

Technical Note

Project:	Havant Thicket Reservoir Outline Design		
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Executive summary

Portsmouth Water is applying for planning consent to construct a new, 8.7 megalitres (8.7 MI) reservoir (Havant Thicket Reservoir) covering an area of approximately 160 hectares to the north of Havant and to the east of the A3(M) within a shallow valley. This technical note provides information to support a case for a Water Framework Directive (WFD) Article 4.7 derogation for Havant Thicket Reservoir. It initially provides an overview of the WFD compliance assessment for the Scheme which identified the potential for deterioration under this legislation. Causes of potential non-compliance under the Directive are then outlined. Evidence required for the necessary justifications to meet each of the tests required under the Article 4.7 derogation process is then detailed.

The proposed Havant Thicket Reservoir scheme is located between the residential settlements of Warren Park, Leigh Park and Rowlands Castle. The reservoir site currently comprises predominantly open grassland with some woodland, vegetation and ditches. A pipeline also forms part of the Scheme (under a separate outline planning application) and extends from Bedhampton Springs to the reservoir site.

Following the completion of a WFD compliance Assessment, as part of the Environmental Statement, Havant Thicket Reservoir was deemed to have the potential to cause deterioration of the impacted water body of the Riders Lane Stream which is part of the Hermitage Stream water body (GB107042016370). The assessment identified that hydromorphological and biological WFD quality elements were at risk of deterioration. From a hydromorphological perspective, the quality elements that were impacted were those related to the scale of the habitat loss (including i) river depth and width variation; ii) structure and substrate of the river bed; iii) structure of the riparian zone) along with river continuity. The biological elements impacted were macroinvertebrates, macrophytes and phytobenthos.

In a situation whereby there remains a potential for deterioration, even after including embedded mitigation, the Scheme as outlined can only go forward if granted a derogation under Article 4.7 of the WFD. To do this, evidence is required to meet a series of conditions which ultimately needs to be approved by the Regulatory Authority.

As part of the Article 4.7 derogation process, a variety of workshops were held with the EA to determine the evidence required to meet the various conditions of Article 4.7. The evidence was developed to meet each of four conditions:

- a. all practicable steps are to be taken to mitigate the adverse impacts on the water body concerned
- b. the reasons for modifications or alterations are specifically set out and explained in the RBMP
- c. the reasons for those modifications or alterations are of overriding public interest and/or the benefits to the environment and to society of achieving the objectives set are outweighed by the benefits of the new modifications or alterations to human health, to the maintenance of human safety or to sustainable development, and
- d. the beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option.

Evidence is presented in Section 0 of this technical note. Further evidence to demonstrate that the Scheme complies with Article 4(8) and 4(9) of WFD is shown in Section 6. Discussions and agreements were sought at each stage of the process with the Environment Agency. Agreements have been detailed in this technical note.

The long list of practicable measures that was developed to fulfil Article 4.7 condition (a) has been agreed with the Environment Agency and is deemed sufficient for the purposes of Article 4.7.

During the next phase of the process (and not part of the derogation itself) a short-listing exercise will be carried out to reduce the full list of practicable measures to generate a short list of options. The approach to short-listing and options will be discussed and agreed with the Environment Agency. The short list of mitigation measures will deliver against the legal requirement for all practicable mitigation. Key considerations proposed for the short-listing exercise are deliverability (land ownership, conservation sites and heritage) along with the ability of the measure to improve WFD Quality Elements affected by the scheme. The overall score for each measure will be used to rank priority options.

This short list will be examined in detail through more site-specific analyses to develop a conceptual design for shortlisted measures. This will include, amongst others, further detail on site specific constraints and opportunities along with a cost-benefit analysis. The short listing would identify a set of measures which would then be delivered as part of the overall mitigation and compensation strategy for the scheme.

1. Introduction

1.1. Background to the scheme

Portsmouth Water is applying for planning consent to construct a new, 160 hectare reservoir (Havant Thicket Reservoir) to the north of Havant and to the east of the A3(M) within a shallow valley located between the residential settlements of Warren Park, Leigh Park and Rowlands Castle. and the reservoir site currently comprises predominantly open grassland with some woodland, vegetation and ditches. A pipeline also forms part of the Scheme (under a separate outline planning application) and extends from Bedhampton Springs to the reservoir site.

This technical note provides an overview of the WFD compliance assessment and provides information to support a case for an Article 4.7 derogation undertaken for Havant Thicket Reservoir under WFD. It outlines the reasoning for the potential for non-compliance under the directive and details the necessary justifications required to meet each of the tests required under the Article 4.7 derogation process.

1.2. Water Framework Directive Compliance

The Water Framework Directive 2000/60/EC (WFD) sets out environmental objectives that must be met for all water bodies within Member States. Prior to receiving consent, new developments that have the potential to affect water bodies need to be assessed against the Directive's environmental objectives to determine whether they have the potential to prevent these objectives from being met. This process is documented for a scheme through the undertaking of a WFD compliance assessment. Where a scheme has the potential to be non-compliant with the Directive a scheme either needs to consider additional mitigation or undertake changes to the proposed development. Where this is not possible, a case must be compiled for an Article 4.7 derogation for the scheme to be able to be progressed. For Havant Thicket Reservoir, a WFD compliance assessment (Reference HTR-ATK-ZZ-ZZ-RP-Z-0123) was produced to inform the Local Planning Authority (Havant Borough Council and East Hampshire District Council) and the Environment Agency in relation to their duties to the local River Basin Management Plan (RBMP) and other plans. For the purpose of the WFD compliance assessment, the Scheme was examined as the following discrete components:

- i. reservoir (including the embankment and footprint)
- ii. proposed pipeline that would extend from Bedhampton Springs to the reservoir site
- iii. compensation flow
- iv. emergency discharge
- v. access roads

The Scheme was deemed to have the potential to cause deterioration to the Hermitage Stream water body by virtue of the extent, and type, of the habitat loss incurred at the reservoir site as a consequence of the reservoir (embankment and footprint). This feature has the potential to cause deterioration of biological elements (macroinvertebrate; macrophytes) and hydromorphology elements (river continuity, river depth and width variation; structure and substrate of the river bed; structure of the riparian zone). The potential for deterioration occurs even with all embedded mitigation being put in place. As a result, materials have been collated to inform a potential derogation under Article 4.7 of the WFD.

1.3. Requirements of Article 4.7 process

Article 4.7 of the WFD makes provision for a scenario whereby a scheme cannot meet environmental objectives as set out under the WFD. Derogation is possible under Article 4.7 but to do so the development needs to meet a set of stringent tests (Directive 2000/60/EC). Member states will not be in breach of the Directive when:

- failure to achieve good groundwater status, good ecological status or, where relevant, good ecological potential or to prevent deterioration in the status of a body of surface water or groundwater is the result of new modifications to the physical characteristics of a surface water body or alterations to the level of bodies of groundwater, or
- failure to prevent deterioration from high status to good status of a body of surface water is the result of new sustainable human development activities

and the following tests have been satisfied:

- i. All practicable steps are to be taken to mitigate the adverse impacts on the water body concerned
- ii. The reasons for modifications or alterations are specifically set out and explained in the RBMP
- iii. The reasons for those modifications or alterations are of overriding public interest and/or the benefits to the environment and to society of achieving the objectives set are outweighed by the benefits of the new modifications or alterations to human health, to the maintenance of human safety or to sustainable development, and
- iv. The beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option.

In addition, Article 4.8 and 4.9 state that:

- The development must not permanently exclude or compromise achievement of the WFD objectives in other bodies of water within the same River Basin District and must be consistent with the implementation of other EU environmental legislation (Article 4.8).
- In applying Article 4.7, steps must also be taken to ensure the new provisions guarantee at least the same level of protection as the existing EU legislation (Article 4.9).

1.4. Consultation in relation to Article 4.7

A working group was set up between the Environment Agency and the Portsmouth Water team to discuss the derogation process and agree an approach to meeting the various tests. The overall consultations specific to Article 4.7 are detailed in **Table 1-1**.

Table 1-1 Discussions with regulators on Article 4.7

Date	Description
17/10/20	Havant Borough Council and East Hampshire District Council - Further discussions on the requirements for the Article 4.7 derogation for the scheme
16/09/20	Havant Borough Council and East Hampshire District Council - Early discussions on the need for the Article 4.7 derogation for the scheme
08/10/20	Environment Agency - Workshop 1: To define the approach required to meet each of the Article 4.7 tests: a) Mitigation of the adverse impacts on the water body to be achieved through the development of a long list of options that could be undertaken across the Hermitage Stream catchment and then refine this into a shorter list that would fulfil this test. b) Reasons for modifications or alterations set out in RBMP to be taken forward by the EA as part of the RBMP planning cycle. c) Overriding public interest test to be met through detailing outputs from Portsmouth Water and Southern Water's Resources Management Plan (WRMP) 19 which includes Strategic Environmental Assessment (SEA) and its WFD Assessment. d) Benefits cannot be achieved by a significantly better environmental option to be met through detailing outputs from Portsmouth Water's 'Havant Thicket Reservoir Statement of Need (which summarises alternatives considered)' note and Portsmouth Water's Alternative Site Options Report (version 6).
02/11/20	Environment Agency - Workshop 2: Test a) To agree a long list of mitigation and compensation options that could be undertaken within the Hermitage Stream catchment to mitigate and compensate for the habitat lost as part of the scheme where the potential for deterioration was noted. A set of objectives were discussed, and agreed, that would be used to evaluate each of the long list options to develop a short-list.
26/11/20	Environment Agency - Workshop 3: To discuss and agree a list of practicable options that will be taken forward to meet the criteria of Test a).

Note: During the next phase of the process (and not part of the derogation itself) a short-listing exercise will be carried out to reduce the full list of practicable measures to generate a short list of options. The approach to

short-listing and options will be discussed and agreed with the Environment Agency. The short list of mitigation measures will deliver against the legal requirement for all practicable mitigation.

1.5. Paper aims and objectives

This technical note details the evidence for the Article 4.7 derogation to inform both the Environment Agency, Havant Borough Council and East Hampshire District Council. It firstly sets out the findings of a review process of the Scheme's WFD compliance assessment. It details Scheme elements where there is a potential risk of deterioration in water body status and outlines the justification for project derogation through the provision of evidence on how the scheme can fulfil each of the Article 4.7 conditions.

