Appendix A.2

NORTH WEST AREA REACHES

Appendix A.2 Contents

Reach Overview Sheet

Eller Beck T1

WFD Waterbody:

Haw Beck from Source to Eller Beck (GB104027063060)

Relevant Drought Option(s):

Embsay Reservoir

Sensitive Features and Impact Assessment:

- White-clawed crayfish (Major)
- Otter (Negligible)
- Water vole (Moderate)
- Riffle Beetle Riolus subviolaceus (Moderate)
- Brook lamprey (Major)
- Brown trout (Major)
- Bullhead (Moderate)
- River lamprey (Moderate)
- WFD - Fish (Major)
- WFD - Invertebrates (Moderate)

Significant Water Quality Pressures:

- None

Mitigation Triggers – Relevant Water Quality Thresholds:

Water quality thresholds appropriate to WFD river type:

- Moderate-Poor status thresholds for upland and low alkalinity rivers (less than 64% dissolved oxygen saturation; in excess of 0.75mg/l total ammonia)
- Additional unionised ammonia threshold of 40µg/l further to WFD requirements

Baseline Monitoring

Baseline monitoring proposed to ensure an adequate baseline dataset exists to describe non-drought conditions for those receptors likely to be impacted by drought permit implementation and to fill any data gaps *and reduce uncertainty* ***identified during the environmental assessment****.*

Routine Baseline Monitoring:

- BMON_1 - EA/YWSL to continue monitor river flows and levels/reservoir levels and spill at key monitoring sites
- BMON_2 - EA to continue routine water quality monitoring at existing network of sites on current monthly programme, which includes those on un-impacted reaches suitable as control sites.
- BMON_3 - Macroinvertebrate monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

- BMON_4 - Fish monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

Targeted Baseline Monitoring:

- BMON_5 - White-clawed crayfish surveys to determine distribution and abundance in reaches under serious (i.e. moderate or major) hydrological stress
- BMON_7 - Targeted juvenile lamprey surveys to identify distribution of habitat and an indicative population status within reaches subject to serious hydrological stress

On-set of Environmental Drought- Monitoring

Subject to the availability of relevant data, the following walkover survey should be carried out prior to drought permit implementation

- ODMON_1 – Walkover surveys of habitat quality and identification of drought sensitive habitats such as areas of riffle, pools and artificial features such as weirs and sluices that may be isolated or impassable during low flows. Results to be captured by annotated walkover maps and completion of a '*River Conditions Observation Form - Low Flows*' form.
  - Site 1: 500m located within SE0030253934 to SE0053953768

In-Drought (During drought option implementation) – Monitoring

In order to establish impacts and target mitigation the following surveillance walkover surveys should be completed during the drought option implementation (including on the day of the flow change, the day after and then weekly thereafter until no further changes are noted):

- 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 SE0030253934 to SE0053953768
- 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

In-Drought (During drought option implementation) – Mitigation

Mitigation which may be required during the drought option implementation.

- IDMIT_6 - Gradual phase-in of reduction in water volume/flow to avoid stranding of individuals (fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_7 - Gradual phase-in of compensation release increases to avoid stranding or displacement of individuals (macroinvertebrates, fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_8 - Temporary reduction in volume of abstraction or increase in compensation release (fish)
- IDMIT_9 - Artificial freshet release to provide temporary variation in the flow regime (fish, white-clawed crayfish, fine-lined pea mussel, water vole, otter)

- IDMIT_10 - Creation of alternative refuges in deeper water where walkover surveys identify the loss of important deep water habitat or high densities of fauna in refuges (fish, white-clawed crayfish, water vole)
- IDMIT_11 - Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive species where walkover surveys identify a projected loss of habitat inundation (macroinvertebrates, fish, white-clawed crayfish, water vole, otter)
- IDMIT_12 - Artificial channel narrowing to provide functional refuges and support habitat requirement for species, enabling a quick natural recolonisation of the reach post-drought (fish, macroinvertebrates, white-clawed crayfish, fine-lined pea mussel, otter, water vole)
- IDMIT_13 - Provision of piscivorous “visual” bird scaring measures (e.g. using streamers in riparian trees) to control predation upon species using refuges (fish). These visual measures would only be implemented following consultation with the EA, Natural England and bird specialists, particularly taking account of protected species under the Wildlife and Countryside Act. Implementation would follow best practice guidance.
- IDMIT_14 - Gravel washing of spawning habitats where walkover surveys and routine monitoring identifies likely habitat degradation as a result of sedimentations (fish)
- IDMIT_15 - Aeration of watercourse where significant mortality or change in species abundances are likely to be attributed to water quality deterioration
- IDMIT_16 - Modification of flow structure across barriers to retain favourable conditions to facilitate the movement/migration of species (fish)
- IDMIT_17 - Provision of freshet releases to enable migration of fish across significant obstacles (fish)
- IDMIT_19 - Capture and relocate individuals across significant barriers, taking into account migratory periods (immigration and emigration) (fish) and ensuring biosecurity measures are in place at all times.
- IDMIT_20 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and relocation to suitable habitat where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_21 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and retention for later release where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.

Post-Drought (Drought option removed) – Monitoring

Supplementary monitoring which may be required after drought option implementation:

- PDMON_1 - White-clawed crayfish sampling to monitor recovery of their distribution and abundance

Post-Drought (Drought option removed) – Mitigation

Mitigation which may be required after the drought option is removed:

- PDMIT_1 - Enhancement of habitat beyond the impacted reach (macroinvertebrates, fish, fine-lined pea mussel, white-clawed crayfish, water vole)

- PDMIT_2 - Provision of artificial freshets to ensure fish are capable of migrating where survey identifies insufficient water depth or volume across structures to facilitate migration (fish)
- PDMIT_3 - Modification to barriers and/or flows to improve passage where walkover survey identifies insufficient water depth or volume at obstacles (fish)
- PDMIT_4 - Capture and relocate across barrier (taking migratory period into account) where significant numbers of migratory fish congregate at obstacles (fish)
- PDMIT_5 - Relocation of juveniles where walkover surveys identify the likely desiccation of marginal habitats or loss of water depth at important habitats (fish, fine-lined pea mussel)
- PDMIT_6 - Restocking using juvenile lamprey ammocoetes within the catchment where monitoring indicates loss of fish abundance or recruitment (fish)
- PDMIT_7 - Restocking using offspring from broodstock from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)

Reach Overview Sheet

Eller Beck 1

WFD Waterbody:

Haw Beck from Source to Eller Beck (GB104027063060)

Eller Beck from Haw Beck to River Aire (GB104027063020)

Relevant Drought Option(s):

Embsay Reservoir

Sensitive Features and Impact Assessment:

- White-clawed crayfish (Moderate)
- Otter (Negligible)
- Brook lamprey (Moderate)
- Brown trout (Moderate)
- Bullhead (Minor (summer/autumn only))
- WFD - Fish (Moderate)
- WFD - Invertebrates (Moderate)

Significant Water Quality Pressures:

- Carleton Rd Skipton CSO SD9844450748

Mitigation Triggers – Relevant Water Quality Thresholds:

Water quality thresholds appropriate to WFD river type:

- Moderate-Poor status thresholds for upland and low alkalinity rivers (less than 64% dissolved oxygen saturation; in excess of 0.75mg/l total ammonia)
- Additional unionised ammonia threshold of 40µg/l further to WFD requirements

Baseline Monitoring

Baseline monitoring proposed to ensure an adequate baseline dataset exists to describe non-drought conditions for those receptors likely to be impacted by drought permit implementation and to fill any data gaps *and reduce uncertainty* ***identified during the environmental assessment****.*

Routine Baseline Monitoring:

- BMON_1 - EA/YWSL to continue monitor river flows and levels/reservoir levels and spill at key monitoring sites
- BMON_2 - EA to continue routine water quality monitoring at existing network of sites on current monthly programme, which includes those on un-impacted reaches suitable as control sites.
- BMON_3 - Macroinvertebrate monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.
- BMON_4 - Fish monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

Targeted Baseline Monitoring:

- BMON_5 - White-clawed crayfish surveys to determine distribution and abundance in reaches under serious (i.e. moderate or major) hydrological stress
- BMON_7 - Targeted juvenile lamprey surveys to identify distribution of habitat and an indicative population status within reaches subject to serious hydrological stress

On-set of Environmental Drought- Monitoring

Subject to the availability of relevant data, the following walkover survey should be carried out prior to drought permit implementation

- ODMON_1 – Walkover surveys of habitat quality and identification of drought sensitive habitats such as areas of riffle, pools and artificial features such as weirs and sluices that may be isolated or impassable during low flows. Results to be captured by annotated walkover maps and completion of a '*River Conditions Observation Form - Low Flows*' form.
  - Site 1: 500m located within SD9842950828 to SD9847150315

In-Drought (During drought option implementation) – Monitoring

In order to establish impacts and target mitigation the following surveillance walkover surveys should be completed during the drought option implementation (including on the day of the flow change, the day after and then weekly thereafter until no further changes are noted):

- 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 SD9842950828 to SD9847150315
- 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:
  - Carleton Rd Skipton CSO SD9844450748

In-Drought (During drought option implementation) – Mitigation

Mitigation which may be required during the drought option implementation.

- IDMIT_1 - Negotiation with the licence holder of a temporary reduction of third party abstractions presenting 'significant' impacts to sensitive features, including financial compensation by Yorkshire Water.
- IDMIT_6 - Gradual phase-in of reduction in water volume/flow to avoid stranding of individuals (fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_7 - Gradual phase-in of compensation release increases to avoid stranding or displacement of individuals (macroinvertebrates, fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_8 - Temporary reduction in volume of abstraction or increase in compensation release (fish)
- IDMIT_9 - Artificial freshet release to provide temporary variation in the flow regime (fish, white-clawed crayfish, fine-lined pea mussel, water vole, otter)

- IDMIT_10 - Creation of alternative refuges in deeper water where walkover surveys identify the loss of important deep water habitat or high densities of fauna in refuges (fish, white-clawed crayfish, water vole)
- IDMIT_11 - Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive species where walkover surveys identify a projected loss of habitat inundation (macroinvertebrates, fish, white-clawed crayfish, water vole, otter)
- IDMIT_12 - Artificial channel narrowing to provide functional refuges and support habitat requirement for species, enabling a quick natural recolonisation of the reach post-drought (fish, macroinvertebrates, white-clawed crayfish, fine-lined pea mussel, otter, water vole)
- IDMIT_13 - Provision of piscivorous “visual” bird scaring measures (e.g. using streamers in riparian trees) to control predation upon species using refuges (fish). These visual measures would only be implemented following consultation with the EA, Natural England and bird specialists, particularly taking account of protected species under the Wildlife and Countryside Act. Implementation would follow best practice guidance.
- IDMIT_14 - Gravel washing of spawning habitats where walkover surveys and routine monitoring identifies likely habitat degradation as a result of sedimentations (fish)
- IDMIT_15 - Aeration of watercourse where significant mortality or change in species abundances are likely to be attributed to water quality deterioration
- IDMIT_16 - Modification of flow structure across barriers to retain favourable conditions to facilitate the movement/migration of species (fish)
- IDMIT_17 - Provision of freshet releases to enable migration of fish across significant obstacles (fish)
- IDMIT_19 - Capture and relocate individuals across significant barriers, taking into account migratory periods (immigration and emigration) (fish) and ensuring biosecurity measures are in place at all times.
- IDMIT_20 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and relocation to suitable habitat where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_21 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and retention for later release where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_23 - For CSOs identified as significant water quality prioritise planned maintenance work on and reactive pollution prevention work, including visits by operators.

