not been assessed for flow.

- The objective for macrophytes and phytobenthos has not been set.

- The objectives of Good by 2027 indicates the long term ambition for the waterbodies as it is technically feasible to fix the issues but these were not funded in the Cycle 2 plan. In the Cycle 3 plan these objectives will be revised and if the required fixes are still not funded the deadline could be extended again.

- Where we have a baseline (2015) status of 'Good' then our objective has been set as Good by 2015. This is because the waterbody is already meeting its default objectives and nothing less than good can be predicted as this would go against the directive.

- Where we have an objective of 'Moderate by 2015' this particular waterbody cannot reach good status, only moderate. As the objective is already at moderate for physico-chemical it has an objective of 'Moderate by 2015'. This means the Ecological Potential and Overall Waterbody objectives are 'Moderate by 2015' as, because of the physico-chemical status, they cannot achieve higher than moderate.

Risk of deterioration of elements:

Aire 1 - Aire (River Worth to Gill Beck) GB104027063034

This WFD waterbody is downstream of several waterbodies that will be impacted by the reduction in compensation flow due to the drought permits in the North West area. The EAR produced by YW has assessed the impact on this waterbody in terms of all these drought permits being in place and utilised together. Thus, the assessment in this annex is for the combined flow reduction on the River Aire with all drought permits in place. This would represent the worst-case scenario for WFD.

The maximum combined flow reduction on the River Aire at this WFD waterbody downstream of the Loadpit Beck 1 confluence, with all seven drought permits in place, is 16.64Ml/d.

Fish – The combined physical environment changes (river flows, river habitat and water quality) as a result of the implementation of the drought option are predicted to present a moderate risk in summer/autumn and a minor risk in winter to the WFD status in waterbody WFD GB104027063034 Aire (River Worth to Gill Beck) (associated with Aire 1). The duration of impacts could be up to 6 months. Therefore, the risk to deterioration of the WFD status of the waterbody is considered to be minor.

Invertebrates – The combined physical environment changes (river flows, river habitat and water quality) as a result of the implementation of the drought option are predicted to present a moderate risk in summer/autumn and a minor risk in winter to the macroinvertebrate component of the GB104027063034 Aire (River Worth to Gill Beck) waterbody (associated with Aire 1). The duration of impacts could be up to 6 months. However, the macroinvertebrate community recovery is expected to be relatively quick due to effective re-colonisation strategies in macroinvertebrates. Therefore, the risk to deterioration of the WFD status of the waterbody is considered to be minor.

Macrophytes and Phytobenthos – This element is screened out of the impact assessment as neither are deemed to be impacted by changes in flow. Wetted width reduction would not result in a deterioration of status due to the way monitoring is carried out. Reduced dilution of phosphate caused by drought option implementation may have an impact if P deterioration is predicted but would be temporary and unlikely to impact on either status. We don't believe this drought option poses any risk to the deterioration of macrophyte or phytobenthos status.

Hydrological Regime – Not assessed.

Mitigation Measures – The drought permit will not exacerbate this particular classification as it will not result in changes to the physical modification structures.

Physico-chemical – Risk of short term acute, infrequent, temporary water quality pressures locally downstream of three listed CSOs during rainfall events. There are

no continuous water quality pressures identified as presenting increased risk with drought options implemented. There is a moderate risk from drought options associated with change in dilution of diffuse pollution pressures and the CSO discharges.

Chemical – The EAR has not assessed the specific chemical parameters that are the cause of failure in the EA's catchment planning system. However as there is a moderate risk to physico-chemical parameters associated with a reduction in dilution then it is reasonable to state there may be a risk to chemical parameters due to the same pathway. Although there is a risk of potential further deterioration to this element, it's considered that the mitigation measures will be sufficient to protect against this.

Aire from Gill Beck (Baildon) to River Calder GB104027063032

Aire from Gill Beck (Baildon) to River Calder GB104027063032 is classed as a heavily modified waterbody. The implications of this in relation to the waterbody's ecological status are explained above in 'Worth from Source to Bridgehouse Beck GB104027064210'.