The paper considers the ruling of the Court of Justice of the European Union (CJEU) which ruled in favour of a challenge against a WFD objective assessment process applied for a scheme in Germany. This is commonly referred to as the 'Bund case'. In this ruling, the CJEU clarified the compliance process in any assessment of new developments stating that:

- i. Deterioration in individual water body quality elements constitutes deterioration as defined by the Directive (not just overall water body status deterioration);
- ii. Any deterioration in quality elements in the lowest class constitutes deterioration.

The assessment is based on the legally binding RBMP2 (2015) status classification. In the case of Havant Thicket Reservoir, no water bodies/elements are at the lowest class currently but an assessment of any potential deterioration in specific elements has been made to ensure compliance with this clarification.

2. The Havant Thicket Reservoir and WFD

2.1. The Scheme

Portsmouth Water is applying for planning consent to construct a new reservoir to the north of Havant and to the east of the A3(M) within a shallow valley located between the residential settlements of Warren Park, Leigh Park and Rowlands Castle (see Figure 2-1). It has an area of approximately 160 hectares and comprises predominantly open grassland with some woodland, vegetation and ditches. The reservoir will have a capacity of 9,600 million litres. At the centre of the reservoir site is an area classified as ancient woodland that runs from north to south that is known as The Avenue. Three other areas of ancient woodland, Middle Clearing, Round Wood and Corsican Pine Plantation, are located within the reservoir site. These woodland areas provide habitat for a range of bird, insect and bat species. A Public Right of Way (bridleway) extends across the reservoir site from east to west. Three unnamed small watercourses run from north to south across reservoir site (identified as HS1, HS2 and HS3 in the Environmental Statement for the scheme), these converge into one stream to the west of The Avenue before flowing off site into Riders Lane Stream to the south-west. A pipeline also forms part of the application from Bedhampton Springs to the reservoir site.

2.2. WFD principal environmental objectives

The environmental objectives of the WFD are set out in Article 4 of the Directive and relate to ensuring the continued protection of the condition (the WFD status or potential) of all water bodies, and the development of plans to deliver measures to improve failing water bodies to a good condition (or better).

The two key objectives against which new developments or schemes should be assessed are:

- No deterioration of status (or potential) for surface and groundwaters; and
- Achievement of good status (or potential) by 2021 or 2027, for water bodies currently failing to achieve this status or potential.

WFD compliance assessments for new developments and schemes must demonstrate that the proposals will not result in the deterioration in status (or potential) of any water body. In the case of an impacted water body being at less than good status (or potential), it must be demonstrated that implementation of the proposals will not prevent the water body from meeting good status (or potential) in the future. Where these objectives cannot be met, Article 4.7 of the Directive sets out specific situations and conditions whereby derogations can be permitted.

2.3. WFD compliance assessment process

The Scheme was assessed for its effect on achieving the two key environmental objectives set out in Section 2.2 as part of the WFD compliance assessment process. This was undertaken for each water body where the Scheme resulted in some modification or an indirect effect to the volume or quality of water. The process was documented in the Scheme's WFD compliance assessment report (Volume 4, Appendix A15.1 Water Framework Directive (Portsmouth Water, 2020a). The WFD compliance assessment was sent to the Environment Agency in a draft form on 14th July 2020. Individual scheme elements were considered against each of the WFD elements that make up the water body classification of the water body. Surface water, groundwater and transitional water bodies were all considered within this assessment process.

2.4. Precautionary risk-based approach

A precautionary risk-based approach was taken to the assessment. This approach involved consideration of the level of risk to deterioration or prevention of future good status, taking into account the uncertainty of potential impacts. It used the level of information available at the outline design stage at which the assessment was undertaken as well as baseline information for many of the water bodies assessed. This involved a review of the work 2.2 undertaken in the water chapter of the Environmental Statement for the scheme (Portsmouth Water, 2020b).

The precautionary approach adopted was advocated by the Environment Agency to ensure that all potential adverse effects were reported and detailed at a quality element level, even where the likelihood an effect occurring was very low, or the extent of that effect was limited. The primary driver being to ensure that WFD effects continued to be considered and addressed through the design development and into the consenting phase.

A colour coding “Red, Amber, Yellow, Green, Blue” (RAYGB) system was used for the risk-based approach as agreed with the Environment Agency (see Appendix A – RAYGB Findings). Definitions for the colour coding were assigned to indicate the level of risk of objective non-compliance within each water body once mitigation had been considered. The definitions were as follows:

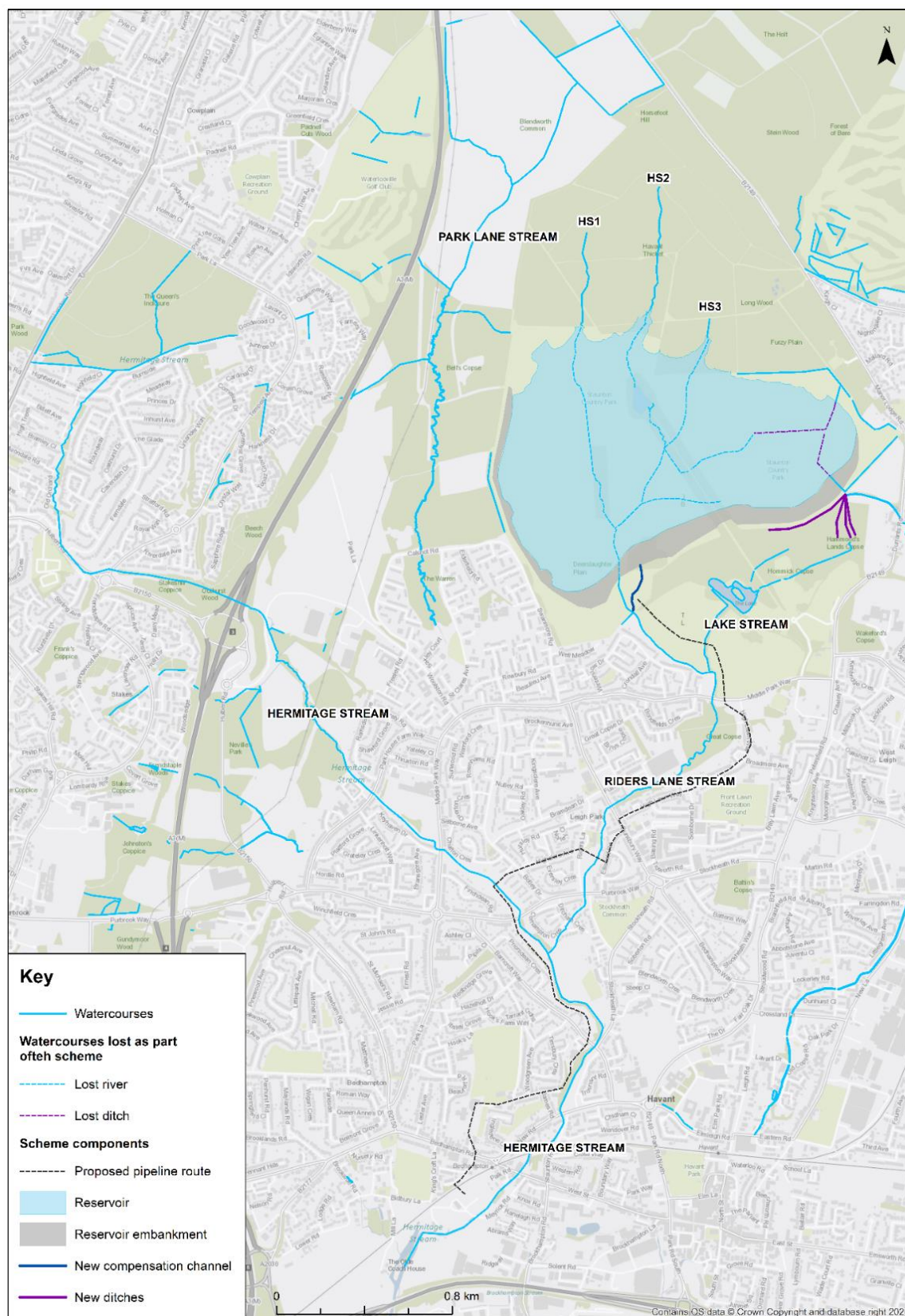
- **Dark Blue:** major beneficial effect of a scale sufficient to increase status class for the water body;
- **Light Blue:** localised/minor beneficial effect resulting in a localised improvement, but insufficient to increase status class at water body scale;
- **Green:** no measurable, change to (or effect on) water body;
- **Yellow:** minor localised and/or temporary effect when balanced against likely embedded mitigation – insufficient to affect an element at a water body scale;
- **Amber:** an adverse widespread or prolonged effect is possible when impact is considered on their own. Impacts in combination with others have the potential to have an adverse effect on the WFD element and water body.
- **Red:** adverse effect of sufficient scale to impact on a quality element and/or status of the at a water body scale.

The approach taken for all the Scheme assessments was that only red risks constituted a potential for deterioration (or prevention of good status) in a water body. Amber risks are those whereby a widespread or prolonged effect was possible, and that deterioration and prevention of good status may occur, but this was less likely if mitigation could be developed sufficiently to offset the impact as the design of the Scheme progressed. In the case of the Scheme no Amber risks were identified. Yellow risks are those where impacts when taken on their own have the potential to lead to a minor localised or temporary effect. There were some yellow risks identified in the Scheme but due to their minor localised or temporary effect they alone, or in combination, did not constitute a potential for deterioration.

The RAYGB system was used to assess the three main surface water bodies impacted within the Hermitage Stream catchment, namely, the Hermitage Stream, the Riders Lane Stream and Park Lane Stream. For each of the sub-catchments an assessment was made on the potential impacts of the following scheme elements:

- Embankment and Reservoir footprint
- Pipeline
- Compensation Flow
- Emergency discharge
- Access Roads

Figure 2-1 - Map of watercourses in Hermitage Stream catchment



3. Water body compliance assessment review

3.1. Water body assessment overview

The WFD compliance assessment has followed the three stages outlined in the Planning Inspectorate advice note 18 on the WFD in June 2017. This was agreed with the Environment Agency at the start of the WFD process. The process includes:

3.1.1. WFD Screening assessment

Screening is used to determine whether there are any activities in the Scheme that can be screened out of any further assessment since these elements will not be impacting a water body, or alternatively, there are existing activities which will form part of the baseline assessment. Findings need to be shared with the Environment Agency and the extent of conclusions agreed.

