Ricardo Energy & Environment

Severn Trent Water Ltd

Draft Water Resources Management Plan 2019

Habitats Regulations Assessment
Stage 1 Screening

Report for Severn Trent Water Ltd

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Executive Summary

Water companies in England and Wales have a statutory requirement to prepare a Water Resource Management Plan (WRMP) every five years; the next WRMP must be submitted in draft to the Secretary of State in December 2017 to seek his agreement for issuing for public consultation during early 2018, with the final plan submitted for approval to the Secretary of State in late 2018 or early 2019. The purpose of these WRMPs is to set out a strategy for a particular supply area over a 25 year period. This statutory requirement is defined under the Water Act 2003.

A water company must ensure its WRMP meets the requirements of the Habitats Regulations before implementation. The requirement for a Habitats Regulations Assessment (HRA) is established through Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and Flora. This directive, known as the Habitats Directive, is transposed into national legislation by the Conservation of Habitats and Species Regulations 2010 (as amended); commonly referred to as the Habitats Regulations. Under Regulations 61 and 102, any plan or project which is likely to have a significant effect on a European Site (either alone or in-combination with other plans or projects) and is not directly connected with, or necessary for the management of the site, must be subject to a HRA to determine the implications for the site in view of its conservation objectives. Under UK Government policy, wetland sites designated under the international Ramsar Convention 1971 should also be subject to HRA, and are also referred to as 'European Sites' in this context. In relation to the Draft WRMP 2019 (dWRMP19) the HRA needs to consider whether there are any likely significant effects (LSE) arising from construction or implementation activities and/or operation of any of the options (components) considered in the dWRMP19.

Ricardo Energy & Environment was commissioned by Severn Trent Water to undertake a HRA of a 'feasible' list of components in its draft WRMP 2019 (dWRMP19). By considering HRA from the outset, the intention is to seek to avoid components being included in the WRMP that would lead to LSE on European Sites. This HRA Screening Report documents the first stage of the HRA process for the 'feasible' list of components in the dWRMP19.

This report provides the legislative background, consultation process, plan overview, methodology for the HRA and the results of the Stage 1 Screening assessment process.

All components screened for consideration were taken forward into the decision-making modelling process to provide an indication of the solutions to be included in the preferred programme. A colour coding system has been applied to represent the outcome of the assessment of each component, where 'green' refers to no LSE, 'amber' is LSE where further assessment/information regarding the component may enable the effects to be reduced and 'red' for those components with LSE and where significant modification to the component would be required to avoid LSE. A total of 103 components were assessed, 93 of which have no LSE. Ten components with LSE of an 'amber' rating (components 4, 44, 120A-F and 94A and 94B) and were not taken forward into the preferred programme.

An assessment of the components with no LSE was undertaken and combined where appropriate to derive a set of solutions. A total of 23 solutions have been considered in the dWRMP19 to resolve the forecast supply-demand deficits over the planning period. These solutions include:

- NOT04 New strategic transfer capacity from Strategic Grid to Sunnyside (component 305)
- BHS15 Conversion B'ham BH from augmentation to PWS (component 12)
- DOR05 DO Recovery - WTW C (component 99E)
- DOR02 DO Recovery - Site I WTW (component 99B)
- WIL05 R Trent augmentation from Barnhurst STW via R Penk > Site E expansion with main to Hathern Cross (components 7A and 14B)
- LIT01 Expand Site F WTW and new bi-directional pumping main (component 32)
- DOR08 DO Recovery - WTW B (component 99D)
- GRD15 Whaddon to Forest Transfer (component 132)
- UNK07 Reconfigure Site L WTW to handle flows less than 16Ml/d (component 195)
- GRD18 DO recovery of Peckforton Group BHs (rehab BHs and treatment upgrades) (component 200)
- CRO06 New abstraction R Soar transfer WTW Bs (component 54)

- WTW05 Croft Quarry to new WTW (component 31C)
- MEL29 Additional water from Carsington Res to Site Q WTWs > DO Recovery - Site Q WTW (component17 and 99G)
- DAM07 Raise water level at Reservoir C (6% (1400Ml)) (components 122A and 310)
- BAM04 Increase Site R WTW capacity (component 313)
- DAM01 Stanford Reservoir minor dam extension (10%) (component 84A)
- CRO05 Thornton Res to supply WTW B (component 35)
- NOT01 New strategic link from Strategic Grid to Mansfield (component 304)
- DAM03 Reservoir A minor dam extension (5%) (component 84C)
- BHS07 Recommission Ladyflatte BHs (component 198)
- DAM02 Lower Shustoke minor dam extension (10%) (component 84B)
- GRD19 DVA to Nottingham Pipeline Enhancement (component 16)
- BHS06 Upgrade network capacity to fully deploy Diddlebury and Munslow BHs (component 191)

In addition, four demand management solutions have also been included in the preferred programme. The HRA has determined that, typically, demand management solutions involve relatively small-scale and temporary activity and are largely concentrated within urban and suburban areas. As a result of this, they are unlikely to be in close proximity to European sites and impacts will be small-scale, temporary and geographically confined at the point of delivery. Impacts resulting from the demand management solutions, both alone and in-combination, are therefore assessed as unlikely to have a significant effect on qualifying features of any European sites.

An in-combination effects assessment was undertaken on the solutions included in the preferred programme to identify where potential construction and operational in-combination effects may occur between the solutions and between other plans/projects. None of the preferred solutions were shown to have in-combination effects with any other solutions included in preferred programme. No in-combination adverse effects have been identified in relation to the current published Drought Plans of neighbouring water companies and no cumulative effects are currently anticipated with the developing draft 2019 WRMPs of these water companies. Beneficial effects may arise in respect of the Drought Plan measures for water efficiency and demand management with similar activities in the draft WRMP19.

In summary, the dWRMP19 preferred programme does not include any component with LSE alone, where normal best-practice mitigation measures are implemented. Certain solutions have overlap in programme or the designated sites which may be affected. As a result, an in-combination effects assessment was undertaken between these schemes and with forthcoming plans and projects. The assessment concludes no LSE alone or in-combination from those within the preferred programme.

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1 Introduction

1.1 Background and Purpose of Report

Water companies in England and Wales have a statutory requirement to prepare a Water Resources Management Plan (WRMP) every five years; the next WRMP must be submitted in draft to the Secretary of State by the 1 December 2017 to seek his agreement for issuing for public consultation during early 2018, with the final plan submitted for approval to the Secretary of State in late 2018 or early 2019. The WRMP also informs the regulatory water company business planning Price Review process through which the Water Services Regulation Authority (Ofwat) sets the prices that water companies can charge their customers for water (and wastewater) services. The next Price Review will be in 2019.

A water company must ensure its WRMP meets the requirements of the Habitats Regulations before implementation. The requirement for a Habitats Regulations Assessment (HRA) is established through Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, hereby referred to as the 'Habitats Directive', in Articles 6(3) and 6(4). The Habitats Directive is transposed into national legislation by the Conservation of Habitats and Species Regulations 2010 (as amended), commonly referred to as the Habitats Regulations. Under Regulations 61 and 102, any plan or project which is likely to have a significant effect on a European site (either alone or in-combination with other plans or projects) and is not directly connected with, or necessary for the management of the site, must be subject to a HRA to determine the implications for the site in view of its conservation objectives. In relation to the Draft WRMP 2019 (dWRMP19), the HRA needs to consider whether there are any likely significant effects (LSE) arising from construction or implementation activities and/or operation of any of the components considered in the dWRMP19.

European Sites include Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) (also known as Natura 2000 Sites). UK Government policy also requires Ramsar sites to be assessed in the same way:

- SPAs are classified under the European Council Directive 'on the conservation of wild birds' (2009/147/EC; 'Birds Directive') for the protection of **wild birds and their habitats** (including particularly rare and vulnerable species listed in Annex 1 of the Birds Directive, and migratory species).

- SACs are designated under the Habitats Directive (92/43/EEC) and target particular **habitats** (Annex 1) **and/or species** (Annex II) identified as being of European importance.

- The Government also expects potential SPAs (pSPAs), candidate SACs (cSACs), associated compensation habitat and Ramsar sites to be included within the assessment.

- Ramsar sites support **internationally important wetland habitats** and are listed under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention, 1971).

For ease of reference through this HRA report, these designations are collectively referred to as “European Sites”, despite Ramsar designations being made at the international level rather than EU level.

The HRA screening has generally been undertaken in accordance with available guidance for England[1,2,3,4,5,6] and based on the precautionary approach as required under the Habitats Regulations. Some of the options considered are located within Wales and for these options reference has been made to the relevant sections of the Regulations affecting Wales. Both the 'Strategic Environmental Assessment (SEA) and HRA - Guidance for Water Resources Management Plans and Drought Plans' and 'Final Water Resources Planning Guideline' recommend that all WRMPs should be subject to the first stage of HRA, i.e. screening for LSE. The Water Resources Planning Guideline additionally states that an Appropriate Assessment (AA) (HRA Stage 2) will be needed if a component included in the WRMP could adversely affect any designated European site and that companies must clearly test their plans using HRA where applicable.