Post-Drought (Drought option removed) – Monitoring

Supplementary monitoring which may be required after drought option implementation:

- PDMON_1 - White-clawed crayfish sampling to monitor recovery of their distribution and abundance

Post-Drought (Drought option removed) – Mitigation

Mitigation which may be required after the drought option is removed:

- PDMIT_1 - Enhancement of habitat beyond the impacted reach (macroinvertebrates, fish, fine-lined pea mussel, white-clawed crayfish, water vole)
- PDMIT_2 - Provision of artificial freshets to ensure fish are capable of migrating where survey identifies insufficient water depth or volume across structures to facilitate migration (fish)
- PDMIT_3 - Modification to barriers and/or flows to improve passage where walkover survey identifies insufficient water depth or volume at obstacles (fish)
- PDMIT_4 - Capture and relocate across barrier (taking migratory period into account) where significant numbers of migratory fish congregate at obstacles (fish)
- PDMIT_5 - Relocation of juveniles where walkover surveys identify the likely desiccation of marginal habitats or loss of water depth at important habitats (fish, fine-lined pea mussel)
- PDMIT_6 - Restocking using juvenile lamprey ammocoetes within the catchment where monitoring indicates loss of fish abundance or recruitment (fish)
- PDMIT_7 - Restocking using offspring from broodstock from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)

Reach Overview Sheet

Silsden Beck 1

WFD Waterbody:

Silsden Beck from Source to River Aire (GB104027062990)

Relevant Drought Option(s):

Silsden Reservoir

Sensitive Features and Impact Assessment:

- Otter (Negligible)
- Brown trout (Major)
- Bullhead (Moderate)
- Grayling (Moderate)
- WFD - Fish (Major)
- WFD - Invertebrates (Moderate)

Significant Water Quality Pressures:

- None

Mitigation Triggers – Relevant Water Quality Thresholds:

Water quality thresholds appropriate to WFD river type:

- Moderate-Poor status thresholds for upland and low alkalinity rivers (less than 64% dissolved oxygen saturation; in excess of 0.75mg/l total ammonia)
- Additional unionised ammonia threshold of 40µg/l further to WFD requirements

Baseline Monitoring

Baseline monitoring proposed to ensure an adequate baseline dataset exists to describe non-drought conditions for those receptors likely to be impacted by drought permit implementation and to fill any data gaps *and reduce uncertainty* ***identified during the environmental assessment****.*

Routine Baseline Monitoring:

- BMON_1 - EA/YWSL to continue monitor river flows and levels/reservoir levels and spill at key monitoring sites
- BMON_2 - EA to continue routine water quality monitoring at existing network of sites on current monthly programme, which includes those on un-impacted reaches suitable as control sites.
- BMON_3 - Macroinvertebrate monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.
- BMON_4 - Fish monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

Targeted Baseline Monitoring:

- None required

On-set of Environmental Drought- Monitoring

Subject to the availability of relevant data, the following walkover survey should be carried out prior to drought permit implementation

- ODMON_1 – Walkover surveys of habitat quality and identification of drought sensitive habitats such as areas of riffle, pools and artificial features such as weirs and sluices that may be isolated or impassable during low flows. Results to be captured by annotated walkover maps and completion of a '*River Conditions Observation Form - Low Flows*' form.
  - Site 1: 500m located within SE0400745679 to SE0394045232

In-Drought (During drought option implementation) – Monitoring

In order to establish impacts and target mitigation the following surveillance walkover surveys should be completed during the drought option implementation (including on the day of the flow change, the day after and then weekly thereafter until no further changes are noted):

- 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 SE0400745679 to SE0394045232
- 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

In-Drought (During drought option implementation) – Mitigation

Mitigation which may be required during the drought option implementation.

- IDMIT_6 - Gradual phase-in of reduction in water volume/flow to avoid stranding of individuals (fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_7 - Gradual phase-in of compensation release increases to avoid stranding or displacement of individuals (macroinvertebrates, fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_8 - Temporary reduction in volume of abstraction or increase in compensation release (fish)
- IDMIT_9 - Artificial freshet release to provide temporary variation in the flow regime (fish, white-clawed crayfish, fine-lined pea mussel, water vole, otter)
- IDMIT_10 - Creation of alternative refuges in deeper water where walkover surveys identify the loss of important deep water habitat or high densities of fauna in refuges (fish, white-clawed crayfish, water vole)
- IDMIT_11 - Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive species where walkover surveys identify a projected loss of habitat inundation (macroinvertebrates, fish, white-clawed crayfish, water vole, otter)
- IDMIT_12 - Artificial channel narrowing to provide functional refuges and support habitat requirement for species, enabling a quick natural recolonisation of the reach post-drought (fish, macroinvertebrates, white-clawed crayfish, fine-lined pea mussel, otter, water vole)

- IDMIT_13 - Provision of piscivorous “visual” bird scaring measures (e.g. using streamers in riparian trees) to control predation upon species using refuges (fish). These visual measures would only be implemented following consultation with the EA, Natural England and bird specialists, particularly taking account of protected species under the Wildlife and Countryside Act. Implementation would follow best practice guidance.
- IDMIT_14 - Gravel washing of spawning habitats where walkover surveys and routine monitoring identifies likely habitat degradation as a result of sedimentations (fish)
- IDMIT_15 - Aeration of watercourse where significant mortality or change in species abundances are likely to be attributed to water quality deterioration
- IDMIT_16 - Modification of flow structure across barriers to retain favourable conditions to facilitate the movement/migration of species (fish)
- IDMIT_17 - Provision of freshet releases to enable migration of fish across significant obstacles (fish)
- IDMIT_19 - Capture and relocate individuals across significant barriers, taking into account migratory periods (immigration and emigration) (fish) and ensuring biosecurity measures are in place at all times.
- IDMIT_20 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and relocation to suitable habitat where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_21 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and retention for later release where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.

Post-Drought (Drought option removed) – Monitoring

Supplementary monitoring which may be required after drought option implementation:

- None required

Post-Drought (Drought option removed) – Mitigation

Mitigation which may be required after the drought option is removed:

- PDMIT_1 - Enhancement of habitat beyond the impacted reach (macroinvertebrates, fish, fine-lined pea mussel, white-clawed crayfish, water vole)
- PDMIT_2 - Provision of artificial freshets to ensure fish are capable of migrating where survey identifies insufficient water depth or volume across structures to facilitate migration (fish)
- PDMIT_3 - Modification to barriers and/or flows to improve passage where walkover survey identifies insufficient water depth or volume at obstacles (fish)
- PDMIT_4 - Capture and relocate across barrier (taking migratory period into account) where significant numbers of migratory fish congregate at obstacles (fish)
- PDMIT_5 - Relocation of juveniles where walkover surveys identify the likely desiccation of marginal habitats or loss of water depth at important habitats (fish, fine-lined pea mussel)
- PDMIT_7 - Restocking using offspring from broodstock from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)

Reach Overview Sheet

Bridgehouse Beck T1

WFD Waterbody:

Bridgehouse Beck from Source to River Worth (GB104027064200)

Relevant Drought Option(s):

Leeshaw Reservoir

Sensitive Features and Impact Assessment:

- Otter (Negligible)
- Brown trout (Moderate)
- Bullhead (Minor)
- WFD - Fish (Moderate)
- WFD - Invertebrates (Moderate)

Significant Water Quality Pressures:

- None

Mitigation Triggers – Relevant Water Quality Thresholds:

Water quality thresholds appropriate to WFD river type:

- Moderate-Poor status thresholds for upland and low alkalinity rivers (less than 64% dissolved oxygen saturation; in excess of 0.75mg/l total ammonia)
- Additional unionised ammonia threshold of 40µg/l further to WFD requirements

Baseline Monitoring

Baseline monitoring proposed to ensure an adequate baseline dataset exists to describe non-drought conditions for those receptors likely to be impacted by drought permit implementation and to fill any data gaps *and reduce uncertainty* ***identified during the environmental assessment****.*

Routine Baseline Monitoring:

- BMON_1 - EA/YWSL to continue monitor river flows and levels/reservoir levels and spill at key monitoring sites
- BMON_2 - EA to continue routine water quality monitoring at existing network of sites on current monthly programme, which includes those on un-impacted reaches suitable as control sites.
- BMON_3 - Macroinvertebrate monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.
- BMON_4 - Fish monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

Targeted Baseline Monitoring:

- None required

On-set of Environmental Drought- Monitoring

Subject to the availability of relevant data, the following walkover survey should be carried out prior to drought permit implementation

- ODMON_1 – Walkover surveys of habitat quality and identification of drought sensitive habitats such as areas of riffle, pools and artificial features such as weirs and sluices that may be isolated or impassable during low flows. Results to be captured by annotated walkover maps and completion of a '*River Conditions Observation Form - Low Flows*' form.
  - Site 1: 500m located within SE 01874 35186 to SE 02346 35195

In-Drought (During drought option implementation) – Monitoring

In order to establish impacts and target mitigation the following surveillance walkover surveys should be completed during the drought option implementation (including on the day of the flow change, the day after and then weekly thereafter until no further changes are noted):

- 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 SE 01874 35186 to SE 02346 35195
- 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

In-Drought (During drought option implementation) – Mitigation

Mitigation which may be required during the drought option implementation.

- IDMIT_6 - Gradual phase-in of reduction in water volume/flow to avoid stranding of individuals (fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_7 - Gradual phase-in of compensation release increases to avoid stranding or displacement of individuals (macroinvertebrates, fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_8 - Temporary reduction in volume of abstraction or increase in compensation release (fish)
- IDMIT_9 - Artificial freshet release to provide temporary variation in the flow regime (fish, white-clawed crayfish, fine-lined pea mussel, water vole, otter)
- IDMIT_10 - Creation of alternative refuges in deeper water where walkover surveys identify the loss of important deep water habitat or high densities of fauna in refuges (fish, white-clawed crayfish, water vole)
- IDMIT_11 - Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive species where walkover surveys identify a projected loss of habitat inundation (macroinvertebrates, fish, white-clawed crayfish, water vole, otter)

- IDMIT_12 - Artificial channel narrowing to provide functional refuges and support habitat requirement for species, enabling a quick natural recolonisation of the reach post-drought (fish, macroinvertebrates, white-clawed crayfish, fine-lined pea mussel, otter, water vole)
- IDMIT_13 - Provision of piscivorous “visual” bird scaring measures (e.g. using streamers in riparian trees) to control predation upon species using refuges (fish). These visual measures would only be implemented following consultation with the EA, Natural England and bird specialists, particularly taking account of protected species under the Wildlife and Countryside Act. Implementation would follow best practice guidance.
- IDMIT_14 - Gravel washing of spawning habitats where walkover surveys and routine monitoring identifies likely habitat degradation as a result of sedimentations (fish)
- IDMIT_15 - Aeration of watercourse where significant mortality or change in species abundances are likely to be attributed to water quality deterioration
- IDMIT_16 - Modification of flow structure across barriers to retain favourable conditions to facilitate the movement/migration of species (fish)
- IDMIT_17 - Provision of freshet releases to enable migration of fish across significant obstacles (fish)
- IDMIT_19 - Capture and relocate individuals across significant barriers, taking into account migratory periods (immigration and emigration) (fish) and ensuring biosecurity measures are in place at all times.
- IDMIT_20 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and relocation to suitable habitat where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_21 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and retention for later release where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.

Post-Drought (Drought option removed) – Monitoring

Supplementary monitoring which may be required after drought option implementation:

- None required

Post-Drought (Drought option removed) – Mitigation

Mitigation which may be required after the drought option is removed:

- PDMIT_1 - Enhancement of habitat beyond the impacted reach (macroinvertebrates, fish, fine-lined pea mussel, white-clawed crayfish, water vole)
- PDMIT_2 - Provision of artificial freshets to ensure fish are capable of migrating where survey identifies insufficient water depth or volume across structures to facilitate migration (fish)
- PDMIT_3 - Modification to barriers and/or flows to improve passage where walkover survey identifies insufficient water depth or volume at obstacles (fish)
- PDMIT_4 - Capture and relocate across barrier (taking migratory period into account) where significant numbers of migratory fish congregate at obstacles (fish)

- PDMIT_5 - Relocation of juveniles where walkover surveys identify the likely desiccation of marginal habitats or loss of water depth at important habitats (fish, fine-lined pea mussel)
- PDMIT_7 - Restocking using offspring from broodstock from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)

Reach Overview Sheet

Bridgehouse Beck

T2

WFD Waterbody:

Bridgehouse Beck from Source to River Worth (GB104027064200)

Relevant Drought Option(s):

Leeming Reservoir

Sensitive Features and Impact Assessment:

- Otter (Negligible)
- Riffle Beetle *Riolus subviolaceus* (Minor)
- Brown trout (Major)
- Bullhead (Moderate)
- WFD - Fish (Major)
- WFD - Invertebrates (Moderate)

Significant Water Quality Pressures:

- None

Mitigation Triggers – Relevant Water Quality Thresholds:

Water quality thresholds appropriate to WFD river type:

- Moderate-Poor status thresholds for upland and low alkalinity rivers (less than 64% dissolved oxygen saturation; in excess of 0.75mg/l total ammonia)
- Additional unionised ammonia threshold of 40µg/l further to WFD requirements

Baseline Monitoring

Baseline monitoring proposed to ensure an adequate baseline dataset exists to describe non-drought conditions for those receptors likely to be impacted by drought permit implementation and to fill any data gaps *and reduce uncertainty* ***identified during the environmental assessment****.*

Routine Baseline Monitoring:

- BMON_1 - EA/YWSL to continue monitor river flows and levels/reservoir levels and spill at key monitoring sites
- BMON_2 - EA to continue routine water quality monitoring at existing network of sites on current monthly programme, which includes those on un-impacted reaches suitable as control sites.
- BMON_3 - Macroinvertebrate monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.
- BMON_4 - Fish monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

Targeted Baseline Monitoring:

- None required

On-set of Environmental Drought- Monitoring

Subject to the availability of relevant data, the following walkover survey should be carried out prior to drought permit implementation

- ODMON_1 – Walkover surveys of habitat quality and identification of drought sensitive habitats such as areas of riffle, pools and artificial features such as weirs and sluices that may be isolated or impassable during low flows. Results to be captured by annotated walkover maps and completion of a '*River Conditions Observation Form - Low Flows*' form.
  - Site 1: 500m located within SE0356734403 to SE0345834727

In-Drought (During drought option implementation) – Monitoring

In order to establish impacts and target mitigation the following surveillance walkover surveys should be completed during the drought option implementation (including on the day of the flow change, the day after and then weekly thereafter until no further changes are noted):

- 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 SE0356734403 to SE0345834727
- 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

In-Drought (During drought option implementation) – Mitigation

Mitigation which may be required during the drought option implementation.