Consideration	Status		
	Baseline status (2015)	**Cycle 2 current status (2019)**	**Cycle 2 Objective**
Overall WB status	Moderate (Very Certain)	Moderate	Moderate by 2015
Ecological potential	Moderate (Very Certain)	Moderate (Very Certain)	Moderate by 2015
Fish	No Data	No Data	Not set
Invertebrates	Moderate (Very Certain)	Moderate (Very Certain)	Good by 2027
Macrophytes & Phytobenthos Combined	Poor (Very Certain)	Poor (Very Certain)	Not assessed
Hydrological regime	Supports Good	Supports Good	Supports Good by 2015
Mitigation measures	Moderate/Less	Moderate/Less (Uncertain)	Good by 2027
Physico-chemical	Moderate (Very Certain)	Moderate (Very Certain)	Moderate by 2015
Chemical	Good	Fail (Certain)	Good by 2015

Table 4: Aire from Gill Beck (Baildon) to River Calder, GB104027063032 (Heavily Modified)

Reasons For Not Achieving Good:

Ecological Potential – The ecological potential is at moderate status and does not meet Good WFD status due to several contributing factors explained below.

Fish – The fish status has no data. This is due to uncertainties relating to the fish community within the waterbody as limited survey data is available.

Invertebrates – The invertebrate status is Moderate (very certain). This is due to point source pollution (ammonia) from sewage discharge from the water industry. It is also due to changes in morphology as a result of urban development.

Macrophytes and Phytobenthos –The Macrophytes/Phytobenthos status is Poor (very certain). No pressure has been identified in Cycle 2 for this status.

Mitigation Measures Assessment – Mitigation measures are Moderate/Less due to physical modification for public water supply and water regulation by the water industry and due to urbanisation by the urban and transport industry.

Physico-chemical – The physico-chemical status is Moderate (very certain) due to phosphate pollution. This is attributed to point source pollution from the water industry (sewage discharge) and diffuse pollution from poor soil management in the agriculture sector.

Chemical – The chemical status is Fail. This is due to levels of Diazinon due to the water industry and mercury, PFOS, PBDE with no pressure defined in Cycle 2.

WFD objectives assessment:

- The objective for fish was not set.
- The objective for macrophytes and phytobenthos was not assessed.
- The objectives of Good by 2027 indicates the long term ambition for the waterbodies as it is technically feasible to fix the issues but these were not funded in the Cycle 2 plan. In the Cycle 3 plan these objectives will be revised and if the required fixes are still not funded the deadline could be extended again.
- Where we have a baseline (2015) status of 'Good' then our objective has been set as Good by 2015. This is because the waterbody is already meeting its default objectives and nothing less than good can be predicted as this would go against the directive.
- Where we have an objective of 'Moderate by 2015' this particular waterbody cannot reach good status, only moderate. As the objective is already at moderate for physico-chemical it has an objective of 'Moderate by 2015'. This means the Ecological Potential and Overall Waterbody objectives are 'Moderate by 2015' as, because of the physico-chemical status, they cannot achieve higher than moderate.

Risk of deterioration of elements:

Aire 2 - Aire from Gill Beck (Baildon) to River Calder, GB104027063032

Fish – The fish community element of GB104027063032 Aire from Gill Beck (Baildon) to River Calder (associated with Aire 2) is not classified, the risk to deterioration of the WFD status of the waterbody is considered to be minor.

Invertebrates – The combined physical environment changes (river flows, river habitat and water quality) as a result of the implementation of the drought option are predicted to present a minor risk to the macroinvertebrate component of the GB104027063032 Aire from Gill Beck (Baildon) to River Calder waterbody (associated with Aire 2). The duration of impacts could be up to 6 months. However, the macroinvertebrate community recovery is expected to be relatively quick due to effective re-colonisation strategies in macroinvertebrates. Therefore, the risk to deterioration of the WFD status of the waterbody is considered to be minor.

Macrophytes and Phytobenthos – This element is screened out of the impact assessment as neither are deemed to be impacted by changes in flow. Wetted width reduction would not result in a deterioration of status due to the way monitoring is carried out. Reduced dilution of phosphate caused by drought option implementation may have an impact if P deterioration is predicted but would be temporary and unlikely to impact on either status. We don't believe this drought option poses any risk to the deterioration of macrophyte or phytobenthos status.

Hydrological Regime – The maximum combined flow reduction on the River Aire downstream of the Gill Beck 1 confluence, with all eight drought permits in place, is therefore 16.64 Ml/d. Based on the estimated flow statistics for this reach, this represents a reduction of 12% and 17% in the summer Q95 and Q99 flow statistics, which is assessed as a moderate hydrological impact on this reach in summer and autumn months. The reduction in year-round Q95 and Q50 is 11% and 2.8% respectively, which is assessed as a minor hydrological impact during winter months associated with winter refill periods.

Mitigation Measures – The drought permit will not exacerbate this particular classification as it will not result in changes to the physical modification structures.

Physico-chemical – There are no sampling locations in Aire 2, the next sample downstream of this reach, Aire at Apperley (NE-49400676), has been used. There are no significant continuous or intermittent discharges into Aire 2. The EAR reports minor risk from drought options to total ammonia, oxygen and phosphates.