The HRA has been undertaken in parallel with the SEA and Water Framework Directive (WFD) assessment of the dWRMP19, to ensure an integrated approach to environmental assessment such that environmental considerations are integral to the development of the 'best value programme' of components.

The overall objective of the HRA was to establish whether measures included in the dWRMP19 are likely to have an adverse effect on European Sites, alone or in-combination with other components in the plan, or with other plans and projects. Where LSE cannot be ruled out, adopting the precautionary principle, the objective is to determine through AA whether the component would adversely affect the integrity of the European site(s).

The initial 'unconstrained' list of components considered for possible inclusion in the dWRMP19 was subject to high-level HRA screening to assess whether any components should be ruled out from the outset as they would almost certainly lead to an adverse effect on one or more European sites. Those options not screened out were taken forward into the constrained list of components which were included for consideration within the decision-making modelling processes to provide an indication of the solutions to be included in the preferred programme. HRA Stage 1 screening was carried out on all of all the constrained list components as set out in this report.

By considering HRA from the outset, the intention was to avoid, wherever possible, components being included in the dWRMP19 that could lead to adverse effects on European sites.

The HRA process adopted for the dWRMP19 can be summarised as follows:

- Screening (Stage 1 HRA) was initially carried out on the constrained list of components to identify likely effects on European sites arising from any single component, and to consider whether the effects of these effects are likely to be significant (see Section 4).
- The outcomes of the screening exercise were considered in the programme appraisal process leading to the selection of preferred programme (solutions). The intent of the screening was to reject components that would have LSE on any European sites.
- Following the development of the preferred programme solutions, the potential in-combination effects of these solutions within the programme were considered. Following this process, in-combination effects with other plans or projects were considered (see Section 5).

1.2 Requirement for Habitats Regulations Assessment

Under the Habitats Regulations, the responsibility for undertaking the HRA lies with Severn Trent Water as the "Competent Authority", or Plan making authority. This means that Severn Trent Water can make

1 European Commission Environment DG (2001) Assessment of plans and projects significantly affecting European Sites. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC.
2 Department for Communities and Local Government (DCLG) (2006) Planning for the Protection of European Sites. Guidance for Regional Spatial Strategies and Local Development Documents.
3 English Nature (1997) The Appropriate Assessment (Regulation 48) The Conservation (Natural Habitats &c) Regulations, 1994. Guidance Note HRGN1.
4 English Nature (1997) The Determination of Likely Significant Effect under The Conservation (Natural Habitats &c.) Regulations 1994. Guidance Note HRGN3.
5 Defra (2012) The Habitats and Wild Birds Directives in England and its seas: Core guidance for developers, regulators & land/marine managers.
6 Tyldesley, D. & Chapman, C. (2015) The Habitats Regulations Assessment Handbook. DTA Publications. Version 4.

the judgements as to whether its plans or projects are likely to have significant effects on European sites, with advice from the Statutory Bodies, in particular, Natural England (NE) and Natural Resources Wales (NRW). The HRA Guidance for the appraisal of Plans[7] has been followed in carrying out the assessments.

Regulation 61(5) states that the Plan making authority shall adopt, or otherwise give effect to, the Plan only after having ascertained that it will not adversely affect the integrity of a European site, subject to Regulation 62 or 102 of the Habitats Regulations.

Habitat Regulation 102 and Article 6 relates to the requirement for an Appropriate Assessment should Stage 1 HRA identify LSE and the consultation process.

Regulation 102 of the Habitats Regulations states:
102. — (1) Where a land use plan —

(a) is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects), and

(b) is not directly connected with or necessary to the management of the site, the plan-making authority for that plan must, before the plan is given effect, make an appropriate assessment of the implications for the site in view of that site's conservation objectives.

(2) The plan-making authority must for the purposes of the assessment consult the appropriate nature conservation body and have regard to any representations made by that body within such reasonable time as the authority specify.

(3) They must also, if they consider it appropriate, take the opinion of the general public, and if they do so, they must take such steps for that purpose as they consider appropriate.

(4) In the light of the conclusions of the assessment, and subject to regulation 103 (considerations of overriding public interest), the plan-making authority or, in the case of a regional strategy, the Secretary of State must give effect to the land use plan only after having ascertained that it will not adversely affect the integrity of the European site or the European offshore marine site (as the case may be).

(5) A plan-making authority must provide such information as the appropriate authority may reasonably require for the purposes of the discharge of the obligations of the appropriate authority under this Chapter.

(6) This regulation does not apply in relation to a site which is —

(a) a European site by reason of regulation 8(1)(c), or

(b) a European offshore marine site by reason of regulation 15(c) of the 2007 Regulations (site protected in accordance with Article 5(4) of the Habitats Directive).

Article 6 of the Habitats Directive states:

6(3). Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

Habitat Regulations 62 and article 6(4) describes the criteria for assessing whether a Plan can go ahead with LSE whereby there are imperative reasons of overriding public interest (IROPI). This relates to

[7] Tyldesley, D. & Chapman, C. (2015) The Habitats Regulations Assessment Handbook. DTA Publications. Version 4.

Stage 3 and 4 HRA. Best practice guidance[8] is available for this process. The HRHA of the dWRMP19 did not identify the need to subject the plan to Appropriate Assessment or other subsequent stages of the assessment process.

1.3 Consultation

NRW, NE and the EA were consulted throughout the development of the dWRMP19, including on the HRA methodology and on the emerging findings from the HRA screening.

1.4 Structure of the Report

The report is divided into the following sections:

Section 1: Introduction
Section 2: Methodology
Section 3: Severn Trent Water's WRMP19
Section 4: HRA Screening of Feasible Components
Section 5: HRA Findings for the dWRMP19 Preferred Programme
Section 6: Conclusions and Recommendations

[8] Tyldesley, D. & Chapman, C. (2015). The Habitats Regulations Assessment Handbook. DTA Publications. Version 4.

2 Methodology

The background to the methodology and approach to HRA is provided in Section 1.1. The approach to the identification of likely impacts is summarised in Section 2.1.

2.1 Potential Impacts of dWRMP19

To provide an indication of the likely significant effect on a European site(s), those feasible components considered in the dWRMP19 that were within 10km of a European site or hydrologically / environmentally connected over a longer distance were identified. Consideration has also been given to the relative locations of components and designated sites within the same surface and groundwater catchments (where this information is available) to ensure that any connectivity over a longer distance that might affect water-dependent sites, qualifying features and designated mobile species has also been taken into account. To further inform the likelihood of any impacts on European sites, the NE Site of special Scientific Interest (SSSI) Impact Risk Zone (IRZ) datasets were also applied. The IRZs are reviewed regularly to ensure they reflect the current understanding of specific site sensitivities and potential risks posed to SSSIs, many of which overlap and underpin the interests of European sites. Where the qualifying features of a European site and SSSI are different, the SSSI IRZs have been set so that they reflect both. As such, these IRZs can be used as part of a HRA to assist with determining whether there are likely to be significant effects from off-site impacts of a particular development on the qualifying features of the European site.

The assessment has considered both construction effects and operational effects of each component. In determining the likelihood of significant effects on European sites from the feasible components, particular consideration has been given to the possible source-receptor pathways through which effects may be transmitted from activities associated with dWRMP19 components to features contributing to the integrity of the European sites (e.g. groundwater or surface water catchments, air, etc.). **Table 2.1** provides examples of the types of impacts the feasible components could have on European site qualifying features.

The attributes of the European sites, which contribute to and define their integrity, have been considered with reference to Standard Data forms for SACs and SPAs and Information Sheets for Ramsar sites. An analysis of these information sources has enabled the identification of the site's qualifying features. This information, as well as Article 17 reporting, site conservation objectives, supplementary guidance, and Site Improvement Plans (SIPs) has been used to identify those features of each site that determine current conservation status, site integrity and the specific sensitivities of the site. Analysis of how potential impacts of the dWRMP19 component may affect a European site has been undertaken using this information.

Although screening for LSEs has been determined on a proximity basis for many of the types of impacts, there are many uncertainties associated with using set distances as there are very few standards available as a guide to how far impacts will extend. Different types of impacts can occur over different distances, and therefore professional judgement was applied based on experience and the evidence available. The assumptions used in this HRA and justification for them are shown in **Table 2.1**.

All components screened for consideration were taken forward into the decision-making modelling processes to provide an indication of the solutions to be included in the preferred programme. A colour coding has been assigned to represent the outcome of the assessment of each component, where ‘green’ is no LSE, ‘amber’ is LSE where further assessment/information regarding the component may enable the effects to be reduced and ‘red’ for those with certain LSE and where significant modification to the component would be required to avoid LSE.