- IDMIT_6 - Gradual phase-in of reduction in water volume/flow to avoid stranding of individuals (fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_7 - Gradual phase-in of compensation release increases to avoid stranding or displacement of individuals (macroinvertebrates, fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_8 - Temporary reduction in volume of abstraction or increase in compensation release (fish)
- IDMIT_9 - Artificial freshet release to provide temporary variation in the flow regime (fish, white-clawed crayfish, fine-lined pea mussel, water vole, otter)
- IDMIT_10 - Creation of alternative refuges in deeper water where walkover surveys identify the loss of important deep water habitat or high densities of fauna in refuges (fish, white-clawed crayfish, water vole)
- IDMIT_11 - Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive species where walkover surveys identify a projected loss of habitat inundation (macroinvertebrates, fish, white-clawed crayfish, water vole, otter)

- IDMIT_12 - Artificial channel narrowing to provide functional refuges and support habitat requirement for species, enabling a quick natural recolonisation of the reach post-drought (fish, macroinvertebrates, white-clawed crayfish, fine-lined pea mussel, otter, water vole)
- IDMIT_13 - Provision of piscivorous “visual” bird scaring measures (e.g. using streamers in riparian trees) to control predation upon species using refuges (fish). These visual measures would only be implemented following consultation with the EA, Natural England and bird specialists, particularly taking account of protected species under the Wildlife and Countryside Act. Implementation would follow best practice guidance.
- IDMIT_14 - Gravel washing of spawning habitats where walkover surveys and routine monitoring identifies likely habitat degradation as a result of sedimentations (fish)
- IDMIT_15 - Aeration of watercourse where significant mortality or change in species abundances are likely to be attributed to water quality deterioration
- IDMIT_16 - Modification of flow structure across barriers to retain favourable conditions to facilitate the movement/migration of species (fish)
- IDMIT_19 - Capture and relocate individuals across significant barriers, taking into account migratory periods (immigration and emigration) (fish) and ensuring biosecurity measures are in place at all times.
- IDMIT_20 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and relocation to suitable habitat where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_21 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and retention for later release where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.

Post-Drought (Drought option removed) – Monitoring

Supplementary monitoring which may be required after drought option implementation:

- None required

Post-Drought (Drought option removed) – Mitigation

Mitigation which may be required after the drought option is removed:

- PDMIT_1 - Enhancement of habitat beyond the impacted reach (macroinvertebrates, fish, fine-lined pea mussel, white-clawed crayfish, water vole)
- PDMIT_5 - Relocation of juveniles where walkover surveys identify the likely desiccation of marginal habitats or loss of water depth at important habitats (fish, fine-lined pea mussel)
- PDMIT_7 - Restocking using offspring from broodstock from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)

Reach Overview Sheet

Bridgehouse Beck 1

WFD Waterbody:

Bridgehouse Beck from Source to River Worth (GB104027064200)

Relevant Drought Option(s):

Leeshaw Reservoir; Leeming Reservoir

Sensitive Features and Impact Assessment:

- White-clawed crayfish (Moderate)
- Otter (Negligible)
- Brown trout (Moderate)
- Bullhead (Moderate)
- WFD - Fish (Moderate)
- WFD - Invertebrates (Moderate)

Significant Water Quality Pressures:

- Oxenhope WwTW discharge outfall SE0355035670

Mitigation Triggers – Relevant Water Quality Thresholds:

Water quality thresholds appropriate to WFD river type:

- Moderate-Poor status thresholds for upland and low alkalinity rivers (less than 64% dissolved oxygen saturation; in excess of 0.75mg/l total ammonia)
- Additional unionised ammonia threshold of 40µg/l further to WFD requirements

Baseline Monitoring

Baseline monitoring proposed to ensure an adequate baseline dataset exists to describe non-drought conditions for those receptors likely to be impacted by drought permit implementation and to fill any data gaps *and reduce uncertainty* ***identified during the environmental assessment****.*

Routine Baseline Monitoring:

- BMON_1 - EA/YWSL to continue monitor river flows and levels/reservoir levels and spill at key monitoring sites
- BMON_2 - EA to continue routine water quality monitoring at existing network of sites on current monthly programme, which includes those on un-impacted reaches suitable as control sites.
- BMON_3 - Macroinvertebrate monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.
- BMON_4 - Fish monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

Targeted Baseline Monitoring:

- BMON_5 - White-clawed crayfish surveys to determine distribution and abundance in reaches under serious (i.e. moderate or major) hydrological stress

On-set of Environmental Drought- Monitoring

Subject to the availability of relevant data, the following walkover survey should be carried out prior to drought permit implementation

- ODMON_1 – Walkover surveys of habitat quality and identification of drought sensitive habitats such as areas of riffle, pools and artificial features such as weirs and sluices that may be isolated or impassable during low flows. Results to be captured by annotated walkover maps and completion of a '*River Conditions Observation Form - Low Flows*' form.
  - Site 1: 500m located within SE0362035976 to SE0349835618

In-Drought (During drought option implementation) – Monitoring

In order to establish impacts and target mitigation the following surveillance walkover surveys should be completed during the drought option implementation (including on the day of the flow change, the day after and then weekly thereafter until no further changes are noted):

- 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 SE0362035976 to SE0349835618
- 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:
  - None required

In-Drought (During drought option implementation) – Mitigation

Mitigation which may be required during the drought option implementation.

- IDMIT_3 - Improving the effluent quality from Yorkshire Water WwTWs presenting 'significant' impacts to sensitive features, thereby reducing the water quality pressure (ammonia and oxygen balance) on the impacted features.
- IDMIT_4 - Artificial freshet release to dilute/displace water quality reduction
- IDMIT_5 - Aeration of discharge from third party facility identified as a 'significant' water quality pressure
- IDMIT_6 - Gradual phase-in of reduction in water volume/flow to avoid stranding of individuals (fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_7 - Gradual phase-in of compensation release increases to avoid stranding or displacement of individuals (macroinvertebrates, fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_8 - Temporary reduction in volume of abstraction or increase in compensation release (fish)
- IDMIT_9 - Artificial freshet release to provide temporary variation in the flow regime (fish, white-clawed crayfish, fine-lined pea mussel, water vole, otter)

- IDMIT_10 - Creation of alternative refuges in deeper water where walkover surveys identify the loss of important deep water habitat or high densities of fauna in refuges (fish, white-clawed crayfish, water vole)
- IDMIT_11 - Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive species where walkover surveys identify a projected loss of habitat inundation (macroinvertebrates, fish, white-clawed crayfish, water vole, otter)
- IDMIT_12 - Artificial channel narrowing to provide functional refuges and support habitat requirement for species, enabling a quick natural recolonisation of the reach post-drought (fish, macroinvertebrates, white-clawed crayfish, fine-lined pea mussel, otter, water vole)
- IDMIT_13 - Provision of piscivorous “visual” bird scaring measures (e.g. using streamers in riparian trees) to control predation upon species using refuges (fish). These visual measures would only be implemented following consultation with the EA, Natural England and bird specialists, particularly taking account of protected species under the Wildlife and Countryside Act. Implementation would follow best practice guidance.
- IDMIT_14 - Gravel washing of spawning habitats where walkover surveys and routine monitoring identifies likely habitat degradation as a result of sedimentations (fish)
- IDMIT_15 - Aeration of watercourse where significant mortality or change in species abundances are likely to be attributed to water quality deterioration
- IDMIT_16 - Modification of flow structure across barriers to retain favourable conditions to facilitate the movement/migration of species (fish)
- IDMIT_17 - Provision of freshet releases to enable migration of fish across significant obstacles (fish)
- IDMIT_19 - Capture and relocate individuals across significant barriers, taking into account migratory periods (immigration and emigration) (fish) and ensuring biosecurity measures are in place at all times.
- IDMIT_20 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and relocation to suitable habitat where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_21 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and retention for later release where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.

Post-Drought (Drought option removed) – Monitoring

Supplementary monitoring which may be required after drought option implementation:

- PDMON_1 - White-clawed crayfish sampling to monitor recovery of their distribution and abundance

Post-Drought (Drought option removed) – Mitigation

Mitigation which may be required after the drought option is removed:

- PDMIT_1 - Enhancement of habitat beyond the impacted reach (macroinvertebrates, fish, fine-lined pea mussel, white-clawed crayfish, water vole)

- PDMIT_2 - Provision of artificial freshets to ensure fish are capable of migrating where survey identifies insufficient water depth or volume across structures to facilitate migration (fish)
- PDMIT_3 - Modification to barriers and/or flows to improve passage where walkover survey identifies insufficient water depth or volume at obstacles (fish)
- PDMIT_4 - Capture and relocate across barrier (taking migratory period into account) where significant numbers of migratory fish congregate at obstacles (fish)
- PDMIT_5 - Relocation of juveniles where walkover surveys identify the likely desiccation of marginal habitats or loss of water depth at important habitats (fish, fine-lined pea mussel)
- PDMIT_7 - Restocking using offspring from broodstock from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)
- PDMIT_8 - Restocking of coarse fish from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)

Reach Overview Sheet

Worth 1

WFD Waterbody:

Worth from Source to Bridgehouse Beck, (GB104027064210)

Relevant Drought Option(s):

Springhead Weir Maintained Flow

Sensitive Features and Impact Assessment:

- White-clawed crayfish (Major)
- Otter (Negligible)
- Brook lamprey (Major)
- Brown trout (Major)
- Bullhead (Moderate)
- WFD - Fish (Major)
- WFD - Invertebrates (Moderate)

Significant Water Quality Pressures:

- None

Mitigation Triggers – Relevant Water Quality Thresholds:

Water quality thresholds appropriate to WFD river type:

- Moderate-Poor status thresholds for upland and low alkalinity rivers (less than 64% dissolved oxygen saturation; in excess of 0.75mg/l total ammonia)
- Additional unionised ammonia threshold of 40µg/l further to WFD requirements

Baseline Monitoring

Baseline monitoring proposed to ensure an adequate baseline dataset exists to describe non-drought conditions for those receptors likely to be impacted by drought permit implementation and to fill any data gaps *and reduce uncertainty* ***identified during the environmental assessment****.*

Routine Baseline Monitoring:

- BMON_1 - EA/YWSL to continue monitor river flows and levels/reservoir levels and spill at key monitoring sites
- BMON_2 - EA to continue routine water quality monitoring at existing network of sites on current monthly programme, which includes those on un-impacted reaches suitable as control sites.
- BMON_3 - Macroinvertebrate monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.
- BMON_4 - Fish monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

Targeted Baseline Monitoring:

- BMON_5 - White-clawed crayfish surveys to determine distribution and abundance in reaches under serious (i.e. moderate or major) hydrological stress
- BMON_7 - Targeted juvenile lamprey surveys to identify distribution of habitat and an indicative population status within reaches subject to serious hydrological stress

On-set of Environmental Drought- Monitoring

Subject to the availability of relevant data, the following walkover survey should be carried out prior to drought permit implementation

- ODMON_1 – Walkover surveys of habitat quality and identification of drought sensitive habitats such as areas of riffle, pools and artificial features such as weirs and sluices that may be isolated or impassable during low flows. Results to be captured by annotated walkover maps and completion of a '*River Conditions Observation Form - Low Flows*' form.
  - Site 1: 500m located within SE0238037708 to SE0280237831

In-Drought (During drought option implementation) – Monitoring

In order to establish impacts and target mitigation the following surveillance walkover surveys should be completed during the drought option implementation (including on the day of the flow change, the day after and then weekly thereafter until no further changes are noted):

- 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

In-Drought (During drought option implementation) – Mitigation

Mitigation which may be required during the drought option implementation.