For Havant Thicket Reservoir, the screening assessment was issued to the Environment Agency on 17/01/20. This was discussed with the Environment Agency in a meeting on 27/01/20. The Environment Agency suggested that they were broadly happy with the assessment but suggested a review of the existing mitigation measures already in place/not in place for the water bodies impacted and advised that the impacts of dewatering during the construction works be included as part of the Water Framework Directive compliance assessment. The updated screening assessment was signed off by the Environment Agency on 05/03/20.

3.1.2. WFD Scoping assessment

Scoping is used to identify risk of the proposed development to receptors based on the relevant water bodies and their quality elements. This stage is also used to define and agree with the Environment Agency the future scope of the impact assessment.

For Havant Thicket Reservoir, this was submitted to the Environment Agency on 28/02/20. In correspondence dated 18/03/20, the Environment Agency confirmed that they were broadly happy with the scoping assessment but had a number of specific comments. This principally centred around the need for additional invertebrate surveys and Modular River Physical (MoRPh) surveys to inform the impact assessment and the mitigation and compensation strategy, respectively. The scope of the invertebrate surveys was agreed to be carried out in Spring 2020. A map was issued to the Environment Agency on 25/3/20 showing proposed locations of the eight sampling points. The sample locations points were agreed by the Environment Agency via email on 01/04/20. The invertebrate surveys were undertaken on 14/04/20 and results shared with the Environment Agency on 26/05/20. The scope of the MoRPh surveys was agreed with the Environment Agency 17/06/20 and surveys undertaken on 29/06/20 and 02/07/20. The results were incorporated into the Biodiversity Net Gain for Rivers report for rivers which was submitted as part of the planning application (Portsmouth Water 2020g).

3.1.3. WFD Impact assessment

The impact assessment offers a detailed assessment of how the Scheme would impact water bodies, and their quality elements, that remain screened in at this stage of the process. Identification of any non-compliance and consideration of mitigation measures and contributions to any overall WFD objectives would also be undertaken at this stage.

For Havant Thicket Reservoir, the draft WFD impact assessment was sent to the Environment Agency as part of the wider WFD compliance assessment on 14/07/20 for comment focusing on whether they considered a derogation under Article 4.7 was likely to be required as a result the potential for a non-compliant scheme under the WFD. The Environment Agency confirmed that they agreed an Article 4.7 derogation was necessary in a letter dated 07/08/20. In addition, the Environment Agency requested that the full RAYGB assessment was submitted as evidence. This has been sent to the Environment Agency alongside this technical note.

The WFD compliance assessment considered the impacts of the embankment and reservoir footprint, pipeline, compensation flow, emergency discharge and access roads on wide ranging environments. This included the following water bodies which were screened in from the preliminary assessment:

- Hermitage Stream (GB107042016370);
- River Lavant (Hants) WFD surface water body (GB107042016420);
- Langstone Harbour transitional water body (GB580705130000);

- East Hants Lambeth groundwater body (GB40702G500800);
- East Hants Chalk groundwater body (GB40701G502700); and,
- South Hants Lambeth Group groundwater body (GB40702G503700)

Of the water bodies assessed, there is only the potential for deterioration of Hermitage Stream WFD water body.

3.2. Mitigations

Havant Thicket Reservoir includes several embedded mitigation measures with respect to the water environment. For further details see the Environmental Statement, chapter 15 (Portsmouth Water 2020b). The WFD compliance assessment for both surface water bodies and groundwater bodies assumes all the mitigation measures presented in the Environmental Statement are in place including:

- 250m compensation flow channel;
 - This is a new channel that will connect the reservoir to Riders Lane Stream downstream. The existing channel will be filled in under the embankment footprint but, where feasible, the remainder of the channel upstream of the confluence of the compensation channel and Riders Lane Stream will be left as a backwater to improve habitat value.
- improvements around three pipeline crossings – each around 20m in length should the channel need to be excavated;
 - if direct excavations are required around the watercourse crossings then the opportunity to improve around 20m of channel around these crossing points will be realised.
- improvements to culverts for passage should they need upgrading;
 - should any of the culverts on Riders Lane Stream need upgrading to account for any discharges then the opportunity to enhance them for fish passage will be realised.
- mitigation of habitat around opening outfall from emergency discharge;
 - there will be an outfall from the emergency discharge into the main Hermitage Stream. When this work is undertaken there will be an opportunity to ensure that the habitat around the opening is maximised and this will be taken forward as part of the detailed design.
- additional ditch length around eastern perimeter of the reservoir.
 - a series of new ditches will be created around the embankment toe and to the east of the site which will more than compensate for the loss of the ditch length lost on the eastern side of the reservoir footprint.

3.3. Water bodies where development may cause deterioration

At the start of the WFD compliance assessment a series of criteria were set out to assess compliance against, namely:

- The Scheme will not cause a deterioration in any element of water body classification.
- The Scheme will not prevent the WFD status objectives from being reached within the water body or other downstream water bodies.
- The Scheme will contribute to the delivery of the relevant WFD objectives.

Each of these were assessed in the main WFD compliance assessment supported by a RAYGB assessment which reviewed each of the scheme components against the various water bodies and the general and specific quality elements. This was undertaken for the three sub-catchments in the overall Hermitage Stream catchment namely, Hermitage Stream, Riders Lane Stream and Park Lane Stream. A summary of the findings is detailed in Table 3-1 and discussed in detail below.

3.3.1. Criteria 1: The Scheme will not cause a deterioration in any element of water body classification.

For the water bodies assessed, the Riders Lane Stream was identified as being of a concern when considering whether the Scheme has the potential to cause a deterioration in WFD quality elements (see Table 3-1). This specifically relates to the embankment and the reservoir footprint, where the loss of habitat is significant as the

footprint of the Scheme will see a direct loss of 3.7km of headwater habitat of the Riders Lane Stream. From a scale perspective, the length of watercourse lost also accounts for approximately 42% of headwaters and 18% of entire length of watercourse within the whole water body, which will affect ecological functioning in terms of resource cycling, (re)colonisation potential and resilience. It is physically not possible to recreate this lost water body length. Along with the scale of the loss the invertebrate surveys undertaken in April 2020 have revealed that, in the context of the wider water body, the habitat potentially being lost is distinct and supports a range of specialist taxa indicative of groundwater supply and ephemeral flow conditions, including some nationally notable and scarce species.

There is a potential deterioration under the biological elements, specifically in macroinvertebrates and macrophytes and phytobenthos from the embankment and the reservoir footprint. In addition, for the hydromorphological status element the scale of habitat loss has the potential for deterioration on the quality elements:

- i) river depth and width variation
- ii) structure and substrate of the riverbed
- iii) structure of the riparian zone.

In addition, the embankment will lead to a severance of river continuity quality element as all the sediment that moves from the headwaters downstream will be blocked by the embankment. While the degree of sediment movement through the headwaters is believed to be low (as evidenced on site with respect to sediment sources and sediment sinks), the embankment will lead to a complete severance of sediment continuity downstream. As a result, there is a potential deterioration from a sediment continuity perspective.

The WFD compliance assessment concludes that there will be the potential for deterioration of Hermitage Stream WFD water body only. This also assumes that all embedded mitigation is put in place.

From a scheme perspective, it was concluded that the only element of the Scheme that has the potential to cause deterioration at a water body scale is the embankment and reservoir footprint. The pipeline access route and associated infrastructure do not have the potential to cause the deterioration at this scale. It was determined that in the other sub-catchments the scheme elements do not have the potential to cause a deterioration in the WFD elements. In some instances, there was the potential for a positive impact through improvements in water quality.

3.3.2. Criteria 2: The Scheme will not prevent the WFD status objectives from being reached within the water body or other downstream water bodies.

None of the WFD water body level measure actions identified in the Environment Agency's extended WFD water body summary would be prevented from occurring as a result of the Scheme. Evidence for this is detailed below.

The footprint of the scheme is in the headwaters of the Riders Lane Stream sub-catchment so does not directly impact the delivery of any WFD water body objectives. The access roads are not impacting water bodies at all and therefore will not cause any issues. The pipeline will go under the Riders Lane Stream and Lake stream and thus will not directly impact any delivery of WFD objectives as localised mitigation will be embedded as part of the scheme. The compensation flow will be agreed with the Environment Agency and will be either be as existing, or improved, and thus will not impact WFD objectives delivery. Finally, the emergency discharge is within the normal range of flows within the Hermitage Stream (less than a 1 in 2 year event) and can be accommodated in the present capacity of Riders Lane Stream (after culverts have been upgraded). The emergency discharge will not prevent WFD water body objectives, such as river restoration, from being delivered in the catchment, since any design will be delivered to ensure that the capacity of the channel is not compromised and as a result there will be no change in flood risk.

As none of the scheme elements are deemed to impact the delivery of WFD water body objectives the Scheme is considered to pass this test.

3.3.3. Criteria 3: The Scheme will contribute to the delivery of the relevant WFD objectives.

The commitments in the watercourse mitigation and compensation strategy will ensure that the Scheme will contribute to the relevant WFD objectives and thus the Scheme will also pass this test. For this Scheme, its contribution to the water body reaching its objective GES through planned RBMP mitigation measures was assessed.