Table 2.1 Potential impacts of dWRMP19 components on European sites

Broad categories, and examples, of potential impacts on European sites	Examples of operations responsible for impacts *(Distance assumptions shown in italics)*
Physical loss - Removal (including offsite effects, e.g. foraging habitat) - Smothering	Development of built infrastructure associated with component, e.g. reservoir embankments, water treatment plant, pipelines, pumping stations. Indirect effects from a reduction in flows e.g. drying out marginal habitat, such that there is a loss of/change in a particular habitat type. *Physical loss is most likely to be significant where the boundary of the s component extends within the boundary of the European site, or within an offsite area of known foraging, roosting, breeding habitat (that supports species for which a European site is designated), or where natural processes link the component to the site, such as through hydrological connectivity downstream of a component.*
Physical damage - Sedimentation / silting - Prevention of natural processes - Habitat degradation - Erosion - Trampling - Fragmentation - Severance/barrier effect - Edge effects - Alterations to current management	Construction of structures associated with scheme e.g. reservoir embankments, water treatment plant, pipelines, pumping stations. *Physical damage is likely to be significant where the boundary of the component extends within or is directly adjacent to the boundary of the European site, or within/adjacent to an offsite area of known foraging, roosting, breeding habitat (that supports species for which a European site is designated), or where natural processes link the component to the site, such as through hydrological connectivity downstream of a component.*
Non-physical disturbance - Noise - Visual presence - Human presence - Light pollution	Noise from construction activities. *Taking into consideration the noise level generated from general building activity[9] (c. 122dB(A)) and considering the lowest noise level identified in appropriate guidance[10] as likely to cause disturbance to bird species, it is concluded that noise impacts could be significant up to 1km from the boundary of the European site but can be up to 1.7km for construction traffic transport routes[11]. From a review of EA internal guidance on HRA and various websites it is considered that effects of vibration and noise are more likely to be significant if development is within 500 metres of a European site. A precautionary approach is taken based on likely noise levels and frequency.* Plant and personnel involved in construction and operation of components e.g. for maintenance. *These effects (noise, visual/human presence) are only likely to be significant where the boundary of the component extends within or is directly adjacent to the boundary of the European site, or within/adjacent to an offsite area of known foraging, roosting, breeding habitat (that supports species for which a European site is designated).* Development of built infrastructure associated with *component, which includes artificial lighting.*

9 British Standards Institute (BSI) (2009) BS5228 - Noise and Vibration Control on Construction and Open Sites. BSI, London.
10 Environment Agency (2013) Bird Disturbance from Flood and Coastal Risk Management Construction Activities. Overarching Interpretive Summary Report. Prepared by Cascade Consulting and Institute of Estuarine and Coastal Studies.
11 A series of studies carried out in the Netherlands have shown that road noise levels above 42-43dB and 47dB results in a rapid fall in population of woodland and grassland breeding bird species, with disturbance distances varying between species from 20 to 1700 metres from the road (at 5000 cars a day) and up to 3.53 kilometres at 50,000 cars a day. The most recent study is: Reijnen, R.; Foppen, R.; Veenbaas, G. (1997) Disturbance by traffic of breeding birds: evaluation of the effect and considerations in planning and managing road corridors. Biodiversity and Conservation 6 (4), 567-581.

Broad categories, and examples, of potential impacts on European sites	Examples of operations responsible for impacts *(Distance assumptions shown in italics)*
	Effects from light pollution are only likely to be significant where the boundary of the component *is within 500 m of the boundary of the European site. From a review of EA internal guidance on HRA and various websites it is considered that effects of light are more likely to be significant if development is within 500 metres of a European site.*
Water table/availability - Drying - Flooding - Other changes to surface water levels and flows - Changes in groundwater levels and flows - Changes to coastal water movement	Changes to water levels and flows due to water abstraction, storage and drainage interception. *These effects are only likely to be significant where the boundary of the* component *extends within the same ground or surface water catchment as the European site. However, these effects are dependent on hydrological continuity between the* component *and the European site, and sometimes, whether the* component *is up or down stream from the European site.*
Toxic contamination - Water pollution - Soil contamination - Air pollution	Pollution of surface water bodies due to site runoff from construction sites. Contamination of soils result from the mobilisation of contaminants during excavation. Air emissions associated with vehicular traffic during construction *of* component *s. This effect is only likely to be significant where the transport route to and from the* component *is within or in proximity to (200m) the boundary of the European site*[12]
Non-toxic contamination - Nutrient enrichment (e.g. of soils and water) - Changes in salinity - Changes in thermal regime - Changes in turbidity - Air pollution (dust)	Changes to water salinity, nutrient levels, turbidity, thermal regime. *These effects are only likely to be significant where the boundary of the* component *extends within the same ground or surface water catchment as the European site. However, these effects are dependent on hydrological continuity between the* component *and the European site, and sometimes, whether the* component *is up or down stream from the European site. This level of information is not available until data such as groundwater modelling is collected to accompany planning applications.* Emissions of dust during earthworks, construction of plant and tunnel/pipeline construction associated with component s. *This effect is only likely to be significant where the construction works for the* component *are within 350m of the boundary of the European sites*[13].
Biological disturbance - Direct mortality - Out-competition by non-native species - Selective extraction of species - Introduction of disease	Potential mortality or injuring of terrestrial, aquatic and marine species during building of structures associated with the component, and potential introduction of disease or non-native species into the receiving water from canal and river transfers. Potential for favouring completing species could disturb ecological balances, resulting in rapid population fluctuations.

2.2 Review of Existing Abstraction Licences and Recent Data

The dWRMP19 sets out Severn Trent Water's long-term strategy for maintaining reliable and resilient water supplies to its customers. The strategy includes the use of existing water resources to meet

12 Highways Agency (2003) Design Manual for Roads and Bridges (DMRB), Volume 11.
13 Institute of Air Quality Management (2014) Guidance on the assessment of dust from demolition and construction v1.1.

demand as well as existing demand management measures to ensure sufficient supply under current baseline conditions.

The EA Review of Consents (RoC) process undertaken for Severn Trent Water's existing water source abstraction licences is, therefore, relevant to those potential options in Severn Trent Water's dWRMP19 that involve increasing existing abstraction at licensed water sources while remaining within the existing abstraction licence limit. The EA RoC was undertaken by considering all European sites within Severn Trent Water's supply area and the findings have been taken into account in carrying out this HRA of the dWRMP19.

2.3 Review of Potential In-Combination Effects

Article 6(3) of the Habitats Directive requires an AA of '*Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives*'.

Following the screening process of the feasible list of components, the HRA has considered the in-combination effects of the preferred programme of the dWRMP19. A staged approach was adopted to assess the in-combination effects. The approach can be summarised as follows:

- Following the development of the preferred programme, the likely timings and implementation regimes have been considered to inform the potential in-combination effects of the solutions included in the preferred programme

- Following this assessment, an assessment of in-combination effects with other plans and projects was undertaken. Other programmes, plans and projects included components identified in other Severn Trent Water plans, neighbouring water company draft 2019 WRMPs and Drought Plans, major projects being brought forward by Severn Trent Water and other neighbouring land users, and in other land use and infrastructure plans.

The findings of the in-combination effects assessment of the preferred programme are provided in Section 5.3 and 5.4.

3 Severn Trent Water's Draft WRMP 2019

3.1 Introduction

This section provides an overview of the water resources management planning process, the Severn Trent Water supply system and Severn Trent Water's WRMP19. For further detail, reference should also be made to the Severn Trent Water Draft Water Resources Management Plan (WRMP) 2019.

Water resources management planning is undertaken by all water companies in England and Wales in order to ensure reliable, resilient water supplies over the long-term planning horizon. The process includes forecasting how much water will be available and how much water customers will need over the planning period (assessing supply and demand). If a potential deficit is identified in the supply-demand balance, the WRMP will determine how best to close the gap.

Water companies in England and Wales have a statutory requirement to prepare a WRMP every five years and this has been described above in Section 1, along with the consultation process and outcome in Section 2.1. Severn Trent Water's dWRMP19 consultation programme commenced in 2016 and will continue as the WRMP19 continues to be developed following formal public consultation in early 2018.

Following any comments on the dWRMP19 and accompanying documents, including this HRA, a Statement of Response will be prepared by Severn Trent Water setting out how it intends to take account of the comments received in finalising the WRMP for the Secretary of State's approval.

Severn Trent Water has identified feasible components from an unconstrained list containing a much greater breadth of components. The feasible list is a set of components that Severn Trent Water consider suitable for inclusion in its options appraisal to determine the preferred programme of solutions for meeting any potential future supply deficit.

Each of these solutions has been assessed to understand the costs, the benefits to the supply-demand balance, the effect on carbon emissions and the environmental and social effects (through the SEA process and associated HRA and WFD assessments). The solutions are subsequently compared through a comprehensive options appraisal process to determine the 'best value' programme of solutions to maintain a supply-demand balance over the planning period.