Chemical – The EAR has not assessed the specific chemical parameters that are the cause of failure in the EA's catchment planning system. However as there is a risk to physico-chemical parameters then it is reasonable to state there may be a risk to chemical parameters due to the same pathway. Although there is a risk of potential further deterioration to this element, it's considered that the mitigation measures will be sufficient to protect against this.

Risk of Deterioration: A summary for all Reaches

Although YW EAR identifies that there is a possible moderate or major risk to certain WFD elements as a result of this drought option (Fish, Invertebrates, Physico-chemical, Chemical), we are satisfied that the monitoring and mitigation conditions included within the drought permit mitigates any possible risk of deterioration in the status of WFD elements (Fish, Invertebrates, Physico-chemical, Chemical). If the monitoring schedule identifies any impacts to the WFD elements as a result of this drought permit, then reactive mitigation will be carried out, dependent on the problems identified. Additionally, should any environmental

problems be identified, YW will increase their compensation flows as laid out in the relevant permit.

E. Impact on ecology and conservation sites

Conservation sites

The sites, species and habitats listed in Tables 1 and 2 below are within the River Worth from the point of the compensation release at Ponden and Lower Laithe Reservoirs to the confluence with the Bridgehouse Beck.

The River Worth downstream of that confluence has potential to be cumulatively affected by reservoirs in YW's North West area reservoir group. Please refer to the main determination report for this group of reservoirs for further details.

Nearest conservation sites (distance searched – 5 km downstream)			
Designation types	**Name of site**	**Distance downstream**	**Potential Impact**
Special Areas of Conservation (SACs)	None	N/A	N/A
Ramsar sites	None	N/A	N/A
Special Protection Areas (SPAs)	None	N/A	N/A
Sites of Special Scientific Interest (SSSIs)	None	N/A	N/A
Groundwater Dependent Terrestrial Ecosystems (GWDTEs) that are not designated as SSSIs	N/A as surface water application	N/A	N/A
National Nature Reserves (NNRs)	None	N/A	N/A
Local Nature Reserves (LNRs)	None	N/A	N/A
Ancient Woodland	None	N/A	N/A
Scheduled Ancient Monuments (SAMs)	None	N/A	N/A
Local Wildlife Sites (LWSs)	Baden Street, Hatworth	4.3 km	Impact on this site is assessed in Appendix B

			of the Environmental Assessment Report (EAR). Unlikely to be in connectivity with impacted reach or support aquatic receptors.
National Parks	None	N/A	N/A
Areas of Outstanding Natural Beauty (AONBs)	None	N/A	N/A
Heritage Coast	None	N/A	N/A
Restoring Sustainable Abstraction (RSA) Programmes	None	N/A	N/A
Protected Species	Brook Lamprey*	0.54 km	Impact on this species has been assessed in YW's EAR and appropriate monitoring and mitigation has been included in the Environmental Monitoring Plan (EMP) in Appendix A.2.
	Brown/Sea Trout*	0.54 km	Impact on this species has been assessed in YW's EAR and appropriate monitoring and mitigation has been included in the EMP in Appendix A.2.
	Bullhead*	0.54 km	Impact on this species has been assessed in YW's EAR and appropriate monitoring and mitigation has been included in the EMP in Appendix A.2.
	Unidentified Lamprey*	0.54 km	Impact on this species has been assessed in YW's EAR and appropriate monitoring and mitigation has been included in the EMP in Appendix A.2.
Protected Habitats	Deciduous woodland*	0.22 km	Unlikely to be in connectivity with impacted reach or support aquatic receptors.
Invasive Non-	Northern River	1.34 km	The implementation of

native Species	Crangonyctid*		this drought option is not anticipated to increase the spread of Invasive non-native species.
	Himalayan Balsam*	1.34 km	
	Japanese Knotweed	4.9 km	

Table 5: Ponden Reservoir to Springhead Weir conservation screening results

Nearest conservation sites (distance searched 3.25 km downstream)			
Designation types	**Name of site**	**Distance downstream**	**Potential Impact**
Special Areas of Conservation (SACs)	None	N/A	N/A
Ramsar sites	None	N/A	N/A
Special Protection Areas (SPAs)	None	N/A	N/A
Sites of Special Scientific Interest (SSSIs)	None	N/A	N/A
Groundwater Dependent Terrestrial Ecosystems (GWDTEs) that are not designated as SSSIs	N/A as surface water application	N/A	N/A
National Nature Reserves (NNRs)	None	N/A	N/A
Local Nature Reserves (LNRs)	None	N/A	N/A
Ancient Woodland	None	N/A	N/A
Scheduled Ancient Monuments (SAMs)	None	N/A	N/A
Local Wildlife Sites (LWSs)	Baden Street, Haworth	2.45 km	Impact on this site is assessed in Appendix B of the EAR. Unlikely to be in connectivity with impacted reach or support aquatic receptors.
National Parks	None	N/A	N/A
Areas of Outstanding Natural Beauty (AONBs)	None	N/A	N/A