- IDMIT_6 - Gradual phase-in of reduction in water volume/flow to avoid stranding of individuals (fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_7 - Gradual phase-in of compensation release increases to avoid stranding or displacement of individuals (macroinvertebrates, fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_8 - Temporary reduction in volume of abstraction or increase in compensation release (fish)
- IDMIT_9 - Artificial freshet release to provide temporary variation in the flow regime (fish, white-clawed crayfish, fine-lined pea mussel, water vole, otter)
- IDMIT_10 - Creation of alternative refuges in deeper water where walkover surveys identify the loss of important deep water habitat or high densities of fauna in refuges (fish, white-clawed crayfish, water vole)

- IDMIT_11 - Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive species where walkover surveys identify a projected loss of habitat inundation (macroinvertebrates, fish, white-clawed crayfish, water vole, otter)
- IDMIT_12 - Artificial channel narrowing to provide functional refuges and support habitat requirement for species, enabling a quick natural recolonisation of the reach post-drought (fish, macroinvertebrates, white-clawed crayfish, fine-lined pea mussel, otter, water vole)
- IDMIT_13 - Provision of piscivorous “visual” bird scaring measures (e.g. using streamers in riparian trees) to control predation upon species using refuges (fish). These visual measures would only be implemented following consultation with the EA, Natural England and bird specialists, particularly taking account of protected species under the Wildlife and Countryside Act. Implementation would follow best practice guidance.
- IDMIT_14 - Gravel washing of spawning habitats where walkover surveys and routine monitoring identifies likely habitat degradation as a result of sedimentations (fish)
- IDMIT_15 - Aeration of watercourse where significant mortality or change in species abundances are likely to be attributed to water quality deterioration
- IDMIT_16 - Modification of flow structure across barriers to retain favourable conditions to facilitate the movement/migration of species (fish)
- IDMIT_17 - Provision of freshet releases to enable migration of fish across significant obstacles (fish)
- IDMIT_19 - Capture and relocate individuals across significant barriers, taking into account migratory periods (immigration and emigration) (fish) and ensuring biosecurity measures are in place at all times.
- IDMIT_20 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and relocation to suitable habitat where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_21 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and retention for later release where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.

Post-Drought (Drought option removed) – Monitoring

Supplementary monitoring which may be required after drought option implementation:

- PDMON_1 - White-clawed crayfish sampling to monitor recovery of their distribution and abundance

Post-Drought (Drought option removed) – Mitigation

Mitigation which may be required after the drought option is removed:

- PDMIT_1 - Enhancement of habitat beyond the impacted reach (macroinvertebrates, fish, fine-lined pea mussel, white-clawed crayfish, water vole)
- PDMIT_2 - Provision of artificial freshets to ensure fish are capable of migrating where survey identifies insufficient water depth or volume across structures to facilitate migration (fish)

- PDMIT_3 - Modification to barriers and/or flows to improve passage where walkover survey identifies insufficient water depth or volume at obstacles (fish)
- PDMIT_4 - Capture and relocate across barrier (taking migratory period into account) where significant numbers of migratory fish congregate at obstacles (fish)
- PDMIT_5 - Relocation of juveniles where walkover surveys identify the likely desiccation of marginal habitats or loss of water depth at important habitats (fish, fine-lined pea mussel)
- PDMIT_6 - Restocking using juvenile lamprey ammocoetes within the catchment where monitoring indicates loss of fish abundance or recruitment (fish)
- PDMIT_7 - Restocking using offspring from broodstock from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)

Reach Overview Sheet

Worth 2

WFD Waterbody:

River Worth from Bridgehouse Beck to River Aire (GB104027062891)

Relevant Drought Option(s):

Leeshaw Reservoir; Leeming Reservoir; Springhead Weir Maintain Flow

Sensitive Features and Impact Assessment:

- Otter (Negligible)
- Brook lamprey (Major)
- Brown trout (Major)
- Bullhead (Moderate)
- Grayling (Moderate)
- River lamprey (Moderate)
- WFD - Fish (Major)
- WFD - Invertebrates (Moderate)

Significant Water Quality Pressures:

- South Street Keighley CSO SE0592040223
- Oxenhope WwTW discharge outfall SE0355035670

Mitigation Triggers – Relevant Water Quality Thresholds:

Water quality thresholds appropriate to WFD river type:

- Moderate-Poor status thresholds for upland and low alkalinity rivers (less than 64% dissolved oxygen saturation; in excess of 0.75mg/l total ammonia)
- Additional unionised ammonia threshold of 40µg/l further to WFD requirements

Baseline Monitoring

Baseline monitoring proposed to ensure an adequate baseline dataset exists to describe non-drought conditions for those receptors likely to be impacted by drought permit implementation and to fill any data gaps *and reduce uncertainty* ***identified during the environmental assessment****.*

Routine Baseline Monitoring:

- BMON_1 - EA/YWSL to continue monitor river flows and levels/reservoir levels and spill at key monitoring sites
- BMON_2 - EA to continue routine water quality monitoring at existing network of sites on current monthly programme, which includes those on un-impacted reaches suitable as control sites.
- BMON_3 - Macroinvertebrate monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

- BMON_4 - Fish monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

Targeted Baseline Monitoring:

- BMON_7 - Targeted juvenile lamprey surveys to identify distribution of habitat and an indicative population status within reaches subject to serious hydrological stress

On-set of Environmental Drought- Monitoring

Subject to the availability of relevant data, the following walkover survey should be carried out prior to drought permit implementation

- ODMON_1 – Walkover surveys of habitat quality and identification of drought sensitive habitats such as areas of riffle, pools and artificial features such as weirs and sluices that may be isolated or impassable during low flows. Results to be captured by annotated walkover maps and completion of a '*River Conditions Observation Form - Low Flows*' form.
  - Site 1: 500m located within SE0510538813 to SE0530439241

In-Drought (During drought option implementation) – Monitoring

In order to establish impacts and target mitigation the following surveillance walkover surveys should be completed during the drought option implementation (including on the day of the flow change, the day after and then weekly thereafter until no further changes are noted):

- 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

In-Drought (During drought option implementation) – Mitigation

Mitigation which may be required during the drought option implementation.

- IDMIT_3 - Improving the effluent quality from Yorkshire Water WwTWs presenting 'significant' impacts to sensitive features, thereby reducing the water quality pressure (ammonia and oxygen balance) on the impacted features.
- IDMIT_4 - Artificial freshet release to dilute/displace water quality reduction
- IDMIT_5 - Aeration of discharge from third party facility identified as a 'significant' water quality pressure
- IDMIT_6 - Gradual phase-in of reduction in water volume/flow to avoid stranding of individuals (fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_7 - Gradual phase-in of compensation release increases to avoid stranding or displacement of individuals (macroinvertebrates, fish, white-clawed crayfish, fine-lined pea mussel)

- IDMIT_8 - Temporary reduction in volume of abstraction or increase in compensation release (fish)
- IDMIT_9 - Artificial freshet release to provide temporary variation in the flow regime (fish, white-clawed crayfish, fine-lined pea mussel, water vole, otter)
- IDMIT_10 - Creation of alternative refuges in deeper water where walkover surveys identify the loss of important deep water habitat or high densities of fauna in refuges (fish, white-clawed crayfish, water vole)
- IDMIT_11 - Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive species where walkover surveys identify a projected loss of habitat inundation (macroinvertebrates, fish, white-clawed crayfish, water vole, otter)
- IDMIT_12 - Artificial channel narrowing to provide functional refuges and support habitat requirement for species, enabling a quick natural recolonisation of the reach post-drought (fish, macroinvertebrates, white-clawed crayfish, fine-lined pea mussel, otter, water vole)
- IDMIT_13 - Provision of piscivorous “visual” bird scaring measures (e.g. using streamers in riparian trees) to control predation upon species using refuges (fish). These visual measures would only be implemented following consultation with the EA, Natural England and bird specialists, particularly taking account of protected species under the Wildlife and Countryside Act. Implementation would follow best practice guidance.
- IDMIT_14 - Gravel washing of spawning habitats where walkover surveys and routine monitoring identifies likely habitat degradation as a result of sedimentations (fish)
- IDMIT_15 - Aeration of watercourse where significant mortality or change in species abundances are likely to be attributed to water quality deterioration
- IDMIT_16 - Modification of flow structure across barriers to retain favourable conditions to facilitate the movement/migration of species (fish)
- IDMIT_17 - Provision of freshet releases to enable migration of fish across significant obstacles (fish)
- IDMIT_19 - Capture and relocate individuals across significant barriers, taking into account migratory periods (immigration and emigration) (fish) and ensuring biosecurity measures are in place at all times.
- IDMIT_20 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and relocation to suitable habitat where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_21 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and retention for later release where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_23 - For CSOs identified as significant water quality prioritise planned maintenance work on and reactive pollution prevention work, including visits by operators.

Post-Drought (Drought option removed) – Monitoring

Supplementary monitoring which may be required after drought option implementation:

- None required

Post-Drought (Drought option removed) – Mitigation

Mitigation which may be required after the drought option is removed:

- PDMIT_1 - Enhancement of habitat beyond the impacted reach (macroinvertebrates, fish, fine-lined pea mussel, white-clawed crayfish, water vole)
- PDMIT_2 - Provision of artificial freshets to ensure fish are capable of migrating where survey identifies insufficient water depth or volume across structures to facilitate migration (fish)
- PDMIT_3 - Modification to barriers and/or flows to improve passage where walkover survey identifies insufficient water depth or volume at obstacles (fish)
- PDMIT_4 - Capture and relocate across barrier (taking migratory period into account) where significant numbers of migratory fish congregate at obstacles (fish)
- PDMIT_5 - Relocation of juveniles where walkover surveys identify the likely desiccation of marginal habitats or loss of water depth at important habitats (fish, fine-lined pea mussel)
- PDMIT_6 - Restocking using juvenile lamprey ammocoetes within the catchment where monitoring indicates loss of fish abundance or recruitment (fish)
- PDMIT_7 - Restocking using offspring from broodstock from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)
- PDMIT_8 - Restocking of coarse fish from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)

Reach Overview Sheet

Denholme Beck 1

WFD Waterbody:

Harden Beck from Source to River Aire (GB104027062870)

Relevant Drought Option(s):

Doe Park Reservoir

Sensitive Features and Impact Assessment:

- White-clawed crayfish (Moderate)
- Otter (Negligible)
- Water vole (Moderate)
- Brown trout (Moderate)
- Bullhead (Moderate)
- WFD - Fish (Moderate)
- WFD - Invertebrates (Minor)

Significant Water Quality Pressures:

- None

Mitigation Triggers – Relevant Water Quality Thresholds:

Water quality thresholds appropriate to WFD river type:

- Moderate-Poor status thresholds for upland and low alkalinity rivers (less than 64% dissolved oxygen saturation; in excess of 0.75mg/l total ammonia)
- Additional unionised ammonia threshold of 40µg/l further to WFD requirements

Baseline Monitoring

Baseline monitoring proposed to ensure an adequate baseline dataset exists to describe non-drought conditions for those receptors likely to be impacted by drought permit implementation and to fill any data gaps *and reduce uncertainty* ***identified during the environmental assessment****.*

Routine Baseline Monitoring:

- BMON_1 - EA/YWSL to continue monitor river flows and levels/reservoir levels and spill at key monitoring sites
- BMON_2 - EA to continue routine water quality monitoring at existing network of sites on current monthly programme, which includes those on un-impacted reaches suitable as control sites.
- BMON_3 - Macroinvertebrate monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.
- BMON_4 - Fish monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

Targeted Baseline Monitoring:

- BMON_5 - White-clawed crayfish surveys to determine distribution and abundance in reaches under serious (i.e. moderate or major) hydrological stress

On-set of Environmental Drought- Monitoring

Subject to the availability of relevant data, the following walkover survey should be carried out prior to drought permit implementation

- ODMON_1 – Walkover surveys of habitat quality and identification of drought sensitive habitats such as areas of riffle, pools and artificial features such as weirs and sluices that may be isolated or impassable during low flows. Results to be captured by annotated walkover maps and completion of a '*River Conditions Observation Form - Low Flows*' form.
  - Site 1: 500m located within SE0761234330 to SE0743534742

In-Drought (During drought option implementation) – Monitoring

In order to establish impacts and target mitigation the following surveillance walkover surveys should be completed during the drought option implementation (including on the day of the flow change, the day after and then weekly thereafter until no further changes are noted):

- 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 SE0761234330 to SE0743534742
- 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

In-Drought (During drought option implementation) – Mitigation

Mitigation which may be required during the drought option implementation.

- IDMIT_6 - Gradual phase-in of reduction in water volume/flow to avoid stranding of individuals (fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_7 - Gradual phase-in of compensation release increases to avoid stranding or displacement of individuals (macroinvertebrates, fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_8 - Temporary reduction in volume of abstraction or increase in compensation release (fish)
- IDMIT_9 - Artificial freshet release to provide temporary variation in the flow regime (fish, white-clawed crayfish, fine-lined pea mussel, water vole, otter)
- IDMIT_10 - Creation of alternative refuges in deeper water where walkover surveys identify the loss of important deep water habitat or high densities of fauna in refuges (fish, white-clawed crayfish, water vole)
- IDMIT_11 - Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive species where walkover surveys identify a projected loss of habitat inundation (macroinvertebrates, fish, white-clawed crayfish, water vole, otter)

- IDMIT_12 - Artificial channel narrowing to provide functional refuges and support habitat requirement for species, enabling a quick natural recolonisation of the reach post-drought (fish, macroinvertebrates, white-clawed crayfish, fine-lined pea mussel, otter, water vole)
- IDMIT_13 - Provision of piscivorous “visual” bird scaring measures (e.g. using streamers in riparian trees) to control predation upon species using refuges (fish). These visual measures would only be implemented following consultation with the EA, Natural England and bird specialists, particularly taking account of protected species under the Wildlife and Countryside Act. Implementation would follow best practice guidance.
- IDMIT_14 - Gravel washing of spawning habitats where walkover surveys and routine monitoring identifies likely habitat degradation as a result of sedimentations (fish)
- IDMIT_15 - Aeration of watercourse where significant mortality or change in species abundances are likely to be attributed to water quality deterioration
- IDMIT_16 - Modification of flow structure across barriers to retain favourable conditions to facilitate the movement/migration of species (fish)
- IDMIT_17 - Provision of freshet releases to enable migration of fish across significant obstacles (fish)
- IDMIT_19 - Capture and relocate individuals across significant barriers, taking into account migratory periods (immigration and emigration) (fish) and ensuring biosecurity measures are in place at all times.
- IDMIT_20 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and relocation to suitable habitat where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_21 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and retention for later release where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.