3.2 Severn Trent Water's Supply System and Water Resources

Severn Trent Water is one of the largest water and wastewater companies in England and Wales, providing high quality water and wastewater services to over 3.7 million households and businesses over an area of 21,000km^2 in the Midlands and mid-Wales, stretching from the Bristol Channel to the Humber. Severn Trent Water provides water to 8 million people, supplying 1,800 million litres per day (Ml/d) to 4.3 million homes and businesses. Water is supplied through nearly 47,000km of water mains fed from multiple sources including 28 impounding reservoirs and 181 groundwater sites. Groundwater sources, river derived sources and impounding reservoirs provide 35%, 35% and 30% respectively of the total volume of water put into supply. For water resource planning purposes, Severn Trent Water's supply area is divided into 15 independent Water Resources Zones (WRZs) reflecting the different characteristics of the supply areas and associated risks to meeting demand within the supply area. The 15 WRZs are shown in **Figure 3.1.** The dWRMP19 also considered a range of components beyond the supply area boundary, including parts of the upper River Severn and River Wye catchment areas. The following sections summarise the characteristics of each WRZ.

Strategic Grid

By far the largest WRZ, the Strategic Grid extends from the Peak District in the north, encompassing most of Derbyshire and Leicestershire. The WRZ then extends south-west through Warwickshire to Gloucestershire, and then north-west covering most of Worcestershire and some of Shropshire. It serves a population of 5 million (65% of the total population supplied by STW). The Strategic Grid is made up of 14 major water treatment works (WTW), five reservoir complexes, three major grid booster pumping stations and a number of strategic pipeline network connections and aqueducts.

Nottinghamshire

The Nottinghamshire WRZ is supported by inter-linked groundwater sources and can also receive transfers from the Strategic Grid. The zone is largely supplied from a sandstone aquifer, which is a large unit that responds slowly to abstraction and drought pressures. The WRZ serves just over 1 million people (13% of the total).

Newark

The Newark WRZ is supplied from local boreholes and imports from Nottinghamshire WRZ. The WRZ serves a population of 45,000 (0.6% of the total).

North Staffordshire

This WRZ extends from Site L reservoir in the Peak District south-west towards Market Drayton. The WRZ is well connected and flexible. Water is routinely transferred from Site L WTW to support the groundwater supplied areas to the south-west of the zone. Similarly, when Site L output is reduced, demand in the North Staffordshire area can be met by increased output from the groundwater sources. This allows the conjunctive use of ground water and surface water resources. The WRZ serves a population of 520,000 (6.8% of the total).

Stafford

There are four borehole groups which supply the distribution reservoirs in the zone, allowing an even distribution of water throughout the zone. The zone has no defined connections to the surrounding WRZs under normal operation. It serves a population of 91,000 (1.2% of the total).

Whitchurch and Wem

This WRZ lies on the English side of England-Wales border and extends from Whitchurch southwards to Wem. The WRZ is supplied from local boreholes. There are no connections with surrounding WRZs under normal operation. The WRZ serves a population of 31,000 (0.4% of the total).

Kinsall

This WRZ lies to the west of the Whitchurch and Wem WRZ. The WRZ is supplied from local boreholes. There are no connections with surrounding WRZs under normal operation. The WRZ serves a population of 12,000 (0.2% of the total).

Mardy

This WRZ runs along the Welsh border encompassing Oswestry. The zone is supplied from a local borehole. There are no connections to the surrounding WRZs under normal operation. It serves a population of 8,200 (0.1% of the total).

Ruyton

The zone is supplied from a local borehole and a limited connection from the Shelton WRZ. The WRZ serves a population of 12,300 (0.2%).

Shelton

This WRZ spans the England-Wales border extending from Gwynedd towards Wolverhampton. The zone is connected by a strategic link from Shelton to Telford that allows water resources to be effectively utilised throughout the zone from Shropshire to west Staffordshire.

Wolverhampton

The zone is supplied with water from South Staffordshire Water's Site N WTW, with support from a number of local groundwater sources. The WRZ serves a population of 232,000 (3% of the total).

Llandinam and Llanwrin

This WRZ is supplied from local boreholes which are operated conjunctively. There are no connections with surrounding WRZs under normal operation. The WRZ serves a population of 42,000 (0.5% of the total).

Bishops Castle

The zone is supplied from local boreholes. There are no connections to the surrounding WRZs under normal operation. The WRZ serves a population of 8,000 (0.1% of the total).

Rutland

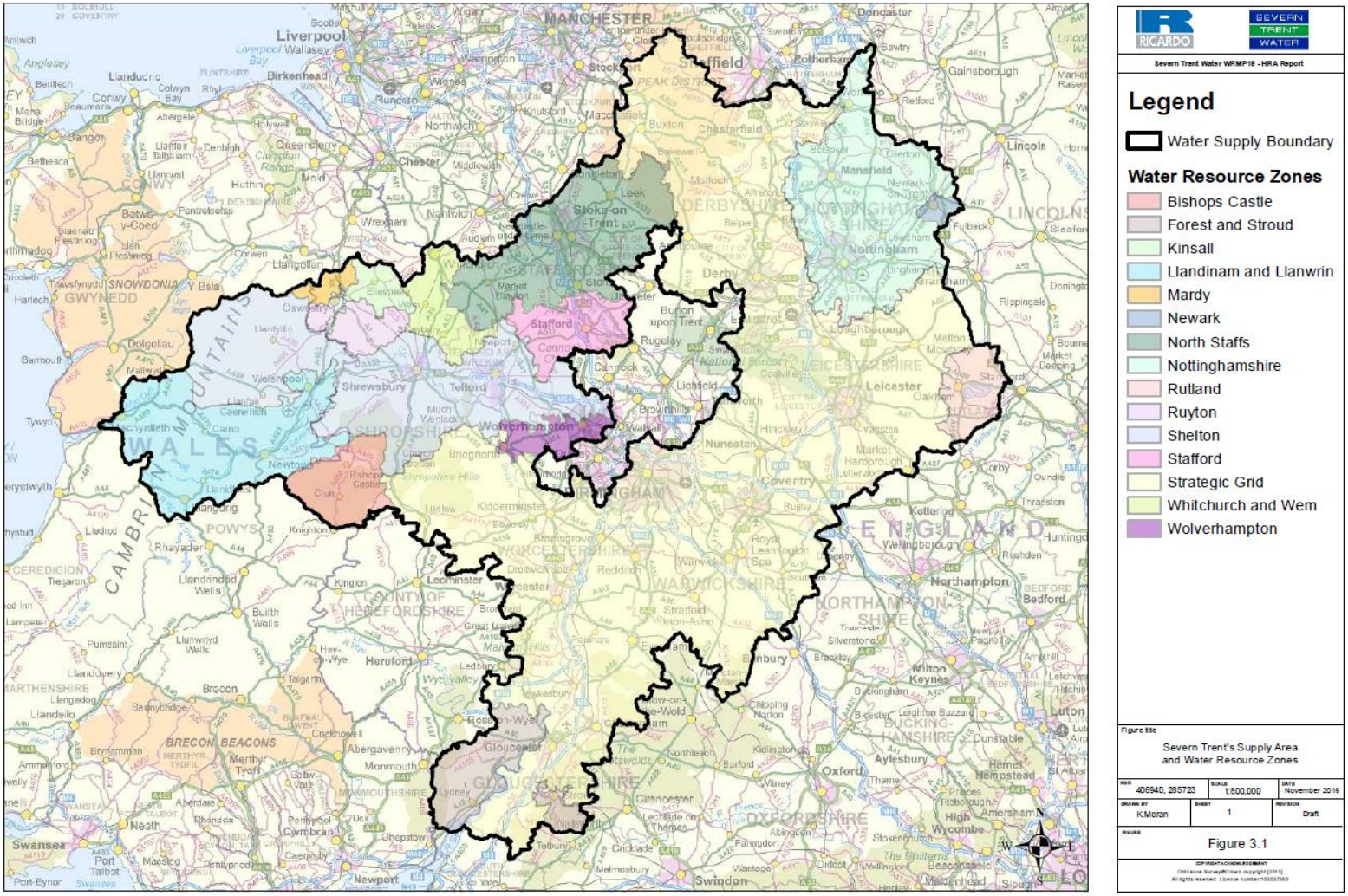
This zone on the eastern edge of the supply area receives all of its water from bulk supply transfers from Anglian Water. The WRZ serves a population of 32,000 (0.4% of the total).

Forest and Stroud

This zone is supplied with water from Site K WTW , which can be distributed throughout the zone, and local groundwater and spring sources. The WRZ serves a population of 130,000 (1.7% of the total).

Further details about the Severn Trent Water supply system are provided on the Severn Trent Water website (www.stwater.co.uk).

Figure 3.1 Severn Trent Water's Supply Area and WRZs



4 HRA Screening of Feasible Components

4.1 Potential Likely Significant Effects of dWRMP19 Components

The approach to HRA screening is described above in Sections 1 and 2 above. The assessment area for the HRA is associated with a large number of European and internationally designated sites as shown on **Figure 4.1**.