Heritage Coast	None	N/A	N/A
Restoring Sustainable Abstraction (RSA) Programmes	None	N/A	N/A
Protected Species	Brown/Sea Trout*	0.58 km	Impact on these species has been assessed in YW's EAR and appropriate monitoring and mitigation has been included in the EMP in Appendix A.2.
	Bull Head*	3 km	
	Brook Lamprey*	3 km	
	Unidentified Lamprey	3 km	
Protected Habitats	Deciduous woodland*	0.02 km	Unlikely to be in connectivity with impacted reach or support aquatic receptors.
Invasive Non-native Species	Japanese Knotweed	3.1 km	The implementation of this drought option is not anticipated to increase the spread of Invasive non-native species.
	Himalayan Balsam	3.1 km	

Table 6: Springhead Weir (Lower Laithe Reservoir) conservation screening results

* There are several records of this feature within the screening distance, but only the closest record to the discharge point has been included in this table.

Protected fish species

There is a pathway for the drought permit to impact on fish species in the identified impacted reach. This has been assessed in YWs EAR and we agree with this assessment and the proposed monitoring and mitigation plan. Mitigation is set out in YW's EMP Appendix A.2 and will be included on the Drought Permit.

Monitoring and mitigation

The following monitoring and mitigation conditions will be included on the Drought Permit:

Monitoring

- IDMON_1: Surveillance walkover surveys of habitat quality and ecological stress, recording signs of environmental problems at 1 Site: River Worth between SE 02380 37708 to SE 02802 37831.
- If the monitoring identifies signs of environmental distress, the following actions shall be undertaken by the water company:
    - i) upon finding any signs of environmental problems the water company shall notify the Agency in writing and by telephone on 0800 80 70 60 and shall provide details of the signs of distress and the location;
    - ii) the water company shall undertake a remedial course of action to address the signs of environmental problems, as directed in writing by the Agency.

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Worth 1

- IDMON_1 - Surveillance walkover surveys of habitat quality and ecological stress, recording signs of environmental problems (reaches to match those in ODMON_1): − Site 1: 500m located within SE0238037708 to SE0280237831
- IDMON_2 - Targeted surveillance walkover surveys of water quality and ecological stress local to 'significant' water quality pressures', to include water quality spot sampling in priority areas such as pools and weirs where aquatic species may become isolated during low flows: − None required
- IDMON_3 - Storm intensity forecasting to predict likely CSO spill events and the need for pre-emptive mitigation: − None required

Worth 2

- IDMON_1 - Surveillance walkover surveys of habitat quality and ecological stress, recording signs of environmental problems (reaches to match those in ODMON_1): − Site 1: 500m located within SE0510538813 to SE0530439241
- IDMON_2 - Targeted surveillance walkover surveys of water quality and ecological stress local to 'significant' water quality pressures', to include water quality spot sampling in priority areas such as pools and weirs where aquatic species may become isolated during low flows: − Site 2: 10m upstream and at least 100m downstream of the Oxenhope WwTW discharge outfall at SE0355035670
- IDMON_3 - Storm intensity forecasting to predict likely CSO spill events and the need for pre-emptive mitigation: − South Street Keighley/CSO: SE 05920 40223

Aire 1

- IDMON_1 - Surveillance walkover surveys of habitat quality and ecological stress, recording signs of environmental problems (reaches to match those in ODMON_1): − Site 1: 500m located within SE1312338376 to SE1367538239
- IDMON_2 - Targeted surveillance walkover surveys of water quality and ecological stress local to 'significant' water quality pressures', to include water quality spot sampling in priority areas such as pools and weirs where aquatic species may become isolated during low flows: − None required
- IDMON_3 - Storm intensity forecasting to predict likely CSO spill events and the need for pre-emptive mitigation: − Buck Mill Lane CSO SE1689338881 − Dock Lane CSO SE1516037590 − Coach Road CSO SE1446038140

Aire 2

- IDMON_1 - Surveillance walkover surveys of habitat quality and ecological stress, recording signs of environmental problems (reaches to match those in ODMON_1): − Site 1: 500m located within SE1748139782 to SE1802540113