Table 3-1 - Summary of WFD quality elements that have the potential for deterioration at a water body scale from the Scheme within Hermitage Stream Water body (GB107042016370)

Hermitage Stream sub catchment	Scheme element	WFD quality element		Conclusion
		WFD element	Quality elements	
Riders Lane Stream	Embankment and the reservoir	Biology	Macro-invertebrates	Distinct, local, habitat loss including range of specialist taxa indicative of groundwater supply and ephemeral flow conditions, including some nationally notable and scarce species.
			Macrophytes and phytobenthos	Scale of macrophyte habitat loss is potentially significant at a water body scale. Phytobenthos is not impacted but the quality element groups both macrophytes and phytobenthos together. There are also some unique macrophyte communities in the Upper Lake that will be lost as part of the scheme.
		Hydromorphology	River depth and width variation	Scale of habitat loss is significant at a water body scale
			Structure and substrate of the riverbed	Scale of habitat loss is significant at a water body scale
			Structure of the riparian zone	Scale of habitat loss is significant at a water body scale
			River continuity	There will be a severance in the sediment continuity between the uppermost Riders Lane Stream and the lower Riders Lane Stream as a consequence of the embankment

3.4. WFD compliance assessment review summary

The review of WFD compliance assessment has concluded that impacts on WFD objectives could result from the embankment and the reservoir footprint within the sub-catchment of the Riders Lane Stream, which is part of the Hermitage Stream water body. No WFD objectives on the main Hermitage Stream and the Park Lane Stream, which is another sub-catchment within the wider catchment, are deemed to be at risk of deterioration from the scheme. Thus, in summary, the potential for deterioration at a water body scale remains for specific WFD quality elements namely:

- macroinvertebrates;
- macrophytes and phytobenthos;
- river depth and width variation;
- structure and substrate of the riverbed;
- structure of the riparian zone; and,
- river continuity.

The impacts cannot be readily mitigated or compensated against despite the mitigation and compensation being embedded into the Scheme. Thus, there is a potential that the Scheme will cause deterioration of several

quality elements and thus deterioration at a water body scale cannot be ruled out. The Environment Agency confirmed this assessment in a letter dated 07/08/20. A derogation under Article 4.7 of WFD will be required for the Havant Thicket Reservoir Scheme.

3.5. Article 4.7

In accordance with Article 4.7 of the WFD Member States will not be in breach of the WFD when failure to meet its environmental objectives is the result of either new modifications to the physical characteristics of a water body, or as a result of new human sustainable development on the proviso that the modifications or new development proposed are compliant with four key conditions. In so doing, Article 4.7 provides a means whereby a derogation for a proposed modification or sustainable development may be granted where it meets these four conditions.

Using a precautionary approach, the Article 4.7 process can also be applied when potential water body impacts may prevent achievement of the WFD's environmental objectives. The four conditions that must be met for proposed modifications or new development are set out below and outlined in detail in Section 4:

- All practicable steps are taken to mitigate the adverse impact on the status of the body of water;
- The reasons for those modifications or alterations are specifically set out and explained in the river basin management plan required under Article 13 and the objectives are reviewed every six years;
- The reasons for those modifications or alterations are of overriding public interest and/or the benefits to the environment and to society of achieving the objectives set out in paragraph 1 are outweighed by the benefits of the new modifications or alterations to human health, to the maintenance of human safety or to sustainable development, and
- The beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option.

The remainder of this report presents detail on how the Article 4.7 condition tests are met for the Hermitage Stream WFD water body. It is important to note that only scheme components driving non-compliance need to be considered as part of these tests. The information presented in sections 4 and 5 will allow the Environment Agency and Local Planning Authorities to determine the suitability of the evidence for derogation under Article 4.7.

3.6. Article 4.8

Article 4(8) states that "a Member State shall ensure that the application does not permanently exclude or compromise the achievement of the objectives of this Directive in other bodies of water within the same river basin district and is consistent with the implementation of other Community environmental legislation." This was reviewed within the WFD Compliance assessment undertaken for the scheme and information relating to this is detailed in Section 5.1.

3.7. Article 4.9

Article 4(9) states that "Steps must be taken to ensure that the application of the new provisions, including the application of paragraphs 3, 4, 5, 6 and 7, guarantees at least the same level of protection as the existing Community legislation." In the case of Havant Thicket Reservoir other Community law that is relevant in this instance is the Habitats Directive (92/43/EEC). Information relating to this is detailed in Section 5.2.

4. Article 4.7 conditions

This section sets out the information Portsmouth Water intends to present at detailed planning application stage to evidence that the Havant Thicket Reservoir meets the conditions for all four conditions (a-d) of Article 4.7. It also provides information sources used for each condition.

4.1. Condition (a): All practicable steps are to be taken to mitigate the adverse impacts on the water body concerned

This section provides evidence to demonstrate that all practicable steps will be taken to mitigate for the adverse impacts on the Hermitage Stream water body following a series of workshops with the Environment Agency (for details see Table 4-1). This resulted in the production of a long list of practicable measures that could be delivered across the catchment which is provided as evidence to meet the requirements for Article 4.7 condition (a). During the next phase of the process (and not part of the derogation itself) a short-listing exercise will be carried out to reduce the full list of practicable measures to generate a short list of options. The approach to short-listing and options will be discussed and agreed with the Environment Agency. The short list of mitigation measures will deliver against the legal requirement for all practicable mitigation.

The results of the WFD compliance assessment (Environmental Statement, Volume 4, Appendix A15.1 Water Framework Directive (Portsmouth Water, 2020a)) demonstrated that the scheme had the potential for deterioration for a number of different WFD elements within the Riders Lane Stream which is a sub-catchment of the Hermitage Stream catchment and part of the Hermitage Stream water body (see Table 3-1). These related to both hydromorphological and biological quality elements. From a hydromorphological perspective, the quality elements that were impacted were those related to the scale of the habitat loss along with river continuity in accordance with Table 3-1. The biological elements impacted were macroinvertebrates as well as macrophytes and phytobenthos. Further detail has been provided in Appendix A – RAYGB Findings.

To determine practicable measures that could mitigate the adverse impact on the water body a process must be undertaken to identify suitable measures that have the potential to mitigate against the impacts identified. To do this, a series of workshops have been held with the Environment Agency to determine the most suitable approach to undertake and the necessary documented evidence base that is required to chart this process. The details of these workshops and key outcomes are detailed in Table 4-1. It was agreed, from the onset, that the focus should be on delivery of any mitigation measures within the Hermitage Stream catchment as a whole and only if this was not possible should the potential for mitigation options outside the catchment be explored.

Table 4-1 - Workshops held with the Environment Agency for Article 4.7 test in relation to condition (a)

Date	Description	Outcomes
08/10/20	Workshop 1: To define the approach required to meet each of the Article 4.7 tests: a) Mitigation of the adverse impacts on the water body to be achieved through the development of a long list of options that could be undertaken across the Hermitage Stream catchment and then refine this into a shorter list that would fulfil this test. b) Reasons for modifications or alterations set out in RBMP to be taken forward by the Environment Agency as part of the RBMP planning cycle. c) Overriding public interest test to be met through detailing outputs from Portsmouth Water and Southern Water's Resources Management Plan (WRMP) 19 which includes Strategic Environmental Assessment (SEA) and its WFD Compliance Assessment. d) Benefits cannot be achieved by a significantly better environmental option to	The Environment Agency requested that: For Test (a) a) A RAYGB WFD compliance assessment audit trail for surface waters should be produced to map the various quality elements that would be impacted by the scheme. b) A long list of practicable measures should be developed across the catchment that could be used to mitigate against the impacts identified. Criteria should be developed that would be used to cut the long list to a short list. c) Criteria needs to look at key issues, such as aligned opportunities particularly in relation to quality elements impacted. d) Need to be clear in any strategy produced what is mitigation, compensation and net gain.

Date	Description	Outcomes
	be met through detailing outputs from Portsmouth Water's 'Havant Thicket Reservoir Statement of Need (which summarises alternatives considered)' note and Portsmouth Water's Alternative Site Options Report (version 6).	For Test (c) and (d) use water resources management plans and associated strategy documents for the evidence base (detailed by the Environment Agency in an email on 23/10/20). Test (b) is a reporting regulation and the Environment Agency will lead on this aspect.
02/11/20	Workshop 2: Test a) To agree a long list of mitigation and compensation options that could be undertaken within the Hermitage Stream catchment to mitigate and compensate for the habitat lost as part of the scheme where the potential for deterioration was noted. A set of objectives were discussed, and agreed, that would be used to evaluate each of the long list options to develop a short-list.	Long list of options and assessment criteria were presented and discussed, and any suggested amendments noted and taken forward to version 2 of the assessment criteria. All criteria were agreed to be equally weighted. Additional criteria on longevity of options, certainty of outcomes and co-benefits with other projects were developed for the next version following these discussions.
26/11/20	Workshop 3: To agree a list of practicable options that will be taken forward to meet the criteria of Test a) through the review of the scoring undertaken as part of the scoring exercise.	Discussed and agreed revised set of criteria, objectives and ranking that would be taken forward to meet test (a) with short-listing to be undertaken at a later date following the acceptance of the Article 4.7 paper. The long list was also agreed at this stage with more detail to be provided on measure descriptions in Article 4.7 technical note. As part of this process it was also agreed to split WFD quality elements as a separate, criteria by itself.

To determine the range of practicable steps that could be undertaken to mitigate the impacts of the embankment and reservoir footprint a long list of measures, that could be delivered at spatially specific locations, were developed. This assessment was based upon previous site visits as well as an additional walkover of the headwater streams which included those in Riders Lane Stream as well as Park Lane Stream and Hermitage Stream (undertaken on 19/10/20). The long list of reach practicable measures is shown in Table 4-2 which details both the measure (such as restoration opportunity) and the location where it could be undertaken (such as the Headwater Stream 3). The locations of these reaches are shown in Figure 4-1 and marked by a green tick. An orange tick marks the potential for only a limited scope for delivery of the measure at the location marked. Details of the descriptions of these measures and what WFD quality elements that they could provide mitigation for are detailed in Table 4-3.