The HRA screening of demand management components for the dWRMP19 is provided in **Table 4.1** and for potential water supply components in **Table 4.2**. Where uncertainty has been identified, this uncertainty indicates that a confident conclusion of no LSE is not yet possible. Where uncertainty remains, a Stage 2 HRA (AA) would be required to either confirm no adverse effect related to a scheme or to confirm an adverse effect and any appropriate mitigation measures. The dWRMP19 does not include any components that were identified as 'uncertain' in respect of LSE on any European site.

Figure 4.1 European sites within the study area

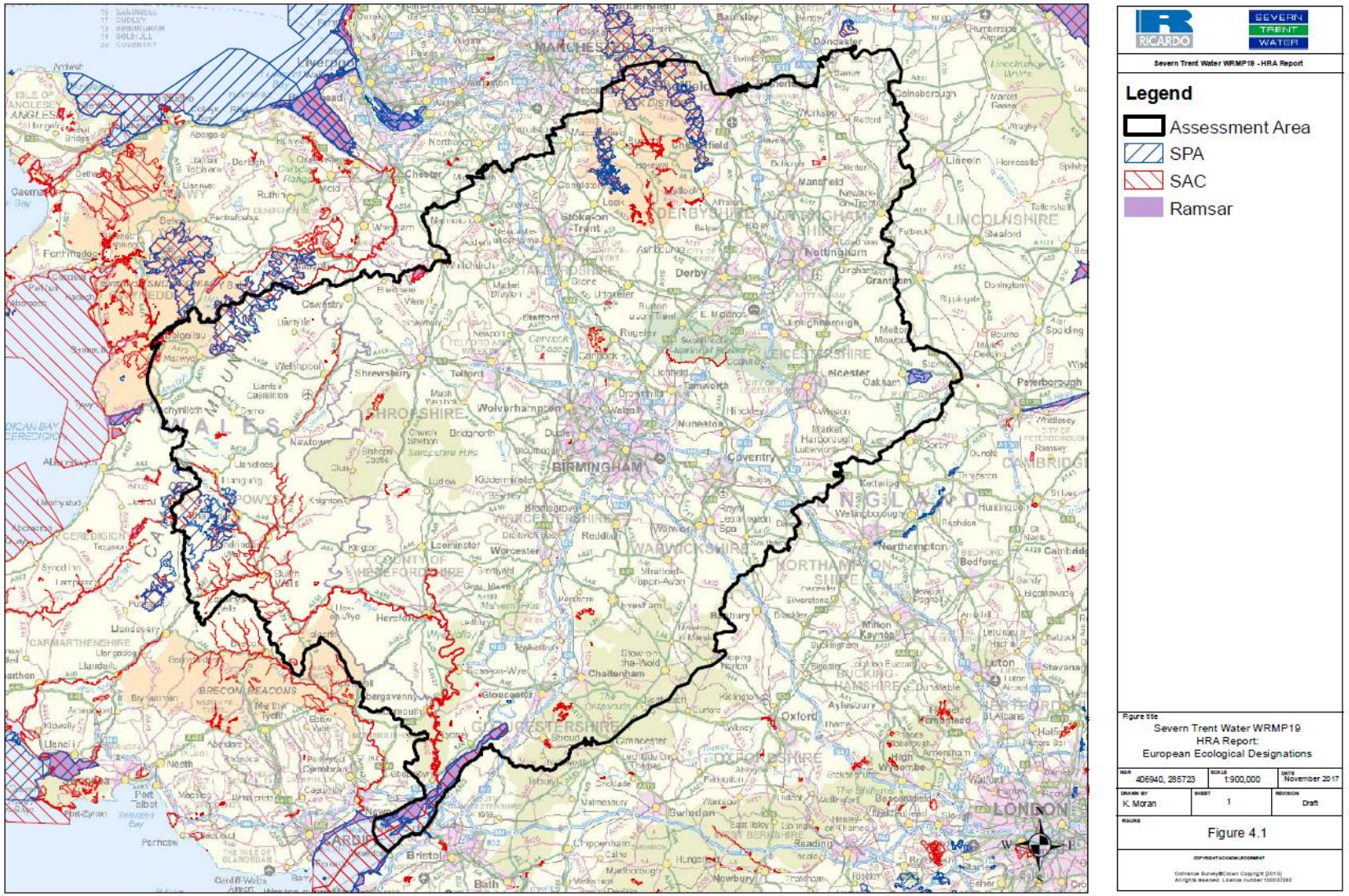


Table 4.1. Screening of demand management components for effects on European sites

Solution No.	Component	HRA Outcome	Comments
Demand Management Components			
WE003A	Enhanced Household Water Efficiency Audit	No LSE	This water efficiency option involve a detailed audit of 30,000 annually household water efficiency (base programme is to complete 25,000 audits annually). The programme will start in 2020 for 15 years and it would provide an average additional saving of 0.15Ml/d. As this option is targeted at increased efficiency audits it will not be associated with any European Sites.
WE003B	Enhanced Household Water Efficiency Audit	No LSE	This water efficiency option involve a detailed audit of 35,000 annually household water efficiency (base programme is to complete 25,000 audits annually). The programme will start in 2020 for 15 years and it would provide an average additional saving of 0.30Ml/d. As this option is targeted at increased efficiency audits it will not be associated with any European Sites.
WE004A	Enhanced Social Housing Water Efficiency Audit	No LSE	This water efficiency option involve a detailed audit of 7,500 annually social household water efficiency (base programme is to complete 5,000 audits annually). The programme will start in 2020 for 15 years and it would provide an average additional saving of 0.08Ml/d. As this option is targeted at increased efficiency audits it will not be associated with any European Sites.
WE004B	Enhanced Social Housing Water Efficiency Audit	No LSE	This water efficiency option involve a detailed audit of 12,000 annually social household water efficiency (base programme is to complete 5,000 audits annually). The programme will start in 2020 for 15 years and it would provide an average additional saving of 0.21Ml/d. As this option is targeted at increased efficiency audits it will not be associated with any European Sites.
WE005	Leakage Reduction	No LSE	This demand management option is to reduce leakage. Severn Trent Water will use measures including active leakage control and pressure management in District Meter Areas covering all water resources zones of their network during AMP7. These leakage reduction measures will generate savings of 15%. This would be a step change in leakage reduction for Severn Trent Water and the activities will not be associated with any European Sites.
WE006	Increasing in Metering	No LSE	This demand management option proposes to increase the number of rateable value billed customers switching to a metered supply (domestic and industrial meter optants) from the current baseline of 41% to Severn Trent Water's target of 70%. This target would generate water savings of 60 Ml/d over

			a 15-year period and the activities will not be associated with any European Sites.

Table 4.2. Screening of water supply components for effects on European sites

Component Nr.	Component	HRA Outcome	Comments
4	Site R Conjunctive Use	Moderate Risk, Stage 2 HRA is required	Works associated with component 4 are likely to have a significant effect on the Peak District Dales SAC and further information and assessment is required. The component involves construction works upstream of the following features: bullhead, brook lamprey and white-clawed crayfish. White-clawed crayfish are particularly sensitive to sedimentation and disease. It is possible that they may be present within the upstream reach of the River Derwent and tributaries, in the area of the works. There could be temporary loss of this habitat for construction, which could affect population survival. Additional mitigation maybe required.
12	Central Birmingham GW Potable Supply	No LSE	
7A	River Trent Augmentation (Barnhurst)	No LSE	
14B	Site E Expansion	No LSE	
16	DVA to Nottingham Pipeline Enhancement	No LSE	
17	Site Q (Dove) Conjunctive Use	No LSE	
22	Elmhurst BH Recommissioning (Potable)	No LSE	
25A	Upper Avon/Leam Resource	No LSE	
25B	Upper Avon/Leam Resource	No LSE	
27	Hatton (Warks) Conjunctive Use	No LSE	
30	New BH in Hopton GWMU	No LSE	
31C	E.Midlands Raw Water Storage	No LSE	
31D	E.Midlands Raw Water Storage	No LSE	
32	Site F Conjunctive Use	No LSE	
33	Site M WTW Expansion	No LSE	
34	Longdon Marsh Reservoir	No LSE	
44	New river WTW nr. Stafford	Moderate Risk, Stage 2 HRA is required	The proposed component pipeline intercepts the Cannock Chase SAC boundary in the north of the site. More information is required on the pipeline route and potential to adjust the route to avoid LSE and any mitigation practices in relation to the new pipeline. As it stands, there is likely to be direct habitat loss and possible indirect effects to adjacent habitat within the SAC but there is potential to avoid this through re-routing the pipeline.
45	New river WTW on Notts Trent	No LSE	