Post-Drought (Drought option removed) – Monitoring

Supplementary monitoring which may be required after drought option implementation:

- PDMON_1 - White-clawed crayfish sampling to monitor recovery of their distribution and abundance

Post-Drought (Drought option removed) – Mitigation

Mitigation which may be required after the drought option is removed:

- PDMIT_1 - Enhancement of habitat beyond the impacted reach (macroinvertebrates, fish, fine-lined pea mussel, white-clawed crayfish, water vole)
- PDMIT_2 - Provision of artificial freshets to ensure fish are capable of migrating where survey identifies insufficient water depth or volume across structures to facilitate migration (fish)
- PDMIT_3 - Modification to barriers and/or flows to improve passage where walkover survey identifies insufficient water depth or volume at obstacles (fish)
- PDMIT_4 - Capture and relocate across barrier (taking migratory period into account) where significant numbers of migratory fish congregate at obstacles (fish)

- PDMIT_5 - Relocation of juveniles where walkover surveys identify the likely desiccation of marginal habitats or loss of water depth at important habitats (fish, fine-lined pea mussel)
- PDMIT_7 - Restocking using offspring from broodstock from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)

Reach Overview Sheet

Harden Beck 1

WFD Waterbody:

Harden Beck from Source to River Aire (GB104027062870)

Relevant Drought Option(s):

Doe Park Reservoir; Hewenden Reservoir

Sensitive Features and Impact Assessment:

- Harden Beck LWS (Moderate)
- White-clawed crayfish (Moderate)
- Otter (Negligible)
- Water vole (Moderate)
- Brown trout (Moderate)
- Bullhead (Moderate)
- Grayling (Moderate)
- WFD - Fish (Moderate)
- WFD - Invertebrates (Moderate)

Significant Water Quality Pressures:

- Harecroft WwTW discharge outfall at SE0780035900

Mitigation Triggers – Relevant Water Quality Thresholds:

Water quality thresholds appropriate to WFD river type:

- Moderate-Poor status thresholds for upland and low alkalinity rivers (less than 64% dissolved oxygen saturation; in excess of 0.75mg/l total ammonia)
- Additional unionised ammonia threshold of 40µg/l further to WFD requirements

Baseline Monitoring

Baseline monitoring proposed to ensure an adequate baseline dataset exists to describe non-drought conditions for those receptors likely to be impacted by drought permit implementation and to fill any data gaps *and reduce uncertainty* ***identified during the environmental assessment****.*

Routine Baseline Monitoring:

- BMON_1 - EA/YWSL to continue monitor river flows and levels/reservoir levels and spill at key monitoring sites
- BMON_2 - EA to continue routine water quality monitoring at existing network of sites on current monthly programme, which includes those on un-impacted reaches suitable as control sites.
- BMON_3 - Macroinvertebrate monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.
- BMON_4 - Fish monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

Targeted Baseline Monitoring:

- BMON_5 - White-clawed crayfish surveys to determine distribution and abundance in reaches under serious (i.e. moderate or major) hydrological stress

On-set of Environmental Drought- Monitoring

Subject to the availability of relevant data, the following walkover survey should be carried out prior to drought permit implementation

- ODMON_1 – Walkover surveys of habitat quality and identification of drought sensitive habitats such as areas of riffle, pools and artificial features such as weirs and sluices that may be isolated or impassable during low flows. Results to be captured by annotated walkover maps and completion of a '*River Conditions Observation Form - Low Flows*' form.
  - Site 1: 500m located within SE1010038598 to SE1050038455

In-Drought (During drought option implementation) – Monitoring

In order to establish impacts and target mitigation the following surveillance walkover surveys should be completed during the drought option implementation (including on the day of the flow change, the day after and then weekly thereafter until no further changes are noted):

- 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 SE1010038598 to SE1050038455
- 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 Harecroft WwTW discharge outfall at SE0780035900
- IDMON_3 - Storm intensity forecasting to predict likely CSO spill events and the need for pre-emptive mitigation:
  - None required

In-Drought (During drought option implementation) – Mitigation

Mitigation which may be required during the drought option implementation.

- IDMIT_3 - Improving the effluent quality from Yorkshire Water WwTWs presenting 'significant' impacts to sensitive features, thereby reducing the water quality pressure (ammonia and oxygen balance) on the impacted features.
- IDMIT_4 - Artificial freshet release to dilute/displace water quality reduction
- IDMIT_5 - Aeration of discharge from third party facility identified as a 'significant' water quality pressure
- IDMIT_6 - Gradual phase-in of reduction in water volume/flow to avoid stranding of individuals (fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_7 - Gradual phase-in of compensation release increases to avoid stranding or displacement of individuals (macroinvertebrates, fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_8 - Temporary reduction in volume of abstraction or increase in compensation release (fish)
- IDMIT_9 - Artificial freshet release to provide temporary variation in the flow regime (fish, white-clawed crayfish, fine-lined pea mussel, water vole, otter)

- IDMIT_10 - Creation of alternative refuges in deeper water where walkover surveys identify the loss of important deep water habitat or high densities of fauna in refuges (fish, white-clawed crayfish, water vole)
- IDMIT_11 - Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive species where walkover surveys identify a projected loss of habitat inundation (macroinvertebrates, fish, white-clawed crayfish, water vole, otter)
- IDMIT_12 - Artificial channel narrowing to provide functional refuges and support habitat requirement for species, enabling a quick natural recolonisation of the reach post-drought (fish, macroinvertebrates, white-clawed crayfish, fine-lined pea mussel, otter, water vole)
- IDMIT_13 - Provision of piscivorous “visual” bird scaring measures (e.g. using streamers in riparian trees) to control predation upon species using refuges (fish). These visual measures would only be implemented following consultation with the EA, Natural England and bird specialists, particularly taking account of protected species under the Wildlife and Countryside Act. Implementation would follow best practice guidance.
- IDMIT_14 - Gravel washing of spawning habitats where walkover surveys and routine monitoring identifies likely habitat degradation as a result of sedimentations (fish)
- IDMIT_15 - Aeration of watercourse where significant mortality or change in species abundances are likely to be attributed to water quality deterioration
- IDMIT_16 - Modification of flow structure across barriers to retain favourable conditions to facilitate the movement/migration of species (fish)
- IDMIT_17 - Provision of freshet releases to enable migration of fish across significant obstacles (fish)
- IDMIT_19 - Capture and relocate individuals across significant barriers, taking into account migratory periods (immigration and emigration) (fish) and ensuring biosecurity measures are in place at all times.
- IDMIT_20 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and relocation to suitable habitat where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_21 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and retention for later release where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.

Post-Drought (Drought option removed) – Monitoring

Supplementary monitoring which may be required after drought option implementation:

- PDMON_1 - White-clawed crayfish sampling to monitor recovery of their distribution and abundance

Post-Drought (Drought option removed) – Mitigation

Mitigation which may be required after the drought option is removed:

- PDMIT_1 - Enhancement of habitat beyond the impacted reach (macroinvertebrates, fish, fine-lined pea mussel, white-clawed crayfish, water vole)

- PDMIT_2 - Provision of artificial freshets to ensure fish are capable of migrating where survey identifies insufficient water depth or volume across structures to facilitate migration (fish)
- PDMIT_3 - Modification to barriers and/or flows to improve passage where walkover survey identifies insufficient water depth or volume at obstacles (fish)
- PDMIT_4 - Capture and relocate across barrier (taking migratory period into account) where significant numbers of migratory fish congregate at obstacles (fish)
- PDMIT_5 - Relocation of juveniles where walkover surveys identify the likely desiccation of marginal habitats or loss of water depth at important habitats (fish, fine-lined pea mussel)
- PDMIT_7 - Restocking using offspring from broodstock from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)

Reach Overview Sheet

Loadpit Beck 1

WFD Waterbody:

River Aire, River Worth to Gill Beck (GB104027063034)

Relevant Drought Option(s):

Eldwick Reservoir

Sensitive Features and Impact Assessment:

- Otter (Negligible)
- Brown trout (Major)
- Bullhead (Moderate)
- White-clawed crayfish (Moderate)
- WFD - Fish (Moderate)
- WFD - Invertebrates (Moderate)

Significant Water Quality Pressures:

- None

Mitigation Triggers – Relevant Water Quality Thresholds:

Water quality thresholds appropriate to WFD river type:

- Moderate-Poor status thresholds for lowland and high alkalinity 'salmonid water' rivers (less than 64% dissolved oxygen saturation; in excess of 1.1mg/l total ammonia)
- Additional unionised ammonia threshold of 40µg/l further to WFD requirements

Baseline Monitoring

Baseline monitoring proposed to ensure an adequate baseline dataset exists to describe non-drought conditions for those receptors likely to be impacted by drought permit implementation and to fill any data gaps *and reduce uncertainty* ***identified during the environmental assessment****.*

Routine Baseline Monitoring:

- BMON_1 - EA/YWSL to continue monitor river flows and levels/reservoir levels and spill at key monitoring sites
- BMON_2 - EA to continue routine water quality monitoring at existing network of sites on current monthly programme, which includes those on un-impacted reaches suitable as control sites.
- BMON_3 - Macroinvertebrate monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.
- BMON_4 - Fish monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

Targeted Baseline Monitoring:

- BMON_5 - White-clawed crayfish surveys to determine distribution and abundance in reaches under serious (i.e. moderate or major) hydrological stress

On-set of Environmental Drought- Monitoring

Subject to the availability of relevant data, the following walkover survey should be carried out prior to drought permit implementation

- ODMON_1 – Walkover surveys of habitat quality and identification of drought sensitive habitats such as areas of riffle, pools and artificial features such as weirs and sluices that may be isolated or impassable during low flows. Results to be captured by annotated walkover maps and completion of a '*River Conditions Observation Form - Low Flows*' form.
  - Site 1: 500m located within SE1263340449 to SE1288740077

In-Drought (During drought option implementation) – Monitoring

In order to establish impacts and target mitigation the following surveillance walkover surveys should be completed during the drought option implementation (including on the day of the flow change, the day after and then weekly thereafter until no further changes are noted):

- 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 SE1263340449 to SE1288740077
- 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

In-Drought (During drought option implementation) – Mitigation

Mitigation which may be required during the drought option implementation.

- IDMIT_6 - Gradual phase-in of reduction in water volume/flow to avoid stranding of individuals (fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_7 - Gradual phase-in of compensation release increases to avoid stranding or displacement of individuals (macroinvertebrates, fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_8 - Temporary reduction in volume of abstraction or increase in compensation release (fish)
- IDMIT_9 - Artificial freshet release to provide temporary variation in the flow regime (fish, white-clawed crayfish, fine-lined pea mussel, water vole, otter)
- IDMIT_10 - Creation of alternative refuges in deeper water where walkover surveys identify the loss of important deep water habitat or high densities of fauna in refuges (fish, white-clawed crayfish, water vole)
- IDMIT_11 - Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive species where walkover surveys identify a projected loss of habitat inundation (macroinvertebrates, fish, white-clawed crayfish, water vole, otter)

- IDMIT_12 - Artificial channel narrowing to provide functional refuges and support habitat requirement for species, enabling a quick natural recolonisation of the reach post-drought (fish, macroinvertebrates, white-clawed crayfish, fine-lined pea mussel, otter, water vole)
- IDMIT_13 - Provision of piscivorous “visual” bird scaring measures (e.g. using streamers in riparian trees) to control predation upon species using refuges (fish). These visual measures would only be implemented following consultation with the EA, Natural England and bird specialists, particularly taking account of protected species under the Wildlife and Countryside Act. Implementation would follow best practice guidance.
- IDMIT_14 - Gravel washing of spawning habitats where walkover surveys and routine monitoring identifies likely habitat degradation as a result of sedimentations (fish)
- IDMIT_15 - Aeration of watercourse where significant mortality or change in species abundances are likely to be attributed to water quality deterioration
- IDMIT_16 - Modification of flow structure across barriers to retain favourable conditions to facilitate the movement/migration of species (fish)
- IDMIT_17 - Provision of freshet releases to enable migration of fish across significant obstacles (fish)
- IDMIT_19 - Capture and relocate individuals across significant barriers, taking into account migratory periods (immigration and emigration) (fish) and ensuring biosecurity measures are in place at all times.
- IDMIT_20 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and relocation to suitable habitat where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_21 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and retention for later release where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.