Table 4-2 - Long list of reach options

Sub-catchment	Reach	Natural Flood risk Management (NFM)	Increase light in channel	Riparian zone protection	Remove bank/bed protection	Restoration opportunities	Remove in-channel structures	Improve connectivity (fish)	Channel creation	Pond creation	Pond enhancement	Water quality improvement	Flow improvements	Sediment continuity	Translocation of macroinvertebrates	Translocation of macrophytes	INNS management
Riders Lane Stream	1. Headwater Stream 1 (HS1) Opportunities exist to slow flow (NFM), create ponds for translocation and restore the channels through opening up the canopy and restoring form and function.	✓	✓	-	-	✓	-	-	-	✓	✓	-	-	-	-	✓	-
	2. Headwater Stream 2 (HS2) Opportunities exist to slow flow (NFM), create ponds for translocation and restore the channels through opening up the canopy and restoring form and function.	✓	✓	-	-	✓	-	-	-	✓	✓	-	-	-	✓	✓	-
	3. Headwater Stream 3 (HS3) Opportunities exist to slow flow (NFM), create ponds for translocation and restore the channels through opening up the canopy and restoring form and function.	✓	✓	-	-	✓	-	-	-	✓	✓	-	-	-	-	✓	-
	4. Ponds in Long Wood Opportunities exist to improve pond habitat and translocation of acidic macrophyte species in the Upper Lake (providing water quality conditions are suitable).	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	✓	✓
	5. New channel near Rowlands Castle A new channel will be created to the east of the site.	-	-	-	-	✓	-	-	✓	-	-	-	-	-	-	-	-
	6. Eastern ditches (flowing into River Lavant) New ditch habitat will be created to the east of the site to aid drainage and mitigate for ditch length lost through the footprint.	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	-	-
	7. The Lake Stream Opportunities exist to create ponds for translocation and restore the channels through opening up the canopy and restoring form and function.	-	-	-	-	✓	-	-	-	✓	-	✓	✓	-	-	✓	-
	8. New compensation flow channel	-	-	-	-	-	-	-	✓	-	-	✓	✓	-	✓	-	-

Sub-catchment	Reach	Natural Flood risk Management (NFM)	Increase light in channel	Riparian zone protection	Remove bank/bed protection	Restoration opportunities	Remove in-channel structures	Improve connectivity (fish)	Channel creation	Pond creation	Pond enhancement	Water quality improvement	Flow improvements	Sediment continuity	Translocation of macroinvertebrates	Translocation of macrophytes	INNS management
	New channel will be created to connect Havant Thicket reservoir to Riders Lane Stream.																
	9. Sediment management Options could consider a mechanism to flush reservoir sediments or introduce new sediments at the top of Riders Lane Stream.	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	-
	10. d/s reservoir embankment to Middle Park Way Opportunities exist to restore the channels through opening up the canopy and restoring form and function. Flow can also be enhanced in this reach offering water quality improvements. Culverts could also be improved as part of the scheme's embedded mitigation.	-	✓	✓	-	✓	-	✓	-	-	-	✓	✓	-	-	-	✓
	11. Great Copse Opportunities exist to improve the channels through opening up the canopy. Flow can also be enhanced in this reach offering water quality improvements.	✓	✓	✓	-	✓	-	-	-	-	-	✓	✓	-	-	-	-
	12. Great Copse to Dunsbury Way Opportunities exist to enhance flow in this reach offering water quality improvements. Culverts could also be improved within embedded mitigation.	✓	-	-	-	✓	-	✓	-	-	-	✓	✓	-	-	-	✓
	13. Dunsbury Way to Purbrook Way Opportunities exist to restore the channel at the pipeline crossing; opening up the canopy; restoring form and function. Flow can also be enhanced in this reach offering water quality improvements. Culverts could also be improved as part of the scheme's embedded mitigation.	✓	-	-	-	✓	-	✓	-	-	-	✓	✓	-	-	-	✓

Sub-catchment	Reach	Natural Flood risk Management (NFM)	Increase light in channel	Riparian zone protection	Remove bank/bed protection	Restoration opportunities	Remove in-channel structures	Improve connectivity (fish)	Channel creation	Pond creation	Pond enhancement	Water quality improvement	Flow improvements	Sediment continuity	Translocation of macroinvertebrates	Translocation of macrophytes	INNS management
Park Lane Stream	14. Purbrook Way to Hermitage Stream Opportunities exist to restore the channel via opening up of the canopy and restoring form and function through localised removal of bed and bank protection. Flow can also be enhanced in this reach offering water quality improvements.	✓	-	-	✓	✓	-	-	-	-	-	✓	✓	-	-	-	✓
	15. Tributary north golf course Opportunities exist to restore the channel via restoring form and function.	✓	-	-	✓	✓	-	✓	-	-	-	✓	-	-	-	-	-
	16. Blendworth Common tributary Opportunities exist to restore the channel via opening up of the canopy and restoring form and function.	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	-	-
	17. Tributary south of golf course Opportunities exist to restore the channel via opening up of the canopy and restoring form and function.	-	-	-	-	✓	-	✓	-	-	-	-	-	-	-	-	-
	18. Unnamed Tributary joining on LHB Opportunities exist to restore the channel via opening up of the canopy and restoring form and function.	-	-	-	-	✓	-			-	-	-	-	-	-	-	-
	19. Unnamed Tributary joining on RHB from A3 Opportunities exist to restore the channel via opening up of the canopy and restoring form and function.	-	-	-	-	✓	-			-	-	-	-	-	-	-	-
	20. A3 to Bell's Copse Opportunities exist to restore the channel via opening up of the canopy and restoring form and function and removal of structures. There also exists potential NFM opportunities to slow the flow of water.	✓	✓	-	-	✓	✓	-	-	-	-	✓	-	-	-	-	-
	21. Bell's Copse Opportunities exist to improve the channels through opening up the canopy.	✓	✓	-	-	✓	-	-	-	-	-	✓	-	-	-	-	-

Sub-catchment	Reach	Natural Flood risk Management (NFM)	Increase light in channel	Riparian zone protection	Remove bank/bed protection	Restoration opportunities	Remove in-channel structures	Improve connectivity (fish)	Channel creation	Pond creation	Pond enhancement	Water quality improvement	Flow improvements	Sediment continuity	Translocation of macroinvertebrates	Translocation of macrophytes	INNS management
Hermitage Stream	22. Bell's Copse to Warren Park culvert Opportunities exist to enhance the channel via opening up of the canopy.	-	-	-	-	✓	-	✓	-	-	-	-	-	-	-	-	-
	23. Queen's Inclosure to Burnside (road) Opportunities exist to restore the channels through opening up the canopy and restoring form and function. Opportunities also exist to slow flow (NFM).	✓	✓	✓	-	✓	-	-	-	-	-	-	-	-	-	-	-
	24. Burnside to A3 Limited options to undertake restoration or NFM.	✓	-	-	-	✓	-	-	-	-	-	-	-	-	-	-	-
	25. A3 to Bushey Lease Limited options to undertake restoration or NFM.	✓	-	-	-	✓	-	-	-	-	-	-	-	-	-	-	-
	26. Bushey Lease to Park House Farm Way (Reach B) Significant opportunities exist to restore the channel via removal of bed and bank protection and restoring form and function.	-	-	-	✓	✓	-	-	-	-	-	-	-	-	-	-	✓
	27. Park House Farm Way to Middle Park Way (Reach C) Significant opportunities exist to restore the channel via removal of bed and bank protection and restoring form and function.	-	-	-	✓	✓	-	-	-	-	-	-	-	-	-	-	✓
	28. Middle Park Way to Riders Lane Stream (previously restored) Some opportunities exist to further enhance the channel via removal of bed protection to support in restoring form and function.	-	-	-	✓	✓	-	-	-	-	-	-	-	-	-	-	✓
	29. Riders Lane Stream to Barncroft Way (Reach D)	-	-	-	✓	✓	-	-	-	-	-	-	-	-	-	-	✓

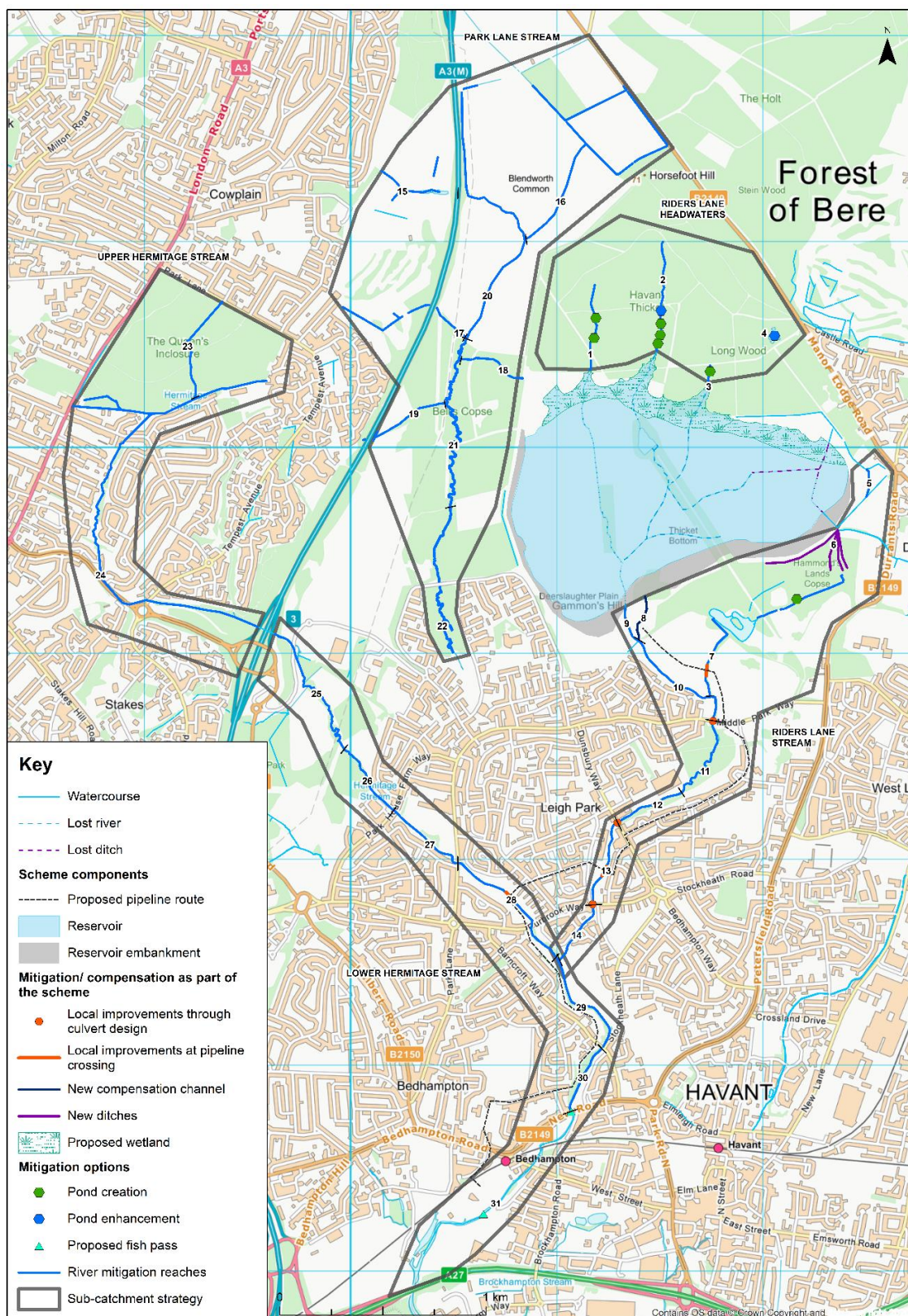
Sub-catchment	Reach	Natural Flood risk Management (NFM)	Increase light in channel	Riparian zone protection	Remove bank/bed protection	Restoration opportunities	Remove in-channel structures	Improve connectivity (fish)	Channel creation	Pond creation	Pond enhancement	Water quality improvement	Flow improvements	Sediment continuity	Translocation of macroinvertebrates	Translocation of macrophytes	INNS management
	Significant opportunities exist to restore the channel via removal of bed and bank protection and restoring form and function.																
	30. Barncroft Way to New Road (Reach E) Significant opportunities exist to restore the channel via removal of bed and bank protection and restoring form and function.	-	-	-	✓	✓	-	✓	-	-	-	-	-	-	-	-	✓
	31. New Road to Waterworks 2 Opportunities exist to improve fish passage around the structure.	-	-	-	✓	✓	-	✓	-	-	-	-	-	-	-	-	✓