Component Nr.	Component	HRA Outcome	Comments
50	New river WTW at Ombersley	No LSE	
53	New river WTW at Buildwas, Shrops	No LSE	
54	River Soar to WTW B	No LSE	
58	River Weaver to Stoke	No LSE	
61	River Trent to Site Q	No LSE	
64	Stanton/Milton to Supply at Site Q	No LSE	
66	Expand Site P	No LSE	
71	Elmhurst BH raw transfer to Site L	No LSE	
79	Wolves-Birmingham Strategic Link Main	No LSE	
81	Yorkshire Water Bulk Import to Chesterfield	No LSE	
82	Cross-Wolverhampton Strategic Link Main	No LSE	
84A	Minor Dam Extensions (Stanford 10% 100Ml)	No LSE	
84B	Minor Dam Extensions (Shustoke 10% 200Ml)	No LSE	
84C	Minor Dam Extensions (Res. A 5% 70Ml)	No LSE	
84D	Minor Dam Extensions (Carsington 10% (3600Ml))	No LSE	
88	River Weaver to Site L WTW	No LSE	
89D-20	Carsington to N Staffs - 20Ml/d	No LSE	
89D-30	Carsington to N Staffs - 20Ml/d	No LSE	
90	Leek-Stoke Trunk Main Enhancement	No LSE	
95B	Site J WTW Output Increase	No LSE	
99B	Component 99B - DO Recovery - Site I	No LSE	
99D	WTW B DO recovery	No LSE	
99E	Component 99E - DO Recovery - Site C	No LSE	
99G	Component 99G - DO Recovery - Site Q	No LSE	
101	Kinsall Additional Resource	No LSE	
103	Mardy Support Link	No LSE	
104	Newark Support Link	No LSE	
105	Ruyton Support Link	No LSE	
108	Stoke to Stafford Link	No LSE	
110	Wolverhampton-Staffs Link	No LSE	
111	Site Q to Staffs Link	No LSE	
112A	Croxton BH Output Increase	No LSE	
112B	Croxton BH Output Increase	No LSE	
117	Peckforton Bulk Import	No LSE	
120A	Middle Severn to Site C	Moderate Risk, Stage 2 HRA is required	The components involve a raw water transfer between catchments and the WFD and SEA have highlighted a potential risk of spreading non-native species from the River Severn to Draycott Water catchment, based on the known presence of Invasive Non-native Species

Component Nr.	Component	HRA Outcome	Comments
			(INNS). Whilst there are no designated sites within 10km of the component location, this could affect designated sites beyond the 10km search area.
120B	Middle Severn to Site C	Moderate Risk, Stage 2 HRA is required	
120C	Middle Severn to Site C	Moderate Risk, Stage 2 HRA is required	
120D	Middle Severn to Site C	Moderate Risk, Stage 2 HRA is required	
120E	Middle Severn to Site C	Moderate Risk, Stage 2 HRA is required	
120F	Middle Severn to Site C	Moderate Risk, Stage 2 HRA is required	
121	Site O to Site K main	No LSE	
122A	Raise water level at Reservoir C (6% (1400Ml))	No LSE	
122B	Raise water level at Reservoir C (25% (5800Ml))	No LSE	
122C	Raise water level at Reservoir C (50% (11500Ml))	No LSE	
123A	Raise Dam at Site L Reservoir (5% (300Ml))	No LSE	
123B	Raise Dam at Site L Reservoir (25% (1600Ml))	No LSE	
125A	Unlock unused Carsington storage /Lower Derwent to Site Q/ L. Eaton/ C. Wilne	No LSE	
128	Carsington to Site L main	No LSE	
131	Site J to Mansfield Pipeline enhancement	No LSE	
132	Whaddon to Forest Transfer	No LSE	
134A	Use Blackbrook reservoir to provide additional supply of raw water to WTW B	No LSE	
135	Use Thornton reservoir to provide additional supply of raw water to WTW B	No LSE	
138	Packington Reuse	No LSE	
142	Use Linacre reservoirs and abstraction licence as a supply to the gird either permanently or as a temporary drought resilience option	No LSE	
144A	Supply of water either from the Canals and Rivers Trust (CRT) network/ rivers/ reservoirs/ groundwater sources or from the North (UU) using the CRT network as a transfer route	No LSE	
144B	Supply of water either from the Canals and Rivers Trust (CRT) network/ rivers/ reservoirs/	No LSE	

Component Nr.	Component	HRA Outcome	Comments
	groundwater sources or from the North (UU) using the CRT network as a transfer route		
150	Little Haywood new WTW on Upper Trent incl main to Meir	No LSE	
152	Use currently under utilised R. Severn abstraction licences at Site N	No LSE	
158	Watery Lane BHs	No LSE	
159	Waverly Road BHs	No LSE	
162	Preston Brockhurst BHs	No LSE	
163	Swynnerton BHs	No LSE	
166	Broomleys BH	No LSE	
186A	Expand Reservoir T 9m 28700Ml	No LSE	
186B	Expand Reservoir T 13m 45600Ml	No LSE	
187A	Expand Carsington - 10500Ml	No LSE	
187B	Expand Carsington - 16900Ml	No LSE	
190	Eyebrook Reservoir	No LSE	
191	Diddlebury BH/Munslow BH Network Constraints	No LSE	
192A	Mardy Support	No LSE	
192B	Mardy Support	No LSE	
193	Much Wenlock Support, Rehabilitation or Redrilling	No LSE	
194A	Clungunford/Oakley Farm Support	Moderate Risk, Stage 2 HRA is required	The proposed component is within 1.72km of the River Clun SAC and 0.18km from the River Clun upstream of the SAC boundary. Although there is no risk of direct effects, as works are outside of the designated site boundary, there is potential for indirect effects to freshwater pearl mussel, which lie downstream of the component. The adjacent aquifer abstraction could result in alterations in river flow that could result in habitat degradation to the Site and functionally linked habitat.
194B	Clungunford/Oakley Farm Support	Moderate RiskHigh Risk, , Stage 2 HRA is required	The proposed component is within 1.72km of the River Clun SAC and 0.18km from the River Clun upstream of the SAC boundary. Although there is no risk of direct effects as works are outside of the Site boundary, there is potential for indirect effects to freshwater pearl mussel from habitat degradation of functionally linked habitat. Construction of the proposed component could cause disturbance, mortality, habitat loss or degradation, due to sedimentation. During operation, alteration of the habitat from low flows could also degrade their habitat.
195	Change the WTW processes at Site L WTW so that it has a lower minimum output than ~ 16 Ml/d.	No LSE	
198	Ladyflatte BH Recommission	No LSE	

Component Nr.	Component	HRA Outcome	Comments
200	Peckforton Group Export	No LSE	
204	New GW Source in Coven Unit	No LSE	
205	Milford DO recovery	No LSE	
F-120	Site U 120Ml/d	No LSE	
F-190	Site U 190Ml/d	No LSE	
304	Ambergate to Mid Nottinghamshire transfer solution	No LSE	
305	Heathy Lea to North Nottinghamshire transfer solution	No LSE	
310	Transfer main from WTW C to Coventry	No LSE	
313	Site R WTW to Baslow pipeline capacity increase	No LSE	

4.2 HRA Screening Conclusions

The screening process has indicated that no demand management components have been assessed as having likely significant effects on European sites.

The screening process has identified several components which would have a LSE on the associated European sites. These components include:

- Component number 4 (Site R Conjunctive Use)
- Component number 44 (New River WTW nr. Stafford)
- Component number 120A, 120B, 120C, 120D, 120E, 120F (Middle Severn to Site C)
- 194A (Clungunford/Oakley Farm Support)
- 194B (Clungunford/Oakley Farm Support)

None of these components were included in the preferred programme for the dWRMP19.

Following the screening of these feasible components, as set out in this document, the Stage 1 HRA has considered the in-combination effects of each solution that was included in the preferred programme for the dWRMP19. This has considered the timing and implementation regime of the solutions that make up the preferred programme. This was followed by an assessment of the in-combination assessment of components in the preferred programme with other programmes, plans and projects that could have an effect on the European sites.

5 HRA Findings for the dWRMP19 Preferred Programme

5.1 Introduction

HRA screening (see Section 4) has been completed for all of the components considered in the development of the dWRMP19 and to assist in refinement of the preferred programme. The components considered as part of the solutions for the preferred programme have been identified in **Table 5.1**.

Section 5.2 discusses the potential effects of the individual solutions which are included in the preferred programme of the dWRMP19. Sections 5.3 and 5.4 discuss in-combination effects within the dWRMP19 and with other plans and projects, respectively. Consideration for LSE in-combination with other projects and plans has only been applied to those solutions identified in the preferred programme of the dWRMP19 (Table 5.1).

Components that were included within the feasible list, but which were not selected for inclusion as solutions in the preferred programme are unlikely to be progressed; however, should any of these components be brought back into consideration in the future, the in-combination assessment and any identified Appropriate Assessments should be completed at this stage.