Post-Drought (Drought option removed) – Monitoring

Supplementary monitoring which may be required after drought option implementation:

- PDMON_1 - White-clawed crayfish sampling to monitor recovery of their distribution and abundance

Post-Drought (Drought option removed) – Mitigation

Mitigation which may be required after the drought option is removed:

- PDMIT_1 - Enhancement of habitat beyond the impacted reach (macroinvertebrates, fish, fine-lined pea mussel, white-clawed crayfish, water vole)
- PDMIT_2 - Provision of artificial freshets to ensure fish are capable of migrating where survey identifies insufficient water depth or volume across structures to facilitate migration (fish)
- PDMIT_3 - Modification to barriers and/or flows to improve passage where walkover survey identifies insufficient water depth or volume at obstacles (fish)
- PDMIT_4 - Capture and relocate across barrier (taking migratory period into account) where significant numbers of migratory fish congregate at obstacles (fish)

- PDMIT_5 - Relocation of juveniles where walkover surveys identify the likely desiccation of marginal habitats or loss of water depth at important habitats (fish, fine-lined pea mussel)
- PDMIT_7 - Restocking using offspring from broodstock from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)

Reach Overview Sheet

Gill Beck 1

WFD Waterbody:

Gill Beck (Baildon) from Source to River Aire (GB104027062940)

Relevant Drought Option(s):

Weecher Reservoir

Sensitive Features and Impact Assessment:

- Hawksworth Spring Wood LWS (Moderate)
- Tong Park LWS (Negligible)
- White-clawed crayfish (Major)
- Otter (Negligible)
- Brown trout (Major)
- Bullhead (Moderate)
- WFD - Fish (Moderate)
- WFD - Invertebrates (Moderate)

Significant Water Quality Pressures:

- None

Mitigation Triggers – Relevant Water Quality Thresholds:

Water quality thresholds appropriate to WFD river type:

- Moderate-Poor status thresholds for lowland and high alkalinity rivers (less than 54% dissolved oxygen saturation; in excess of 1.1mg/l total ammonia)
- Additional unionised ammonia threshold of 40µg/l further to WFD requirements

Baseline Monitoring

Baseline monitoring proposed to ensure an adequate baseline dataset exists to describe non-drought conditions for those receptors likely to be impacted by drought permit implementation and to fill any data gaps *and reduce uncertainty* ***identified during the environmental assessment****.*

Routine Baseline Monitoring:

- BMON_1 - EA/YWSL to continue monitor river flows and levels/reservoir levels and spill at key monitoring sites
- BMON_2 - EA to continue routine water quality monitoring at existing network of sites on current monthly programme, which includes those on un-impacted reaches suitable as control sites.
- BMON_3 - Macroinvertebrate monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.
- BMON_4 - Fish monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

Targeted Baseline Monitoring:

- BMON_5 - White-clawed crayfish surveys to determine distribution and abundance in reaches under serious (i.e. moderate or major) hydrological stress

On-set of Environmental Drought- Monitoring

Subject to the availability of relevant data, the following walkover survey should be carried out prior to drought permit implementation

- ODMON_1 – Walkover surveys of habitat quality and identification of drought sensitive habitats such as areas of riffle, pools and artificial features such as weirs and sluices that may be isolated or impassable during low flows. Results to be captured by annotated walkover maps and completion of a '*River Conditions Observation Form - Low Flows*' form.
  - Site 1: 500m located SE1515041384 to SE1549041207

In-Drought (During drought option implementation) – Monitoring

In order to establish impacts and target mitigation the following surveillance walkover surveys should be completed during the drought option implementation (including on the day of the flow change, the day after and then weekly thereafter until no further changes are noted):

- 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 SE1515041384 to SE1549041207
- 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

In-Drought (During drought option implementation) – Mitigation

Mitigation which may be required during the drought option implementation.

- IDMIT_6 - Gradual phase-in of reduction in water volume/flow to avoid stranding of individuals (fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_7 - Gradual phase-in of compensation release increases to avoid stranding or displacement of individuals (macroinvertebrates, fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_8 - Temporary reduction in volume of abstraction or increase in compensation release (fish)
- IDMIT_9 - Artificial freshet release to provide temporary variation in the flow regime (fish, white-clawed crayfish, fine-lined pea mussel, water vole, otter)
- IDMIT_10 - Creation of alternative refuges in deeper water where walkover surveys identify the loss of important deep water habitat or high densities of fauna in refuges (fish, white-clawed crayfish, water vole)
- IDMIT_11 - Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive species where walkover surveys identify a projected loss of habitat inundation (macroinvertebrates, fish, white-clawed crayfish, water vole, otter)

- IDMIT_12 - Artificial channel narrowing to provide functional refuges and support habitat requirement for species, enabling a quick natural recolonisation of the reach post-drought (fish, macroinvertebrates, white-clawed crayfish, fine-lined pea mussel, otter, water vole)
- IDMIT_13 - Provision of piscivorous “visual” bird scaring measures (e.g. using streamers in riparian trees) to control predation upon species using refuges (fish). These visual measures would only be implemented following consultation with the EA, Natural England and bird specialists, particularly taking account of protected species under the Wildlife and Countryside Act. Implementation would follow best practice guidance.
- IDMIT_14 - Gravel washing of spawning habitats where walkover surveys and routine monitoring identifies likely habitat degradation as a result of sedimentations (fish)
- IDMIT_15 - Aeration of watercourse where significant mortality or change in species abundances are likely to be attributed to water quality deterioration
- IDMIT_16 - Modification of flow structure across barriers to retain favourable conditions to facilitate the movement/migration of species (fish)
- IDMIT_19 - Capture and relocate individuals across significant barriers, taking into account migratory periods (immigration and emigration) (fish) and ensuring biosecurity measures are in place at all times.
- IDMIT_20 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and relocation to suitable habitat where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_21 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and retention for later release where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.

Post-Drought (Drought option removed) – Monitoring

Supplementary monitoring which may be required after drought option implementation:

- PDMON_1 - White-clawed crayfish sampling to monitor recovery of their distribution and abundance

Post-Drought (Drought option removed) – Mitigation

Mitigation which may be required after the drought option is removed:

- PDMIT_1 - Enhancement of habitat beyond the impacted reach (macroinvertebrates, fish, fine-lined pea mussel, white-clawed crayfish, water vole)
- PDMIT_5 - Relocation of juveniles where walkover surveys identify the likely desiccation of marginal habitats or loss of water depth at important habitats (fish, fine-lined pea mussel)
- PDMIT_7 - Restocking using offspring from broodstock from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)
- PDMIT_8 - Restocking of coarse fish from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)

Reach Overview Sheet

Gill Beck 2

WFD Waterbody:

Gill Beck (Baildon) from Source to River Aire (GB104027062940)

Relevant Drought Option(s):

Weecher Reservoir

Sensitive Features and Impact Assessment:

- Hawksworth Spring Wood LWS (Moderate)
- Tong Park LWS (Minor)
- White-clawed crayfish (Moderate)
- Otter (Negligible)
- Brown trout (Moderate)
- Bullhead (Minor)
- WFD - Fish (Moderate)
- WFD - Invertebrates (Moderate)

Significant Water Quality Pressures:

- None

Mitigation Triggers – Relevant Water Quality Thresholds:

Water quality thresholds appropriate to WFD river type:

- Moderate-Poor status thresholds for lowland and high alkalinity rivers (less than 54% dissolved oxygen saturation; in excess of 1.1mg/l total ammonia)
- Additional unionised ammonia threshold of 40µg/l further to WFD requirements

Baseline Monitoring

Baseline monitoring proposed to ensure an adequate baseline dataset exists to describe non-drought conditions for those receptors likely to be impacted by drought permit implementation and to fill any data gaps *and reduce uncertainty* ***identified during the environmental assessment****.*

Routine Baseline Monitoring:

- BMON_1 - EA/YWSL to continue monitor river flows and levels/reservoir levels and spill at key monitoring sites
- BMON_2 - EA to continue routine water quality monitoring at existing network of sites on current monthly programme, which includes those on un-impacted reaches suitable as control sites.
- BMON_3 - Macroinvertebrate monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.
- BMON_4 - Fish monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

Targeted Baseline Monitoring:

- BMON_5 - White-clawed crayfish surveys to determine distribution and abundance in reaches under serious (i.e. moderate or major) hydrological stress

On-set of Environmental Drought- Monitoring

Subject to the availability of relevant data, the following walkover survey should be carried out prior to drought permit implementation

- ODMON_1 – Walkover surveys of habitat quality and identification of drought sensitive habitats such as areas of riffle, pools and artificial features such as weirs and sluices that may be isolated or impassable during low flows. Results to be captured by annotated walkover maps and completion of a '*River Conditions Observation Form - Low Flows*' form.
  - Site 1: 500m located SE1619940664 to SE1644440377

In-Drought (During drought option implementation) – Monitoring

In order to establish impacts and target mitigation the following surveillance walkover surveys should be completed during the drought option implementation (including on the day of the flow change, the day after and then weekly thereafter until no further changes are noted):

- 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 SE1619940664 to SE1644440377
- 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

In-Drought (During drought option implementation) – Mitigation

Mitigation which may be required during the drought option implementation.

- IDMIT_6 - Gradual phase-in of reduction in water volume/flow to avoid stranding of individuals (fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_7 - Gradual phase-in of compensation release increases to avoid stranding or displacement of individuals (macroinvertebrates, fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_8 - Temporary reduction in volume of abstraction or increase in compensation release (fish)
- IDMIT_9 - Artificial freshet release to provide temporary variation in the flow regime (fish, white-clawed crayfish, fine-lined pea mussel, water vole, otter)
- IDMIT_10 - Creation of alternative refuges in deeper water where walkover surveys identify the loss of important deep water habitat or high densities of fauna in refuges (fish, white-clawed crayfish, water vole)
- IDMIT_11 - Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive species where walkover surveys identify a projected loss of habitat inundation (macroinvertebrates, fish, white-clawed crayfish, water vole, otter)

- IDMIT_12 - Artificial channel narrowing to provide functional refuges and support habitat requirement for species, enabling a quick natural recolonisation of the reach post-drought (fish, macroinvertebrates, white-clawed crayfish, fine-lined pea mussel, otter, water vole)
- IDMIT_13 - Provision of piscivorous “visual” bird scaring measures (e.g. using streamers in riparian trees) to control predation upon species using refuges (fish). These visual measures would only be implemented following consultation with the EA, Natural England and bird specialists, particularly taking account of protected species under the Wildlife and Countryside Act. Implementation would follow best practice guidance.
- IDMIT_14 - Gravel washing of spawning habitats where walkover surveys and routine monitoring identifies likely habitat degradation as a result of sedimentations (fish)
- IDMIT_15 - Aeration of watercourse where significant mortality or change in species abundances are likely to be attributed to water quality deterioration
- IDMIT_16 - Modification of flow structure across barriers to retain favourable conditions to facilitate the movement/migration of species (fish)
- IDMIT_17 - Provision of freshet releases to enable migration of fish across significant obstacles (fish)
- IDMIT_19 - Capture and relocate individuals across significant barriers, taking into account migratory periods (immigration and emigration) (fish) and ensuring biosecurity measures are in place at all times.
- IDMIT_20 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and relocation to suitable habitat where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_21 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and retention for later release where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.

Post-Drought (Drought option removed) – Monitoring

Supplementary monitoring which may be required after drought option implementation:

- PDMON_1 - White-clawed crayfish sampling to monitor recovery of their distribution and abundance

Post-Drought (Drought option removed) – Mitigation

Mitigation which may be required after the drought option is removed:

- PDMIT_1 - Enhancement of habitat beyond the impacted reach (macroinvertebrates, fish, fine-lined pea mussel, white-clawed crayfish, water vole)
- PDMIT_5 - Relocation of juveniles where walkover surveys identify the likely desiccation of marginal habitats or loss of water depth at important habitats (fish, fine-lined pea mussel)
- PDMIT_7 - Restocking using offspring from broodstock from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)

Reach Overview Sheet

Jum Beck 1

WFD Waterbody:

Gill Beck (Baildon) from Source to River Aire (GB104027062940)

Relevant Drought Option(s):

Reva Reservoir

Sensitive Features and Impact Assessment:

- Otter (Negligible)
- Brown trout (Major)
- Bullhead (Moderate)
- WFD - Fish (Moderate)
- WFD - Invertebrates (Moderate)

Significant Water Quality Pressures:

- None

Mitigation Triggers – Relevant Water Quality Thresholds:

Water quality thresholds appropriate to WFD river type:

- Moderate-Poor status thresholds for lowland and high alkalinity rivers (less than 54% dissolved oxygen saturation; in excess of 1.1mg/l total ammonia)
- Additional unionised ammonia threshold of 40µg/l further to WFD requirements

Baseline Monitoring

Baseline monitoring proposed to ensure an adequate baseline dataset exists to describe non-drought conditions for those receptors likely to be impacted by drought permit implementation and to fill any data gaps *and reduce uncertainty* ***identified during the environmental assessment****.*

Routine Baseline Monitoring:

- BMON_1 - EA/YWSL to continue monitor river flows and levels/reservoir levels and spill at key monitoring sites
- BMON_2 - EA to continue routine water quality monitoring at existing network of sites on current monthly programme, which includes those on un-impacted reaches suitable as control sites.
- BMON_3 - Macroinvertebrate monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.
- BMON_4 - Fish monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

Targeted Baseline Monitoring:

- None required

On-set of Environmental Drought- Monitoring

Subject to the availability of relevant data, the following walkover survey should be carried out prior to drought permit implementation

- ODMON_1 – Walkover surveys of habitat quality and identification of drought sensitive habitats such as areas of riffle, pools and artificial features such as weirs and sluices that may be isolated or impassable during low flows. Results to be captured by annotated walkover maps and completion of a '*River Conditions Observation Form - Low Flows*' form.
  - Site 1: 500m located within SE1569542264 to SE1523842446

In-Drought (During drought option implementation) – Monitoring

In order to establish impacts and target mitigation the following surveillance walkover surveys should be completed during the drought option implementation (including on the day of the flow change, the day after and then weekly thereafter until no further changes are noted):

- 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 SE1569542264 to SE1523842446
- 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

In-Drought (During drought option implementation) – Mitigation

Mitigation which may be required during the drought option implementation.