Table 4-3 - Measure description and potential to mitigate quality elements

Option	Description	WFD quality elements that could be mitigated for through each option					
		Hydromorphology				Biological	
		River continuity	River width and depth variation	Structure and substrate of the riverbed	Structure of the riparian zone	Macro-invertebrates	Macrophytes and phytobenthos
Natural Flood Management (NFM)	More natural measures which attenuate flow in (upper) parts of the catchment and create permanent or temporary aquatic habitats. This can include the addition of large wood into the channel to create improved habitat diversity which can also support in the management of sediment. It is noted that NFM measures in the Riders Lane Stream are considered less effective in context of the Reservoir providing overall flood risk benefits to the Riders Lane Stream catchment.	✓	✓	✓	✓	✓	✓
Increase light in channel	Reduce the level of shading of the channel, e.g. through the thinning or removal of overhanging vegetation. This will allow more light into the channel and encourage instream/marginal vegetation growth.	-	-	✓	✓	✓	✓
Riparian zone protection	Effectively manage the area immediately adjacent to the river.	-	-	-	✓	✓	✓
Remove bank/bed protection	Remove artificial bed and/or bank protection to re-naturalise a reach of channel	✓	✓	✓	✓	✓	✓
Restoration opportunities	Opportunity to restore a section of channel which is often related to cutting a whole new reach of channel which will have an improved habitat template when compared to the existing one.	✓	✓	✓	✓	✓	✓
Remove in-channel structures	Remove artificial structures to re-naturalise the channel.	✓	✓	✓	✓	✓	✓
Improve connectivity (fish)	Reduce barriers to fish migration through removal, or alteration to, an existing barrier.	✓	✓	✓	✓	✓	✓
Channel creation	Creation of a new channel that previously did not exist at the location.	✓	✓	✓	✓	✓	✓
Pond creation	Creation of a new pond that previously did not exist at the location that links to the watercourse to improve riparian complexity.	-	-	-	✓	✓	✓

Option	Description	WFD quality elements that could be mitigated for through each option					
		Hydromorphology				Biological	
		River continuity	River width and depth variation	Structure and substrate of the riverbed	Structure of the riparian zone	Macro-invertebrates	Macrophytes and phytobenthos
Pond enhancement	Improvement in habitat value of an existing pond through modification and/or management.	-	-	-	✓	✓	✓
Water quality improvement	Improvement in the overall water quality of a reach through the management of point- or diffuse pollution sources.	-	-	-	✓	✓	✓
Flow improvements	Improvements in the water supply to a reach from the reservoir which could also include a degree of sediment flushing.	✓	✓	✓	✓	✓	✓
Sediment management	Options could consider a mechanism to flush reservoir sediments or introduce new sediments at the top of Riders Lane Stream	✓	-	-	-	-	-
Translocation of macroinvertebrates	Establishment of a target community through the translocation of live specimens, or gravels, to a new location. This specifically is linked to the unique communities that have been found on the site of the reservoir.	-	-	-	-	✓	-
Translocation of macrophytes	The addition of macrophytes into an area which have been sourced from elsewhere. This specifically is linked to the translocation of acidic macrophyte species in the Upper Lake.	-	-	-	-	-	✓
Invasive Non-Native Species (INNS) management	Management of aquatic/riparian INNS in areas where these are recorded.	-	-	-	-	-	✓

Figure 4-1 - Catchment reach identification



The criteria for scoring the long list of practicable measures were developed and initially discussed with the Environment Agency on 02/11/20 and finalised in the meeting on the 26/11/20 following some suggested amendments. In the final criteria list, the criteria were split into four different sets which were based around key groupings which included

- effectiveness of implementation
- the ability to contribute to WFD quality elements

- alignment with project objectives
- addition assessment criteria.

For each of the criteria, the scores were set between 1 (low) to 3 (high) for the 'deliverability' set and 1 (low) to 5 (high) for the remaining sets. The 'deliverability' set was deemed to have less variability and hence had a reduced scoring range. The overall scoring matrix was then produced which had totals per individual set as well as an overall total for each of the mitigation areas identified. Thus, key differences could be determined between individual sets and the overall score. A blank matrix is shown in Table 4-4 and full list in Table 4-5. The final agreed scoring was discussed with the Environment Agency on the 26/11/20 and finalised on 04/12/20. The final scoring is shown in Appendix B and shows ranked scores for the mitigation areas against the full list of objectives. The Environment Agency agreed on 04/12/20 that this document provided a list of practicable measures that could mitigate for the impacts caused by the embankment and reservoir footprint and this list of mitigation options would be sufficient to meet the requirements of Article 4.7 test (a).

The list of practicable measures that was developed to fulfil Article 4.7 test (a) includes a variety of measures that could be undertaken to help improve the overall habitat and resilience of system and can thus go some way to mitigate for the loss of habitat associated with the embankment and reservoir footprint. However, the creation of habitat to offset the length of watercourse lost is not technically feasible with the sub-catchment so enhancement of existing habitat will remain the focus. In addition, habitat being potentially lost under the reservoir is also distinct in the context of it supporting a range of specialist taxa indicative of groundwater supply and ephemeral flow conditions, including some nationally notable and scarce species. Suitable comparable habitats have been identified that can be improved for macroinvertebrates but to the extent that this mitigates against the habitat lost is difficult to assess. Further assessment of their suitability will be undertaken over time.

For river continuity, which has been permanently impacted by the embankment, the current proposal would not allow any flushing of fine sediment downstream into Rider Lane Stream. The reservoir design has, at this stage, not incorporated any flushing mechanism since general guidance from the government (gov.uk, 2020) suggests that significant deposits of sediment from reservoir releases have the potential to i) damage the river ecology, ii) destroy fish habitats and breeding sites and iii) change the river's overall appearance. The option to allow sediment flushing could be undertaken, if required by the Environment Agency, but would need to be reassessed during detailed design as it is not currently designed to have this flushing mechanism in place. Three valves are currently proposed with the upper valve supplying water as part of the compensation flow. In addition, the wetland at the upstream limit of the reservoir is likely to act as a sediment sink for the reservoir with a more limited amount of sediment likely to pass this feature and settle in the main reservoir.

Thus, for river continuity, while the embankment will inhibit the movement of sediment downstream it is equally advisable not to release fine sediment from a release from a reservoir. Adding gravels to the Riders Lane Stream downstream of the reservoir footprint could be incorporated into any restoration or improvement measures detailed for Riders Lane Stream, but our work to date indicate that gravel transport is currently limited. Sediment management has been added as a mitigation measure to consider on Rivers Lane Stream.

Table 4-4 - Example unpopulated scoring table

Mitigation area	Set 1: Effectiveness of implementation (deliverability)	Set 2: WFD quality	Set 3: Alignment with project objectives	Set 4: Additional assessment criteria	Totals per set	Totals overall
1....						
29						

The shortlisting of measures is presented in Appendix B.

Table 4-5 - Scoring Criteria for short-listing exercise

Set	Description	Criteria	Scoring
Set 1	Effectiveness of implementation (deliverability)	Land ownership	1 Low to 3 High
		Conservation interest (notably Habitats Directive sites, Site of Special Scientific Interest (SSSI))	1 Low to 3 High
		Heritage interest	1 Low to 3 High
Set 2	WFD quality elements	Mitigation measures will be linked directly to WFD quality elements affected by the scheme	1 Low to 5 High
Set 3	Alignment with project objectives	There is a preference to create new habitats, which may be main channels, tributaries, backwaters or ponds. Where this is not possible, enhancements to existing habitats will be made.	1 Low to 5 High
		There is a preference to undertake mitigation as close to the affected habitats as possible, which aligns with the accepted principle of mitigation at, or near to the source as possible.	1 Low to 5 High
		Mitigation measures will be linked directly to WFD objectives for the Hermitage Stream WFD water body	1 Low to 5 High
		Measures will contribute to catchment resilience	1 Low to 5 High
		There is a preference for measures which improve catchment connectivity between existing 'good' quality habitats	1 Low to 5 High
		Mitigation measures should provide amenity value and enhance the visual quality of the landscape (providing this doesn't compromise more sensitive ecology)	1 Low to 5 High
		Mitigation will target key species/communities of importance/high quality which may be 'lost' locally (e.g. acid pond plant community, macroinvertebrates indicative of 'good' water quality and/or springs).	1 Low to 5 High
		Measures cannot compromise the HMWB designations of the WFD water body, notably flood risk, which have important socio-economic benefits.	1 Low to 5 High
Set 3	Additional assessment criteria	Certainty of outcomes	1 Low to 5 High
		Longevity of measures	1 Low to 5 High
		Co-benefits of working near projects undertaken by environmental groups	1 Low to 5 High
		Benefits attained by a single measure	1 Low to 5 High

4.2. Condition (b): the reasons for modifications or alterations are specifically set out and explained in the RBMP

Condition (b) requires that reasons for those modifications or alterations are specifically set out and explained in the river basin management plan required under Article 13 and the objectives are reviewed every six years.