Table 5.1: HRA screening conclusions for the dWRMP19 solutions.

Solution Ref	Solution name	Components	Effect from components alone
Demand Management			
WE003B	Enhanced Household Water Efficiency Audit	-	No LSE
WE004B	Enhanced Social Housing Water Efficiency Audit	-	No LSE
WE005	Leakage Reduction	-	No LSE
WE006	Increase in Metering	-	No LSE
Supply Solutions			
NOT04	New strategic transfer capacity from Strategic Grid to Sunnyside	Component Refs: 305	No LSE
BHS15	Conversion B'ham BH from augmentation to PWS	Component Refs: 12	No LSE
DOR05	DO Recovery - WTW C	Component Refs: 99E	No LSE
DOR02	DO Recovery - Site I WTW	Component Refs: 99B	No LSE
WIL05	R Trent augmentation from Barnhurst STW via R Penk > Site E expansion with main to Hathern Cross	Component Refs: 7A &14B	No LSE
LIT01	Expand Site F WTW and new bi-directional pumping main	Component Refs: 32	No LSE
DOR08	DO Recovery - WTW B	Component Refs: 99D	No LSE
GRD15	Whaddon to Forest Transfer	Component Refs: 132	No LSE
UNK07	Reconfigure Site L WTW to handle flows less than 16Ml/d	Component Refs: 195	No LSE
GRD18	DO recovery of Peckforton Group BHs (rehab BHs and treatment upgrades)	Component Refs: 200	No LSE
CRO06	New abstraction R Soar transfer WTW Bs	Component Refs: 54	No LSE
WTW05	Croft Quarry to new WTW	Component Refs: 31C	No LSE
MEL29	Additional water from Carsington Res to Site Q WTWs > DO Recovery - Site Q WTW	Component Refs: 17 &99G	No LSE
DAM07	Raise water level at Reservoir C (6% (1400Ml))	Component Refs: 122A & 310	No LSE
BAM04	Increase Site R WTW capacity	Component Refs: 313	No LSE

Solution Ref	Solution name	Components	Effect from components alone
DAM01	Stanford Reservoir minor dam extension (10%)	Component Refs: 84A	No LSE
CRO05	Thornton Res to supply WTW B	Component Refs: 135	No LSE
NOT01	New strategic link from Strategic Grid to Mansfield	Component Refs: 304	No LSE
DAM03	Reservoir A minor dam extension (5%)	Component Refs: 84C	No LSE
BHS07	Recommission Ladyflatte BHs	Component Refs: 198	No LSE
DAM02	Lower Shustoke minor dam extension (10%)	Component Refs: 84B	No LSE
GRD19	DVA to Nottingham Pipeline Enhancement	Component Refs: 16	No LSE
BHS06	Upgrade network capacity to fully deploy Diddlebury and Munslow BHs	Component Refs: 191	No LSE

5.2 Potential Effects of the dWRMP19

Table 5.2 and **Table 5.3** presents the HRA screening assessment of potential effects of the schemes that are included in the preferred programme of the dWRMP19. Potential mitigation measures available were taken into account in the screening process.

The results of the screening process in **Table 5.2** and **Table 5.3** show that the individual solutions included in the preferred plan are not likely to have a significant effect on any European sites.

5.3 Potential In-Combination Effects within the dWRMP19

The matrix in **Figure 5.1** illustrates potential construction and operational in-combination effects between the solutions. A potential in-combination effects arises where an overlap in the project construction / operation programme is identified which could affect the same designated site. The results of the in-combination effects assessment are presented below the table.

From this **Figure 1** it is evident that only four of the solutions included in the preferred programme could have potential in-combination effects on European sites. The first of these combinations includes MEL29 (Additional water from Carsington Res to Site Q WTWs > DO Recovery - Site Q WTW), LIT01 (Expanding Site F WTW and new bi-directional pumping main) and WIL05 (River Trent augmentation from Barnhurst STW via R Penk > Site E expansion with main to Hathern Cross). The second combinations include DAM07 (Raise water level at Reservoir C (6% (1400Ml)) and DOR05 (WTW C DO recovery). Thirdly, Lower Shustoke capacity increase (DAM02) and Reservoir A capacity increase (DAM03) have been identified as having potential in-combination adverse effects. The simultaneous operation of solutions WTW05 and WIL05 has the potential for in-combination effects on the River Trent from Dove to Derwent.

Figure 5.1: Matrix indicating the solutions considered to have potential in-combination effects.

Number	Solutiuon	Potential In-combination Effects																				
1	NOT04																					
2	BHS15																					
3	DOR05																					
4	DOR02																					
5	WIL05																					
6	LIT01																					
7	DOR08																					
8	GRD15																					
9	UNK07																					
10	GRD18																					
11	CRO06																					
12	WTW05																					
13	MEL29																					
14	DAM07																					
15	BAM04																					
16	DAM01																					
17	CRO05																					
18	NOT01																					
19	DAM03																					
20	BHS07																					
21	DAM02																					
22	GRD19																					
23	BHS06																					
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23

Legend	
	Construction
	Operation
	Construction & Operation

5.3.1 Carsington Water

The potential in-combination effects associated with solution (LIT01, MEL29 and WIL05) are related to the operation of the three solutions. LIT01 involves component 32. There are no European sites associated with component 32 and therefore no in-combination effects. MEL29 involves component 99G and 17. Component 99G is 9.67 km upstream of the River Mease SAC. Component 17 has no hydrological pathways to any European sites, with the works located at a sufficient distance to ensure no effects on designated qualifying features will occur. Therefore, MEL29 will have no in-combination effects. WIL05 involves components 7A and 14B. Component 7A is located within 9km from the River Mease SAC. As there is no new infrastructure or abstractions associated with the River Mease, no effects to the qualifying features of the River Mease SAC are anticipated during construction or operation. There are no European sites associated with component 14B and therefore no in-combination effects.

As such, there are no in-combination LSEs expected from the operation or construction of these solutions.

5.3.2 Site C Water WTW and Reservoir Expansion

The WTW C DO recovery (DOR05) and Reservoir C (DAM07) solutions have been identified as having potential in-combination effects related to the construction activities associated with these solutions. However, the assessment shows that there are no SACs, SPAs or Ramsar sites located within 10km of either of the DAM07 and DOR05 solutions.

As such, there are no in-combination LSEs expected from the operation or construction of these solutions.

5.3.3 Shustoke Reservoir and Reservoir A Expansions

Lower Shustoke capacity increase (DAM02) and Reservoir A capacity increase (DAM03) have been identified as having potential for in-combination adverse effects due to overlap in construction programme. As there are no SACs, SPAs or Ramsar sites located within 10km of either of the DAM07 and DOR05 solutions the assessment concludes there are no in-combination LSEs expected from the operation or construction of these solutions.

5.3.4 Trent from Dove to Derwent

The simultaneous operation of solutions WTW05 (component 31c) and WIL05 (component 7A and 14B) has the potential for in-combination adverse effects on the River Trent from Dove to Derwent. Both solutions will involve abstraction from River Trent from Dove to Derwent during their operation, assumed to be all year round. The total abstraction volume to be removed from River Trent (Dove to Derwent) during the operation of both solutions equates to 70Ml/d, of which 20Ml/d will be supported by augmentation with final effluent from Barnhurst STW which discharges to the Penk from Source to Saredon Brook. The current available volume that can be abstracted upstream of North Muskham gauging station before the hands-off flow conditions are triggered is 150Ml/d. Therefore, the proposed both abstractions could be accommodated within this limit and will not have any significant effect in the flow regime or the aquatic ecology of the watercourses. Furthermore, there are no SACs, SPAs or Ramsar sites located within 10km of WTW05 or component 7A of WIL05.

As such, there are no in-combination LSEs expected from the operation or construction of these solutions.

5.4 Potential In-Combination Effects with Other Plans and Projects

Potential in-combination effects of the preferred programme with other plans and projects, where relevant, have been considered in **Table 5.3** and **Table 5.4.** As identified in Section 5.2.1, consideration of in-combination effects with regards to the demand management solutions will not result in any adverse in combination effects.

5.4.1 Severn Trent Water Draft Drought Plan 2018

Severn Trent Water is currently in the process of developing its draft Drought Plan that will be published in early 2018. The implementation of the measures in the draft Drought Plan alongside the dWRMP19 may result in both beneficial and adverse in-combination impacts, the latter particularly in terms of environmental water stress. However, as part of the Drought Plan implementation process, operational and technical liaison with the Environment Agency and Natural Resources Wales is increased to determine the best resources to use to minimise environmental impact.

The Drought Plan demand measures complement the demand management (water efficiency) schemes included in the draft WRMP19. While their implementation may exacerbate some of the potential adverse effects of the leakage management measures, specifically in relation to vehicle movements and associated effects on air quality, transport, community and nuisance, their implementation alongside demand management measures included in the draft WRMP19 should result in an overall beneficial in-combination impact on water resources (with indirect beneficial effects on environmental receptors such as biodiversity) because of the reduced consumption use of water.