- IDMON_2 - Targeted surveillance walkover surveys of water quality and ecological stress local to 'significant' water quality pressures', to include water quality spot sampling in priority areas such as pools and weirs where aquatic species may become isolated during low flows: − None required
- IDMON_3 - Storm intensity forecasting to predict likely CSO spill events and the need for pre-emptive mitigation: − None required

Mitigation:

- If, upon being notified of any signs of environmental problems in accordance with condition 2.2.1(i) or at its own instigation, the Agency gives written notice that there is a disruption to the ecology, the Water Company shall:
  increase the maintained flow at Springhead Weir at National Grid Reference SE 02608 37753 to the rates provided in Conditions 9.2(a) and 9.2(b) of the Licences
  UNLESS
  the environmental problems are identified to be only at the monitoring location 'Worth 1' outlined in Appendix 1 while either the Option 1 or Option 2 Compensation Flows are being released from drought permit numbers DP2022–NE/027/0014/010 and DP2022–NE/027/0014/011, upon which the Water Company shall increase the maintained flow at Springhead Weir to 6 megalitres per day
  or such lesser quantity as may be agreed in writing by the Agency.
- The water company shall increase the stated maintained flows as soon as possible and within 48 hours of receipt of written notification from the Agency. The water company shall not thereafter reduce the maintained flows to those specified in Condition 1 of this drought permit until the Water Company has confirmed in writing that appropriate remedial action has been taken, and the Agency has confirmed in writing that it is satisfied with this.
- The changes to the compensation water specified in this drought permit shall be made in a steady and controlled manner at a rate so as not to cause any flooding of land or disturbance to water users downstream or any adverse effects on the quality of water in the inland water or any adverse impacts on the ecology of the inland water or dependent ecosystems.
- Freshet flows condition

F. Measurement

Measurement of the water abstracted
The drought permit will amend the further conditions under both abstraction licences but there will be no change to the way the abstraction is measured.

G. Recommendations

Based on the conclusions of the main determination report (section 14), the Agency has decided to grant a drought permit under section 79A of the Water Resources Act 1991 subject to conditions, as drafted and attached to this report. The drought permit will suspend the provisions of the 2018 abstraction licences during any period in which YW can abstract under the conditions of the drought permit.

A summary of the reduced compensation release quantities are shown in Table 8 below.

The drought permit will be time limited to 31/03/2023 and will include the following conditions along with appendices detailing the monitoring and mitigation requirements.

Condition	Source of the condition wording
1.1 Compensation Flow	Amended conditions 9.2(a) from 2018 licences – Maintained flow at Springhead Weir under option 1 (see table 7)
1.2 Compensation Flow	Amended condition 9.2(b) from 2018 licence – Maintained flow at springhead increase when linked to the 'Option 1 compensation flows' reducing from both Leeming and Leeshaw reservoirs (see table 7)
1.3 Compensation Flow	Maintained flow at Springhead Weir under option 2 (see table 7)
1.4 Compensation Flow	Maintained flow at springhead increase when linked to the 'Option 2 compensation flows' reducing from both Leeming and Leeshaw reservoirs (see table 7)
2.1 Environmental Monitoring	Monitoring requirements set out in Appendix 1 and 2 of the licence.
2.2 Environmental Monitoring	Actions to take if environmental problems identified during monitoring.
2.3 Control of changes	All changes to compensation flow must be made in a steady and controlled manner.
2.4 TUBs	Drought Permit not relied upon unless Temporary Use Ban is in place.
2.5 CSO's	Combined Sewers Overflow condition.

	Business as Usual			Option 1 – reduce by 50%			Option 2 – reduce by 2/3rds		
Compensation Site	Leeshaw above CL, Leeming above or below CL	Leeshaw below CL, Leeming above CL	Leeshaw & Leeming below CL	Leeshaw above CL, Leeming above or below CL	Leeshaw below CL, Leeming above CL	Leeshaw & Leeming below CL	Leeshaw above CL, Leeming above or below CL	Leeshaw below CL, Leeming above CL	Leeshaw & Leeming below CL
Leeming	4	5.25	3.25	2	2.63	1.63	1.33	1.75	1.08
Leeshaw	4	2.75	2.75	2	1.38	1.38	1.33	0.92	0.92
Springhead Weir	6	6	8	3	3	4	2	2	2.67
Ponden	Min 0.5			Min 0.5			Min 0.5		
Lower Laithe	Min 0.2			Min 0.2			Min 0.2		

Table 7: Summary of compensation releases