- IDMIT_6 - Gradual phase-in of reduction in water volume/flow to avoid stranding of individuals (fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_7 - Gradual phase-in of compensation release increases to avoid stranding or displacement of individuals (macroinvertebrates, fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_8 - Temporary reduction in volume of abstraction or increase in compensation release (fish)
- IDMIT_9 - Artificial freshet release to provide temporary variation in the flow regime (fish, white-clawed crayfish, fine-lined pea mussel, water vole, otter)
- IDMIT_10 - Creation of alternative refuges in deeper water where walkover surveys identify the loss of important deep water habitat or high densities of fauna in refuges (fish, white-clawed crayfish, water vole)
- IDMIT_11 - Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive species where walkover surveys identify a projected loss of habitat inundation (macroinvertebrates, fish, white-clawed crayfish, water vole, otter)
- IDMIT_12 - Artificial channel narrowing to provide functional refuges and support habitat requirement for species, enabling a quick natural recolonisation of the reach post-drought (fish, macroinvertebrates, white-clawed crayfish, fine-lined pea mussel, otter, water vole)

- IDMIT_13 - Provision of piscivorous “visual” bird scaring measures (e.g. using streamers in riparian trees) to control predation upon species using refuges (fish). These visual measures would only be implemented following consultation with the EA, Natural England and bird specialists, particularly taking account of protected species under the Wildlife and Countryside Act. Implementation would follow best practice guidance.
- IDMIT_14 - Gravel washing of spawning habitats where walkover surveys and routine monitoring identifies likely habitat degradation as a result of sedimentations (fish)
- IDMIT_15 - Aeration of watercourse where significant mortality or change in species abundances are likely to be attributed to water quality deterioration
- IDMIT_16 - Modification of flow structure across barriers to retain favourable conditions to facilitate the movement/migration of species (fish)
- IDMIT_17 - Provision of freshet releases to enable migration of fish across significant obstacles (fish)
- IDMIT_19 - Capture and relocate individuals across significant barriers, taking into account migratory periods (immigration and emigration) (fish) and ensuring biosecurity measures are in place at all times.
- IDMIT_20 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and relocation to suitable habitat where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_21 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and retention for later release where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.

Post-Drought (Drought option removed) – Monitoring

Supplementary monitoring which may be required after drought option implementation:

- None required

Post-Drought (Drought option removed) – Mitigation

Mitigation which may be required after the drought option is removed:

- PDMIT_1 - Enhancement of habitat beyond the impacted reach (macroinvertebrates, fish, fine-lined pea mussel, white-clawed crayfish, water vole)
- PDMIT_2 - Provision of artificial freshets to ensure fish are capable of migrating where survey identifies insufficient water depth or volume across structures to facilitate migration (fish)
- PDMIT_3 - Modification to barriers and/or flows to improve passage where walkover survey identifies insufficient water depth or volume at obstacles (fish)
- PDMIT_4 - Capture and relocate across barrier (taking migratory period into account) where significant numbers of migratory fish congregate at obstacles (fish)
- PDMIT_5 - Relocation of juveniles where walkover surveys identify the likely desiccation of marginal habitats or loss of water depth at important habitats (fish, fine-lined pea mussel)
- PDMIT_7 - Restocking using offspring from broodstock from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)

- PDMIT_8 - Restocking of coarse fish from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)

Reach Overview Sheet

Aire 1

WFD Waterbody:

Aire, River Worth to Gill Beck (GB104027063034)

Relevant Drought Option(s):

Hewenden Reservoir; Leeshaw Reservoir; Leeming Reservoir; Springhead Weir Maintained Flow

Sensitive Features and Impact Assessment:

- Otter (Negligible)
- Barbel (Minor)
- Brown trout (Moderate)
- Bullhead (Minor)
- European eel (Moderate)
- Grayling (Minor)
- WFD - Fish (Minor)
- WFD - Invertebrates (Minor)

Significant Water Quality Pressures:

- Buck Mill Lane CSO SE1689338881
- Dock Lane CSO SE1516037590
- Coach Road CSO SE1446038140

Mitigation Triggers – Relevant Water Quality Thresholds:

Water quality thresholds appropriate to WFD river type:

- Moderate-Poor status thresholds for lowland and high alkalinity 'salmonid water' rivers (less than 64% dissolved oxygen saturation; in excess of 1.1mg/l total ammonia)
- Additional unionised ammonia threshold of 40µg/l further to WFD requirements

Baseline Monitoring

Baseline monitoring proposed to ensure an adequate baseline dataset exists to describe non-drought conditions for those receptors likely to be impacted by drought permit implementation and to fill any data gaps *and reduce uncertainty* ***identified during the environmental assessment****.*

Routine Baseline Monitoring:

- BMON_1 - EA/YWSL to continue monitor river flows and levels/reservoir levels and spill at key monitoring sites
- BMON_2 - EA to continue routine water quality monitoring at existing network of sites on current monthly programme, which includes those on un-impacted reaches suitable as control sites.
- BMON_3 - Macroinvertebrate monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

- BMON_4 - Fish monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

Targeted Baseline Monitoring:

- None required

On-set of Environmental Drought- Monitoring

Subject to the availability of relevant data, the following walkover survey should be carried out prior to drought permit implementation

- ODMON_1 – Walkover surveys of habitat quality and identification of drought sensitive habitats such as areas of riffle, pools and artificial features such as weirs and sluices that may be isolated or impassable during low flows. Results to be captured by annotated walkover maps and completion of a '*River Conditions Observation Form - Low Flows*' form.
  - Site 1: 500m located within SE1312338376 to SE1367538239

In-Drought (During drought option implementation) – Monitoring

In order to establish impacts and target mitigation the following surveillance walkover surveys should be completed during the drought option implementation (including on the day of the flow change, the day after and then weekly thereafter until no further changes are noted):

- 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

In-Drought (During drought option implementation) – Mitigation

Mitigation which may be required during the drought option implementation.

- IDMIT_6 - Gradual phase-in of reduction in water volume/flow to avoid stranding of individuals (fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_7 - Gradual phase-in of compensation release increases to avoid stranding or displacement of individuals (macroinvertebrates, fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_8 - Temporary reduction in volume of abstraction or increase in compensation release (fish)
- IDMIT_9 - Artificial freshet release to provide temporary variation in the flow regime (fish, white-clawed crayfish, fine-lined pea mussel, water vole, otter)

- IDMIT_10 - Creation of alternative refuges in deeper water where walkover surveys identify the loss of important deep water habitat or high densities of fauna in refuges (fish, white-clawed crayfish, water vole)
- IDMIT_11 - Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive species where walkover surveys identify a projected loss of habitat inundation (macroinvertebrates, fish, white-clawed crayfish, water vole, otter)
- IDMIT_13 - Provision of piscivorous “visual” bird scaring measures (e.g. using streamers in riparian trees) to control predation upon species using refuges (fish). These visual measures would only be implemented following consultation with the EA, Natural England and bird specialists, particularly taking account of protected species under the Wildlife and Countryside Act. Implementation would follow best practice guidance.
- IDMIT_14 - Gravel washing of spawning habitats where walkover surveys and routine monitoring identifies likely habitat degradation as a result of sedimentations (fish)
- IDMIT_15 - Aeration of watercourse where significant mortality or change in species abundances are likely to be attributed to water quality deterioration
- IDMIT_20 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and relocation to suitable habitat where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_21 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and retention for later release where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_23 - For CSOs identified as significant water quality prioritise planned maintenance work on and reactive pollution prevention work, including visits by operators.

Post-Drought (Drought option removed) – Monitoring

Supplementary monitoring which may be required after drought option implementation:

- None required

Post-Drought (Drought option removed) – Mitigation

Mitigation which may be required after the drought option is removed:

- PDMIT_1 - Enhancement of habitat beyond the impacted reach (macroinvertebrates, fish, fine-lined pea mussel, white-clawed crayfish, water vole)
- PDMIT_7 - Restocking using offspring from broodstock from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)

Reach Overview Sheet

Aire 2

WFD Waterbody:

Aire from Gill Beck (Baildon) to River Calder (GB104027063032)

Relevant Drought Option(s):

Hewenden Reservoir; Leeshaw Reservoir; Leeming Reservoir; Springhead Weir Maintained Flow

Sensitive Features and Impact Assessment:

- Otter (Negligible)
- Water vole (Moderate)
- Brown trout (Moderate)
- Bullhead (Minor)
- European eel (Moderate)
- Grayling (Minor)
- WFD - Fish (Minor)
- WFD - Invertebrates (Minor)

Significant Water Quality Pressures:

- None

Mitigation Triggers – Relevant Water Quality Thresholds:

Water quality thresholds appropriate to WFD river type:

- Moderate-Poor status thresholds for lowland and high alkalinity rivers (less than 64% dissolved oxygen saturation; in excess of 1.1mg/l total ammonia)
- Additional unionised ammonia threshold of 40µg/l further to WFD requirements

Baseline Monitoring

Baseline monitoring proposed to ensure an adequate baseline dataset exists to describe non-drought conditions for those receptors likely to be impacted by drought permit implementation and to fill any data gaps *and reduce uncertainty* ***identified during the environmental assessment****.*

Routine Baseline Monitoring:

- BMON_1 - EA/YWSL to continue monitor river flows and levels/reservoir levels and spill at key monitoring sites
- BMON_2 - EA to continue routine water quality monitoring at existing network of sites on current monthly programme, which includes those on un-impacted reaches suitable as control sites.
- BMON_3 - Macroinvertebrate monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.
- BMON_4 - Fish monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

Targeted Baseline Monitoring:

- None required

On-set of Environmental Drought- Monitoring

Subject to the availability of relevant data, the following walkover survey should be carried out prior to drought permit implementation

- ODMON_1 – Walkover surveys of habitat quality and identification of drought sensitive habitats such as areas of riffle, pools and artificial features such as weirs and sluices that may be isolated or impassable during low flows. Results to be captured by annotated walkover maps and completion of a '*River Conditions Observation Form - Low Flows*' form.
  - Site 1: 500m located within SE1748139782 to SE1802540113

In-Drought (During drought option implementation) – Monitoring

In order to establish impacts and target mitigation the following surveillance walkover surveys should be completed during the drought option implementation (including on the day of the flow change, the day after and then weekly thereafter until no further changes are noted):

- 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

In-Drought (During drought option implementation) – Mitigation

Mitigation which may be required during the drought option implementation.

- IDMIT_6 - Gradual phase-in of reduction in water volume/flow to avoid stranding of individuals (fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_7 - Gradual phase-in of compensation release increases to avoid stranding or displacement of individuals (macroinvertebrates, fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_8 - Temporary reduction in volume of abstraction or increase in compensation release (fish)
- IDMIT_9 - Artificial freshet release to provide temporary variation in the flow regime (fish, white-clawed crayfish, fine-lined pea mussel, water vole, otter)
- IDMIT_10 - Creation of alternative refuges in deeper water where walkover surveys identify the loss of important deep water habitat or high densities of fauna in refuges (fish, white-clawed crayfish, water vole)
- IDMIT_11 - Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive species where walkover surveys identify a projected loss of habitat inundation (macroinvertebrates, fish, white-clawed crayfish, water vole, otter)
- IDMIT_13 - Provision of piscivorous "visual" bird scaring measures (e.g. using streamers in riparian trees) to control predation upon species using refuges (fish). These visual measures

would only be implemented following consultation with the EA, Natural England and bird specialists, particularly taking account of protected species under the Wildlife and Countryside Act. Implementation would follow best practice guidance.