A review of supply-side options in the Draft Drought Plan 2018 identified one potential operational in-combination effect with the dWRMP19. There is potential for in-combination effects between Ambergate to Mid Nottinghamshire transfer solution (NOT01) and the River Derwent at Ambergate Drought Permit Option as they both abstract from the River Derwent. However, in-combination effects are not likely as the proposed solution is located downstream of any SACs.

5.4.2 Neighbouring Water Company WRMPs and Drought Plans

All of the neighbouring water companies to Severn Trent are in the process of producing draft 2019 WRMPs for publication in early 2018. As such, it is not yet possible to identify confirmed schemes that will be included in these draft WRMPs for incorporation into this review of in-combination effects. This exercise will be carried for the Final WRMP19 SEA Environmental Report. However, WRMP discussions with the neighbouring companies have taken place and these have helped Severn Trent Water reach its decisions on the draft WRMP19, in particular the decision to exclude the Vyrnwy Reservoir import option from its draft plan. Based on these discussions, and assuming the exclusion of the Vyrnwy Reservoir import option, no in-combination LSEs are currently anticipated from the forthcoming draft 2019 WRMPs of the neighbouring water companies.

It is likely that all of the neighbouring water companies will include demand management programmes in their draft 2019 WRMPs, similar to those included in Severn Trent Water's draft WRMP. Improved water efficiency and leakage reduction across the country will result in beneficial in-combination effects in terms of reducing the need for, or scale of, new water resources thereby helping protect the water environment as well as reducing energy use through reduced water pumping and treatment.

No in-combination adverse effects have been identified in relation to the current published Drought Plans of neighbouring water companies. Beneficial effects may arise in respect of the Drought Plan measures for water efficiency and demand management with similar activities in the draft WRMP19.

Neighbouring water companies will also be invited to make comments on the draft WRMP19 and Severn Trent Water will also continue to communicate with neighbouring companies regarding the schemes in their draft 2019 WRMPs and any updates to their Drought Plans.

5.4.3 Land Use and Spatial Plans

It is necessary to consider potential in-combination effects with development programmes contained within regional planning frameworks. However, plans, policies and programmes contributing to regional spatial strategies (RSS) were revoked in July 2010 and were abolished following implementation of the Localism Act (2011). Future development is now principally guided by the National Planning Policy Framework (NPPF) and Local Development Frameworks (LDFs), in particular Local Plans. The Local Plans are relatively high-level policy documents and whilst they identify potential areas for future development and zones for particular activities, the certainty of developments, the precise spatial location and their timing make it difficult to identify any potential cumulative effects with the dWRMP19. As the dWRMP19 solutions are brought forward for promotion, an assessment will need to be carried out of possible construction and/or operational in-combination effects with known local developments in dialogue with the relevant local planning authorities.

5.4.4 River Basin Management Plans (RBMP)

The HRA for the 2015 RBMP for the Severn River Basin District[14] concluded that none of the proposed measures in the RBMP were likely to have any significant effects on any European sites, alone or in-combination with other plans or projects. Three of the solutions included in the preferred programme, including DAM07, DAM01 and BHS06 will be located within the Severn River Basin District. These solutions are not likely to result in in-combination LSEs with the RBMP activities.

The remainder of the solution are all associated with the Humber River Basin District. An HRA has also been completed for the 2015 Humber RBMP[15]. This HRA also concluded that none of the RBMP proposed measures will have any LSEs on any European sites, alone or in-combination with other plans or projects.

[14] River basin management plan for the Severn River Basin District Habitats Regulations Assessment Updated December 2015
[15] River basin management plan for the Humber River Basin District Habitats Regulations Assessment Updated December 2015

The solutions included in the dWRMP19 are not likely to result in in-combination LSEs with the 2015 RBMP activities on any European site. It is recommended that, once the dWRMP19 solutions are brought forward for promotion and development, a further assessment of potential in-combination effects with the latest versions of the RBMPs and associated measures is carried out as part of the HRA of the relevant planning permissions and/or environmental permit applications.

5.4.5 Major Projects

The potential for in-combination effects with some of the significant projects and developments identified in the Severn Trent Water supply area include High Speed Two (HS2); M42 Junction 6 Improvement Scheme, M54 to M6 Link Road; Avonmouth Deep Sea Container Terminal; Hinkley Point C Nuclear Power Plant and the Wednesbury to Brierley Hill Metro Extension. In-combination LSEs for these projects are not considered likely as the zones of influence largely do not overlap with the dWRMP19 components due to differing construction periods, or otherwise the effects have been identified as small-scale and geographically distributed.

Table 5.2: Habitats Regulations screening of preferred programme demand management solutions for effects on European sites

Solution Ref	Solution name	LSE from solution alone	LSE from solutions within dWRMP	LSE with other plans and programmes
WE003B	Enhanced Household Water Efficiency Audit	No	No	No
WE004B	Enhanced Social Housing Water Efficiency Audit	No	No	No
WE005	Leakage Reduction	No	No	No
WE006	Increase in Metering	No	No	No

Table 5.3: Habitats Regulations screening of the preferred programme supply-side solutions for effects on European sites.

Solution Ref	Solution name	Components	LSE from solution alone	LSE from solutions within dWRMP	LSE with other plans and programmes
NOT04	New strategic transfer capacity from Strategic Grid to Sunnyside	Refs: 305	No	No	No
BHS15	Conversion B'ham BH from augmentation to PWS	Refs: 12	No	No	No
DOR05	DO Recovery - WTW C	Refs: 99E	No	No	No
DOR02	DO Recovery - Site I WTW	Refs: 99B	No	No	No
WIL05	R Trent augmentation from Barnhurst STW via R Penk > Site E expansion with main to Hathern Cross	Refs: 7A&14B	No	No	No
LIT01	Expand Site F WTW and new bi-directional pumping main	Refs: 32	No	No	No
DOR08	DO Recovery - WTW B	Refs: 99D	No	No	No
GRD15	Whaddon to Forest Transfer	Refs: 132	No	No	No
UNK07	Reconfigure Site L WTW to handle flows less than 16Ml/d	Refs: 195	No	No	No
GRD18	DO recovery of Peckforton Group BHs (rehab BHs and treatment upgrades)	Refs: 200	No	No	No

Solution Ref	Solution name	Components	LSE from solution alone	LSE from solutions within dWRMP	LSE with other plans and programmes
CRO06	New abstraction R Soar transfer WTW B	Refs: 54	No	No	No
WTW05	Croft Quarry to new WTW	Refs: 31C	No	No	No
MEL29	Additional water from Carsington Res to Site Q WTWs > DO Recovery - Site Q WTW	Refs: 17&99G	No	No	No
DAM07	Raise water level at Reservoir C (6% (1400Ml))	Refs: 122A & 310	No	No	No
BAM04	Increase Site R WTW capacity	Refs: 313	No	No	No
DAM01	Stanford Reservoir minor dam extension (10%)	Refs: 84A	No	No	No
CRO05	Thornton Res to supply WTW B	Refs: 135	No	No	No
NOT01	New strategic link from Strategic Grid to Mansfield	Refs: 304	No	No	No
DAM03	Reservoir A minor dam extension (5%)	Refs: 84C	No	No	No
BHS07	Recommission Ladyflatte BHs	Refs: 198	No	No	No
DAM02	Lower Shustoke minor dam extension (10%)	Refs: 84B	No	No	No
GRD19	DVA to Nottingham Pipeline Enhancement	Refs: 16	No	No	No
BHS06	Upgrade network capacity to fully deploy Diddlebury and Munslow BHs	Refs: 191	No	No	No

6 Conclusion and Summary

Severn Trent Water has undertaken a screening assessment of the potential for any LSE on the integrity of European sites arising from the demand solutions and supply-side components included in the feasible list of components for the dWRMP19. Consultation was undertaken with NE, NRW and the EA to inform this HRA screening assessment. The outcomes of the screening exercise were considered in the selection of solutions included in the preferred programme. The dWRMP19 also considered supply and demand balance and the availability of alternative solutions in the development of the preferred programme.

Following the programme appraisal process, the dWRMP19 preferred programme includes both customer and distribution management solutions and several water supply solutions that consist of a number of components. The HRA screening assessment concluded that, the preferred programme is not likely to have a significant effect on the integrity of any European sites, either alone or in-combination with other plans, projects and programmes

It is also considered unlikely that there would be any in-combination effects on any European site from development proposals, Regional Spatial Strategies or other high-level plans. From a review of neighbouring water companies' previous WRMPs, developing draft 2019 WRMPs and Drought Plans, the dWRMP19 is also considered unlikely to have significant in-combination effects with these plans on any European site.

Components which would result in LSE, or those where an uncertain conclusion was reached about the likelihood of significant effects, were not selected for the preferred programme and therefore there was no need for Appropriate Assessment.

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