Portsmouth Water will work with the Environment Agency to include the water body modifications in the third update of the South East RBMP (due to be published in 2021).

4.3. Condition (c): the reasons for those modifications or alterations are of overriding public interest and/or the benefits to the environment and to society of achieving the objectives set are outweighed by the benefits of the new modifications or alterations to human health, to the maintenance of human safety or to sustainable development

Condition (c) must demonstrate that the reasons for modifications or alterations are of overriding public interest and/or the benefits to the environment and to society of achieving the objectives are outweighed by the benefits of the new modifications or alterations to human health, to the maintenance of human safety or to sustainable development.

The evidence for this is in the following information sources:

- National Framework for Water Resources (Environment Agency, 2020);
- National Policy Statement (NPS) for Water Resources Infrastructure (Defra, 2018);
- Water Resource South East's (WRSE) future resource requirements (WRSE, 2020);
- Southern Water's Water Resource Management Plan (WRMP19), which includes SEA and WFD compliance assessment (Southern Water, 2019); and,
- Portsmouth Water's WRMP19, which includes SEA and WFD compliance assessment (Portsmouth, Water, 2019a).

Portsmouth Water, and other water companies, have a legal duty to supply water under section 37 of the Water Industry Act 1991 and thus it is critical where shortfalls in supply are identified they are addressed to continue water supply to customers.

This section will present evidence for overriding public interest only as the Scheme is part of the National Water Resources Framework (which provides impartial, government led evidence for the need for water resources investment, including where this may be required in the UK), a WRSE future resource requirement (which provides multi-company and multi-stakeholder evidence of regional needs) and within the WRMP19 for both Portsmouth Water and Southern Water (which make an accepted case for the loss of deployable output as a result of reducing abstraction in the Rivers Test and Itchen).

In the draft NPS for Water Resources Infrastructure (Defra, 2018), the government recognises the immediate need to increase resilience in the water sector to address pressure on water supplies. This pressure is increasing due to population growth, the impacts of climate change and the need to maintain sufficient water in watercourses, lakes and wetlands to protect the environment.

The National Framework for Water Resources (Environment Agency, 2020) highlights that around 50% of the national need for water by 2050 will be in the South East Region. The majority of the South East is classed as 'seriously water-stressed' with Portsmouth Water currently sharing supplies with Southern Water in West Sussex and Hampshire of up to 30 million litres of water each day. By 2029, this will double to 60 million litres per day in extreme 1 in 200-year drought conditions because Southern Water supplies water to an area that is officially identified as an area of significant population and economic growth.

The National Framework for Water Resources (Environment Agency, 2020) advocates for regional plans to reduce demand, halve leakage rates, develop new supplies, move water to where it is needed and reduce the use of drought measures that have an impact on the environment by 2050. These measures to improve resilience in the future are echoed by WRSE Group report (WRSE, 2020).

The resilience of Southern Water's water supply is also restricted by the requirement for Southern Water to significantly reduce its abstraction on the chalk Rivers Test and Itchen, (as set out by the Environment Agency to meet the requirements of the Habitats Directive and WFD). In Southern Water's WRMP they identify the need to secure an additional large-scale transfer of water from Portsmouth Water (21Ml/d), in excess of that

which can be transferred through existing pipelines. This is required so that Southern Water can meet their agreement under Section 20 of the Water Resources Act 1991 that requires them to use all best endeavours to remove their forecast deficit. Modelling undertaken by WRSE indicates that there is both the scope (through options available to Portsmouth Water, including Havant Thicket Reservoir) and the need for Portsmouth Water to provide additional bulk supplies to Southern Water, to assist its neighbour in meeting supply-demand deficits it faces during the planning period and to ensure its customers' own supplies are protected.

Increasing bulk supplies to Southern Water is a key component of Portsmouth Water's WRMP. The plan to use Havant Thicket Reservoir to provide these bulk supplies, was deemed a significantly better environmental solution than the alternative of negatively impacting the designated River Test Site of Special Scientific Interest and River Itchen Special Area of Conservation (SAC) and SSSI areas, an approach that is supported by Natural England (Portsmouth Water's SEA (Portsmouth Water, 2019)). Therefore, Havant Thicket Reservoir is considered a very important option to help deliver resilience in South East England and has been included in both water companies' five-year investment plans for 2020-25, also approved by Ofwat in late 2019.

Portsmouth Water's WRMP19 (Portsmouth Water, 2019) developed through an options appraisal of an unconstrained list of technically feasible options and screening process. This involved stakeholder consultations to identify the preferred plan that could meet the projected supply-demand deficit with minimal financial, social, environmental and carbon costs. The WRMP is a twin-track approach to reduce leakage and lower per capita consumption, as well as the development of Havant Thicket Reservoir. The modelling in Portsmouth Water's WRMP showed that Havant Thicket Reservoir provides a large proportion of the additional deployable output required to balance supply and demand from 2029/30 onwards and as a result was included preferred plan. Havant Thicket Reservoir would help support Southern Water in delivering greater drought resilience in the most cost-effective way by supplying Portsmouth Water customers directly, and freeing water from other abstractions to be transferred. Without Havant Thicket Reservoir, Southern Water would be required to find alternative supply options that will be significantly more expensive or negatively impact habitats, and thereby offer poorer value to customers. Havant Thicket Reservoir was deemed the most appropriate solution as part of the WRMP process which included consultation and consideration and assessment of a variety of options to fulfil this supply shortage. The proposal to use the reservoir aligns with the national direction of improving water supply resilience and reducing unsustainable abstraction. It therefore provides a more sustainable way of delivering this water resource which reduces overall environmental impacts.

Portsmouth Water's preferred plan was developed as an iterative process with the accompanying SEA Environmental Report, and as a result performs well against the SEA objectives. The SEA concludes that it is likely having only a neutral or minor negative effect against the majority of objectives. In addition, environmental improvements have been identified that can be delivered in many areas through scheme design, catchment management at biodiversity plans. Development of the Havant Thicket Reservoir provides the biggest opportunities for improvements and Portsmouth Water have stated that they will seek, where possible, to enhance positive effects on the local economy and communities through investment; utilising local labour; and appointing local contractors/sub-contractors and utilising locally sourced materials. They will also strive to reduce greenhouse gas emissions and resource use through construction and minimise landscape and visual impacts of construction (Portsmouth Water's SEA).

This summary of information demonstrates that Havant Thicket Reservoir is of overriding public interest by securing a sustainable water supply to Southern Water and Portsmouth Water to meet future demand and supply constraints. This contributes to improved water resources resilience in South East England to ensure that reductions in abstractions on River Test SSSI and River Itchen SAC and SSSI may be delivered for betterment to the environment and society. The critical need for this scheme is evident as until all of the plan is delivered, drought orders/permits may be required in the event that a severe drought arises in the period up to 2027, and for the Test Drought Permit only up to 2028-29 when the Portsmouth Water Havant Thicket Reservoir bulk import scheme is delivered (Southern Water's SEA).

4.4. Condition (d): the beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option.

Test (d) must demonstrate that the beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option.

The evidence that Havant Thicket Reservoir meets test (d) is in the following sources of information:

- Havant Thicket Reservoir Site Alternatives Assessment (Portsmouth Water, 2020c);
- Havant Thicket Reservoir Statement of Need– as set out in the Environmental Statement Chapter 4 (Portsmouth Water, 2020d); and,
- Havant Thicket Reservoir Planning Statement (Portsmouth Water, 2020e).

Portsmouth Water has a modest seasonal water resource surplus and have been working collaboratively with Southern Water to increase water transfers across the South-East as part of the WRSE group. Up to 60 Ml/d of water would be transferred from Portsmouth Water to help Southern Water meet its needs for the future. Portsmouth Water's WRMP (2019) describes how a list of 183 options was identified to make better use of the existing water supply and identify new sources of water to inform Portsmouth Water's WRMP. This unconstrained list of options included new reservoirs, compulsory metering, desalination plants and recycling cleaned wastewater as options (see Table 4-6). For each option, Portsmouth Water considered how much water it could supply, how reliable it would be, technical credibility, whether it would compete with Southern Water for resources, the impact on environment and society including its carbon footprint. Through this screening process Portsmouth Water reduced the list to 25 feasible options. An economic and programme appraisal were then conducted which saw 4 options rejected. Six options that encompassed a combination of options were selected to meet the water supply over the next 25 years.

The Havant Thicket Reservoir was the most significant option to secure water, equating to over 35% of the water supply, and will help Portsmouth Water to free up existing supplies to share with Southern Water to allow it to meet its water supply needs from predicted population growth following the restriction imposed on abstraction from the River Itchen and River Test.

Portsmouth Water has assessed a range of other feasible options and designs to identify Havant Thicket as the best site for the reservoir. In all, 72 potential sites have been assessed across the South East region as set out in the Site Alternatives Assessment (Portsmouth Water, 2020c). The potential reservoir sites were screened in a three-stage process to evaluate their feasibility. In Stage One, defined criteria were set for assessing whether a reservoir could be physically constructed upon the site and whether a sustainable source of water for filling was available. 67 of the 72 sites were rejected at this stage, primarily due to the fact that the proposed source of abstraction was protected, a Habitat Directive did not allow for additional abstraction beyond that currently undertaken and/or sites have been developed or designated as a protection area.

Five sites progressed to Stage Two, but all sites apart from Havant Thicket would fail to meet the minimum volume required to support the planned 21 Ml/d drought yield in 1:200 bulk supply transfer to Southern Water from 2029. The Havant Thicket site would also have the shortest pipeline route to Bedhampton minimising the impact on residential amenity from construction. While the removal of 12.45 ha of ancient woodland at Havant Thicket is one of the main drawbacks of the site, this value is much lower than other potential sites (e.g. 52 ha at Southleigh Forest). Other benefits, such as the sloping bowl-like topography removing the need for embankments around the entire site and opportunities for recreation and biodiversity enhancement, led to the decision to select the Havant Thicket site for the reservoir.