- IDMIT_14 - Gravel washing of spawning habitats where walkover surveys and routine monitoring identifies likely habitat degradation as a result of sedimentations (fish)
- IDMIT_15 - Aeration of watercourse where significant mortality or change in species abundances are likely to be attributed to water quality deterioration
- IDMIT_20 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and relocation to suitable habitat where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_21 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and retention for later release where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.

Post-Drought (Drought option removed) – Monitoring

Supplementary monitoring which may be required after drought option implementation:

- None required

Post-Drought (Drought option removed) – Mitigation

Mitigation which may be required after the drought option is removed:

- PDMIT_1 - Enhancement of habitat beyond the impacted reach (macroinvertebrates, fish, fine-lined pea mussel, white-clawed crayfish, water vole)
- PDMIT_7 - Restocking using offspring from broodstock from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)

Reach Overview Sheet

Dibb 1

WFD Waterbody:

Baren Beck and River Dibb (GB104027064120)

Relevant Drought Option(s):

Grimwith Reservoir

Sensitive Features and Impact Assessment:

- White-clawed crayfish (Major)
- Otter (Negligible)
- Atlantic salmon (Major)
- Brown trout (Major)
- Bullhead (Moderate)
- WFD - Fish (Major)
- WFD - Invertebrates (Moderate)

Significant Water Quality Pressures:

- None

Mitigation Triggers – Relevant Water Quality Thresholds:

Water quality thresholds appropriate to WFD river type:

- Moderate-Poor status thresholds for upland and low alkalinity rivers (less than 64% dissolved oxygen saturation; in excess of 0.75mg/l total ammonia)
- Additional unionised ammonia threshold of 40µg/l further to WFD requirements

Baseline Monitoring

Baseline monitoring proposed to ensure an adequate baseline dataset exists to describe non-drought conditions for those receptors likely to be impacted by drought permit implementation and to fill any data gaps *and reduce uncertainty* ***identified during the environmental assessment****.*

Routine Baseline Monitoring:

- BMON_1 - EA/YWSL to continue monitor river flows and levels/reservoir levels and spill at key monitoring sites
- BMON_2 - EA to continue routine water quality monitoring at existing network of sites on current monthly programme, which includes those on un-impacted reaches suitable as control sites.
- BMON_3 - Macroinvertebrate monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.
- BMON_4 - Fish monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

Targeted Baseline Monitoring:

- BMON_5 - White-clawed crayfish surveys to determine distribution and abundance in reaches under serious (i.e. moderate or major) hydrological stress

On-set of Environmental Drought- Monitoring

Subject to the availability of relevant data, the following walkover survey should be carried out prior to drought permit implementation

- ODMON_1 – Walkover surveys of habitat quality and identification of drought sensitive habitats such as areas of riffle, pools and artificial features such as weirs and sluices that may be isolated or impassable during low flows. Results to be captured by annotated walkover maps and completion of a '*River Conditions Observation Form - Low Flows*' form.
  - Site 1: 500m within SE0528963263 to SE0494762629

In-Drought (During drought option implementation) – Monitoring

In order to establish impacts and target mitigation the following surveillance walkover surveys should be completed during the drought option implementation (including on the day of the flow change, the day after and then weekly thereafter until no further changes are noted):

- 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 within SE0528963263 to SE0494762629
- 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

In-Drought (During drought option implementation) – Mitigation

Mitigation which may be required during the drought option implementation.

- IDMIT_6 - Gradual phase-in of reduction in water volume/flow to avoid stranding of individuals (fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_7 - Gradual phase-in of compensation release increases to avoid stranding or displacement of individuals (macroinvertebrates, fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_8 - Temporary reduction in volume of abstraction or increase in compensation release (fish)
- IDMIT_9 - Artificial freshet release to provide temporary variation in the flow regime (fish, white-clawed crayfish, fine-lined pea mussel, water vole, otter)
- IDMIT_10 - Creation of alternative refuges in deeper water where walkover surveys identify the loss of important deep water habitat or high densities of fauna in refuges (fish, white-clawed crayfish, water vole)
- IDMIT_11 - Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive species where walkover surveys identify a projected loss of habitat inundation (macroinvertebrates, fish, white-clawed crayfish, water vole, otter)

- IDMIT_12 - Artificial channel narrowing to provide functional refuges and support habitat requirement for species, enabling a quick natural recolonisation of the reach post-drought (fish, macroinvertebrates, white-clawed crayfish, fine-lined pea mussel, otter, water vole)
- IDMIT_13 - Provision of piscivorous “visual” bird scaring measures (e.g. using streamers in riparian trees) to control predation upon species using refuges (fish). These visual measures would only be implemented following consultation with the EA, Natural England and bird specialists, particularly taking account of protected species under the Wildlife and Countryside Act. Implementation would follow best practice guidance.
- IDMIT_14 - Gravel washing of spawning habitats where walkover surveys and routine monitoring identifies likely habitat degradation as a result of sedimentations (fish)
- IDMIT_15 - Aeration of watercourse where significant mortality or change in species abundances are likely to be attributed to water quality deterioration
- IDMIT_16 - Modification of flow structure across barriers to retain favourable conditions to facilitate the movement/migration of species (fish)
- IDMIT_17 - Provision of freshet releases to enable migration of fish across significant obstacles (fish)
- IDMIT_19 - Capture and relocate individuals across significant barriers, taking into account migratory periods (immigration and emigration) (fish) and ensuring biosecurity measures are in place at all times.
- IDMIT_20 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and relocation to suitable habitat where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_21 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and retention for later release where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.

Post-Drought (Drought option removed) – Monitoring

Supplementary monitoring which may be required after drought option implementation:

- PDMON_1 - White-clawed crayfish sampling to monitor recovery of their distribution and abundance

Post-Drought (Drought option removed) – Mitigation

Mitigation which may be required after the drought option is removed:

- PDMIT_1 - Enhancement of habitat beyond the impacted reach (macroinvertebrates, fish, fine-lined pea mussel, white-clawed crayfish, water vole)
- PDMIT_2 - Provision of artificial freshets to ensure fish are capable of migrating where survey identifies insufficient water depth or volume across structures to facilitate migration (fish)
- PDMIT_3 - Modification to barriers and/or flows to improve passage where walkover survey identifies insufficient water depth or volume at obstacles (fish)
- PDMIT_4 - Capture and relocate across barrier (taking migratory period into account) where significant numbers of migratory fish congregate at obstacles (fish)

- PDMIT_5 - Relocation of juveniles where walkover surveys identify the likely desiccation of marginal habitats or loss of water depth at important habitats (fish, fine-lined pea mussel)
- PDMIT_7 - Restocking using offspring from broodstock from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)

Reach Overview Sheet

Carr Beck 1

WFD Waterbody:

Wharfe from Hundwith Beck to River Washburn (GB104027064258)

Relevant Drought Option(s):

Carr Bottom Reservoir

Sensitive Features and Impact Assessment:

- White-clawed crayfish (Moderate)
- Otter (Negligible)
- Water vole (Moderate)
- Brown trout (Major)
- Bullhead (Moderate)
- WFD - Fish (Moderate)
- WFD - Invertebrates (Moderate)

Significant Water Quality Pressures:

- None

Mitigation Triggers – Relevant Water Quality Thresholds:

Water quality thresholds appropriate to WFD river type:

- Moderate-Poor status thresholds for lowland and high alkalinity rivers (less than 54% dissolved oxygen saturation; in excess of 1.1mg/l total ammonia)
- Additional unionised ammonia threshold of 40µg/l further to WFD requirements

Baseline Monitoring

Baseline monitoring proposed to ensure an adequate baseline dataset exists to describe non-drought conditions for those receptors likely to be impacted by drought permit implementation and to fill any data gaps *and reduce uncertainty* ***identified during the environmental assessment****.*

Routine Baseline Monitoring:

- BMON_1 - EA/YWSL to continue monitor river flows and levels/reservoir levels and spill at key monitoring sites
- BMON_2 - EA to continue routine water quality monitoring at existing network of sites on current monthly programme, which includes those on un-impacted reaches suitable as control sites.
- BMON_3 - Macroinvertebrate monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.
- BMON_4 - Fish monitoring at a number of locations, including rivers potentially affected by drought measures; to continue in low flow/drought years pending agreement with the EA regarding aquatic species welfare.

Targeted Baseline Monitoring:

- BMON_5 - White-clawed crayfish surveys to determine distribution and abundance in reaches under serious (i.e. moderate or major) hydrological stress

On-set of Environmental Drought- Monitoring

Subject to the availability of relevant data, the following walkover survey should be carried out prior to drought permit implementation

- ODMON_1 – Walkover surveys of habitat quality and identification of drought sensitive habitats such as areas of riffle, pools and artificial features such as weirs and sluices that may be isolated or impassable during low flows. Results to be captured by annotated walkover maps and completion of a '*River Conditions Observation Form - Low Flows*' form.
  - Site 1: 500m within SE1601744642
  - and SE1631044972

In-Drought (During drought option implementation) – Monitoring

In order to establish impacts and target mitigation the following surveillance walkover surveys should be completed during the drought option implementation (including on the day of the flow change, the day after and then weekly thereafter until no further changes are noted):

- 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 within SE1601744642
  - and SE1631044972
- 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

In-Drought (During drought option implementation) – Mitigation

Mitigation which may be required during the drought option implementation.

- IDMIT_6 - Gradual phase-in of reduction in water volume/flow to avoid stranding of individuals (fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_7 - Gradual phase-in of compensation release increases to avoid stranding or displacement of individuals (macroinvertebrates, fish, white-clawed crayfish, fine-lined pea mussel)
- IDMIT_8 - Temporary reduction in volume of abstraction or increase in compensation release (fish)
- IDMIT_9 - Artificial freshet release to provide temporary variation in the flow regime (fish, white-clawed crayfish, fine-lined pea mussel, water vole, otter)
- IDMIT_10 - Creation of alternative refuges in deeper water where walkover surveys identify the loss of important deep water habitat or high densities of fauna in refuges (fish, white-clawed crayfish, water vole)

- IDMIT_11 - Provision of in-stream structures and flow baffles to create functional refuges to support flow sensitive species where walkover surveys identify a projected loss of habitat inundation (macroinvertebrates, fish, white-clawed crayfish, water vole, otter)
- IDMIT_12 - Artificial channel narrowing to provide functional refuges and support habitat requirement for species, enabling a quick natural recolonisation of the reach post-drought (fish, macroinvertebrates, white-clawed crayfish, fine-lined pea mussel, otter, water vole)
- IDMIT_13 - Provision of piscivorous “visual” bird scaring measures (e.g. using streamers in riparian trees) to control predation upon species using refuges (fish). These visual measures would only be implemented following consultation with the EA, Natural England and bird specialists, particularly taking account of protected species under the Wildlife and Countryside Act. Implementation would follow best practice guidance.
- IDMIT_14 - Gravel washing of spawning habitats where walkover surveys and routine monitoring identifies likely habitat degradation as a result of sedimentations (fish)
- IDMIT_15 - Aeration of watercourse where significant mortality or change in species abundances are likely to be attributed to water quality deterioration
- IDMIT_16 - Modification of flow structure across barriers to retain favourable conditions to facilitate the movement/migration of species (fish)
- IDMIT_17 - Provision of freshet releases to enable migration of fish across significant obstacles (fish)
- IDMIT_19 - Capture and relocate individuals across significant barriers, taking into account migratory periods (immigration and emigration) (fish) and ensuring biosecurity measures are in place at all times.
- IDMIT_20 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and relocation to suitable habitat where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.
- IDMIT_21 - Rescue of individuals or groups, in consultation with the EA or NE as appropriate, and retention for later release where they are seen to be in distress or where artificially high densities are likely to result in significant impacts (fish, white-clawed crayfish). Measures will be taken to ensure biosecurity at all times. It should be noted that movement of crayfish requires licensing which can take up to 8 weeks. Movement of crayfish would only take place after consultation agreeing that this was the best course of action.

Post-Drought (Drought option removed) – Monitoring

Supplementary monitoring which may be required after drought option implementation:

- PDMON_1 - White-clawed crayfish sampling to monitor recovery of their distribution and abundance

Post-Drought (Drought option removed) – Mitigation

Mitigation which may be required after the drought option is removed:

- PDMIT_1 - Enhancement of habitat beyond the impacted reach (macroinvertebrates, fish, fine-lined pea mussel, white-clawed crayfish, water vole)
- PDMIT_2 - Provision of artificial freshets to ensure fish are capable of migrating where survey identifies insufficient water depth or volume across structures to facilitate migration (fish)

- PDMIT_3 - Modification to barriers and/or flows to improve passage where walkover survey identifies insufficient water depth or volume at obstacles (fish)
- PDMIT_4 - Capture and relocate across barrier (taking migratory period into account) where significant numbers of migratory fish congregate at obstacles (fish)
- PDMIT_5 - Relocation of juveniles where walkover surveys identify the likely desiccation of marginal habitats or loss of water depth at important habitats (fish, fine-lined pea mussel)
- PDMIT_7 - Restocking using offspring from broodstock from the catchment where monitoring indicates loss of fish abundance or recruitment (fish)