Table 4-6 - Number and type of options considered by Portsmouth Water at each stage of the screening process.

Option category	Range of options	1. Unconstrained options	2. Feasible options	3. Preferred plan	4. Selected options
Customer	Water efficiency	85	15	13	• Water efficiency (metering) 3Ml/d by 2025;
	Water conservation				
	Metering				

	Tariff				
Production	Washwater recovery	4	0	0	
Distribution	Leakage detection	12	4	2	• Reduce leakage 7MI/d by 2025;
	Leakage reduction				
	Distribution capacity expansion				
Resource	Direct river abstraction	82	6	6	• Havant Thicket Reservoir 21MI/d by 2029; • Groundwater improvements 7.8MI/d by 2025; • Enhanced groundwater source 12.5MI/d by 2025; and • Drought permit (only in severe droughts) 8.5MI/d by 2025
	Groundwater abstraction				
	New storage				
	Reclaim and reuse				
	Managed Aquifer Recharge				
	Bulk Transfer				
	Desalination				
	Retain resources				
	Other (tankering, trading, conjunctive use)				
Total		183	25	21	6

Data source: Portsmouth Water WRMP (2019) <https://www.portsmouthwater.co.uk/news/publications/water-resources-planning/>

In Stage Three, eight reservoir design proposals for Havant Thicket Reservoir were evaluated against further criteria. These options varied in size and scope from large designs maximising yield, wetland creation and recreational opportunities to smaller separated reservoirs that attempted to preserve areas of ancient woodland. Key operational considerations in which design to take forward included the potential capacity of the reservoir and availability of suitable material to construct the embankment. Selecting smaller reservoir options would adversely affect the options that Southern Water have to reduce abstraction from the internationally designated River Itchen SSSI and SAC and nationally designated River Test SSSI. Investigations identified an area of suitable clay which extends below The Avenue woodland. If The Avenue was retained, this would sterilise significant quantities of the clay needed for the construction of the embankments. Following feedback from stakeholders and a public consultation in 2006 and 2008 respectively, a refinement of the options was undertaken to maximise the storage volume of the reservoir so that it would meet 21MI/day, while minimising the environmental impact, including the visual impact on the historic landscape, as well as impacts on residential amenity and overall costs.

Portsmouth Water's process from moving from a long list of all possible reservoir sites to one site and design that offer that balances the need to maximise yield against ease of construction and environmental impact clearly demonstrates that all other options are either technically not feasible or come at a greater cost to Portsmouth Water or the environment.

5. Articles 4(8) and 4(9)

5.1. Article 4(8)

Article 4(8) states that “a Member State shall ensure that the application does not permanently exclude or compromise the achievement of the objectives of this Directive in other bodies of water within the same river basin district and is consistent with the implementation of other Community environmental legislation.”

The WFD Compliance Assessment for Havant Thicket Reservoir considered the achievement of environmental objectives in adjacent water bodies. This included a review of the following groundwater bodies within the Hermitage Stream water body:

- East Hants Chalk (GB40701G502700)
- East Hants Lambeth Group (GB40702G500800)
- South Hants Lambeth Group (GB40702G503700)
- Chichester Chalk (GB40701G505200).

The WFD compliance assessment also considered the impacts on Langstone Harbour (GB580705130000) which is transitional water body immediately downstream of the Hermitage Stream water body (GB107042016370). No other surface water bodies are impacted. The conclusion of these assessments is presented in the WFD Compliance Assessment (HTR-ATK-ZZ-ZZ-RP-Z-0123).

No other water body was deemed to be at the potential risk of deterioration and thus it is therefore concluded that the requirements of Article 4(8) have been met.

5.2. Article 4(9)

Article 4(9) states that “Steps must be taken to ensure that the application of the new provisions, including the application of paragraphs 3, 4, 5, 6 and 7, guarantees at least the same level of protection as the existing Community legislation.”

The Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC) are other pieces of Community law which are relevant to Havant Thicket Reservoir. A Habitat Regulations Assessment HRA (HTR-ATK-XX-XX-RP-Z-0035) (Portsmouth Water, 2020f) was undertaken to inform the Stage 1 Screening and Stage 2 Appropriate Assessment of likely significant effects on European Sites. This assessed:

- Chichester and Langstone Harbour Special Protection Area (SPA)
- Chichester and Langstone Harbour Ramsar Site
- Solent Maritime SAC
- Sussex Bat SACs: Singleton and Coking Tunnels SAC and Ebernoe Common SAC.

The Appropriate Assessment identified a suite of avoidance and mitigation measures to be included within the Scheme design and construction plan. These mitigation measures will ensure that there are no adverse effects on European site integrity. The HRA took into account in combination effects. It was concluded that one plan and four applications have a potential in combination effect with the Scheme and could, in combination with the Scheme, affect the combination status of Bechstein’s bat that are a qualifying feature of the Singleton and Coking Tunnels SAC. Portsmouth Water will seek engagement with other landowners to ensure a joined-up mitigation/enhancement approach is taken to maintain the conservation status of the Bechstein’s bat population.

Following a review of other Community law, it was concluded that the Havant Thicket Reservoir would meet the conditions of Article 4(9).

6. Conclusion and next steps

Following the completion of a WFD compliance Assessment, Havant Thicket Reservoir was deemed to have the potential to cause deterioration of the impacted water body on Riders Lane Stream which is part of the Hermitage Stream water body (GB107042016370). The WFD quality elements that were identified as being at risk of deterioration related to both hydromorphological and biological quality elements. From a hydromorphological perspective, the quality elements that were impacted were those related to the scale of the habitat loss, including i) river depth and width variation; ii) structure and substrate of the river bed; iii) structure of the riparian zone) along with iv) river continuity. The biological elements impacted were macroinvertebrates as well as macrophytes and phytobenthos.

A variety of workshops were held with the Environment Agency to determine the evidence required to meet the conditions of Article 4.7. This was developed and evidence to meet the Article 4.7 derogation conditions are presented in Section 0 of this technical note. A summary of this evidence is detailed below:

- Condition (a) - evidence was produced to demonstrate that all practicable steps will be taken to mitigate for the adverse impacts on the Hermitage Stream water body. This resulted in the production of a long, ranked-list, of measures that could be delivered across the catchment which is provided as evidence to meet the requirements for Article 4.7 condition (a).
- Condition (b) - Portsmouth Water will work with the Environment Agency to include the water body modifications in the third update of the South East RBMP (due to be published in 2021).
- Condition (c) - An overriding public interest assessment was provided in reference to Scheme is part of the National Framework for Water Resources, WRSE future resource requirements and Portsmouth Water and Southern Water WRMP19.
- Condition (d) – Evidence was provided for condition which referenced the Havant Thicket Reservoir Site Alternatives Assessment (Portsmouth Water, 2020c), Havant Thicket Reservoir Statement of Need– as set out in the Environmental Statement, Chapter 4 (Portsmouth Water, 2020d) and Havant Thicket Planning Statement (Portsmouth Water, 2020e)

Evidence to demonstrate that the Scheme complies with Article 4(8) and Article 4(9) is shown in Section 6.

The long list of practicable measures detailed is deemed sufficient to deliver all practicable mitigation under Condition (a). It is considered that the Article 4.7 conditions are met as detailed in the evidence presented and that the scheme is therefore considered to be compliant with the Water Framework Directive requirements.

Once Article 4.7 derogation has been agreed, a short-listing exercise will be carried out to reduce the full list of practicable measures to generate a short list of options. The approach to short-listing and options will be discussed and agreed with the Environment Agency. The short list of mitigation measures will deliver against the legal requirement for all practicable mitigation. Key considerations proposed for the short-listing exercise are deliverability (land ownership, conservation sites and heritage) along with the ability of the measure to improve WFD Quality Elements affected by the scheme. The overall score for each measure will be used to rank priority options.

This short list will be examined in detail through more site-specific analyses to develop a conceptual design for shortlisted measures. This will include, amongst others, further detail on site specific constraints and opportunities along with a cost-benefit analysis. The short listing would identify a set of measures which would then be delivered as part of the overall mitigation and compensation strategy for the scheme.

7. References

- DEFRA, 2018, Draft National Policy Statement for Water Resources Infrastructure (2018)
- Environment Agency, 2020, Meeting our future water needs: a national framework for water resources (March 2020).
- Gov.uk, 2020, Reservoir discharges: consents, permits and risk assessments (accessed December 2020)
<https://www.gov.uk/guidance/reservoir-discharges-consents-permits-and-risk-assessments>
- Portsmouth Water, 2019, Portsmouth Water's Water Resource Management Plan (WRMP), which includes the Strategic Environmental Assessment (SEA) and its WFD Compliance Assessment (2019)
- Portsmouth Water, 2020a, Havant Thicket Reservoir Environmental Statement, Volume 4, Appendix A15.1 WFD compliance assessment.
- Portsmouth Water, 2020b, Havant Thicket Reservoir Environmental Statement, Volume 2, Chapter 15 Water.
- Portsmouth Water, 2020c, Havant Thicket Reservoir Site Alternatives Assessment (April 2020) Environmental Statement, Appendix A4.1.
- Portsmouth Water, 2020d, Havant Thicket Reservoir Statement of Need– as set out in the Environmental Statement, Chapter 4.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/872759/National_Framework_for_water_resources_main_report.pdf
- Portsmouth Water, 2020e, Havant Thicket Reservoir Planning Statement
- Portsmouth Water, 2020f, Environmental Statement, Volume 4, Appendix A9.15 Habitat Regulations Assessment HRA.
- Portsmouth Water, 2020g, Environmental Statement, Volume 4, Appendix A15.4 Biodiversity Net Gain for Rivers.
- Southern Water, 2019, Southern Water's Water Resource Management Plan (WRMP), which includes the Strategic Environmental Assessment (SEA) and its WFD Compliance Assessment (2019)
- Water Industry Act, 1991, (c. 56), HMSO.
- WRSE, 2020, Future water resource requirements for South-East England (March 2020).
<https://www.wrse.org.uk/media/anbhm2cb/wrse-future-water-resource-requirements-march-2020-3.pdf>

Appendices

Appendix A – RAYGB Findings

Available on request

Appendix B – WFD Article 4.7 Short-listing matrix v3.1_ to EA

Available on request