

## United Utilities Sources – BNG and NCA Environmental Assessment Technical Note

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## Technical note:

# United Utilities Sources Strategic Resource Options – Natural Capital and Biodiversity Net Gain Assessments

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## 1. Introduction

- 1.1.1 The United Utilities Sources (UUS) Strategic Resource Option (SRO) is being delivered by United Utilities (UU) and is one of three SROs the water company is participating in, the others being United Utilities Vyrnwy Aqueduct (UUVA) and Severn to Thames Transfer (STT). Although these schemes are separate SROs, they directly interface with each other to enable water to be transferred from North West England to the Midlands and South.
- 1.1.2 To meet the Regulators' Alliance for Progressing Infrastructure Development (RAPID) Gate 1 submission environmental requirements<sup>1</sup>, the UUS SRO must be subject to a range of environmental assessments. As part of this process, and in-line with guidance issued by the All Company Working Group (ACWG), UU commissioned Wood Environment and Infrastructure Solutions UK Ltd<sup>2</sup> (Wood) to determine the predicted losses to natural capital, including biodiversity, and potential gains that could be incorporated within the option(s) chosen. This will also address planning policy and future legislation (i.e. the Environment Bill), that may be relevant to some options. It will also help inform the duties of public bodies in making planning decisions with reference (as appropriate) to the principles of the Sustainable Management of Natural Resources in the Environment (Wales) Act 2016<sup>3</sup> and the biodiversity duty in the Natural Environment and Rural Communities Act 2006<sup>4</sup> in Wales and England respectively.
- 1.1.3 This Technical Note presents the findings of the initial NCA and Biodiversity Net Gain (BNG) Assessment of the UUS SRO options being taken forward at Gate 1. At this early stage of the option identification and selection process (Gate 1), the level of detail available on design and exact locations in terms of the components of the options is broad. Therefore, the approach described below to NCA and the calculation of BNG has been tailored to reflect the status of option design whilst providing a quantified outcome that can be used to inform the selection of the preferred solution for the UUS SRO prior to Gate 2.

## 1.2 United Utilities Sources Strategic Resource Option

- 1.2.1 The UUS SRO is one of 17 schemes promoted by Ofwat in the PR19 Final Determination<sup>1</sup> to identify new strategic water resources to address the water needs set out in the National Framework for Water Resources<sup>5</sup>. The SRO programme is managed by RAPID and governed through a gated

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<sup>1</sup> See Ofwat (2019) *PR19 final determinations: Strategic regional water resource solutions* and RAPID (2020) *Accelerated Gate One Assessment –summary of process and criteria Version 2*.

<sup>2</sup> Now Wood Group UK Ltd.

<sup>3</sup> Available at <https://www.legislation.gov.uk/anaw/2016/3/contents/enacted>

<sup>4</sup> Available at <https://www.legislation.gov.uk/ukpga/2006/16/contents>

<sup>5</sup> Environment Agency (2020) *Meeting our future water needs: a national framework for water resources*. Available from [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/872759/National\\_Framework\\_for\\_water\\_resources\\_main\\_report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/872759/National_Framework_for_water_resources_main_report.pdf) [Accessed September 2020].

process during AMP7 with the purpose of selecting the strategic resource options which provide best value for customers for delivery in AMP8. The gates are:

- **Gate 1:** Initial concept design and decision making;
- **Gate 2:** Detailed feasibility, concept design and multi-solution decision making;
- **Gate 3:** Developed design, finalised feasibility, pre-planning investigations and planning applications;
- **Gate 4:** Planning applications, procurement and land purchase.

1.2.2 Gate 1 of this process takes place in July 2021 and involves initial concept design and decision making. The Gate 1 decision, if supportive, will provide further funding for development of the schemes and the selected options will be included in the plan development process for the Regional Plans and Water Resources Management Plans 2024 (WRMP24s), as appropriate

1.2.3 The purpose of the UUS SRO, alongside the UOVA SRO, is to support the STT SRO proposal to transfer up to 180 mega litres per day (ML/d) of water from Lake Vyrnwy to the Thames Water region via the River Severn by maintaining supply resilience to UU customers if water were to be transferred out of region.

1.2.4 Source options for the UUS SRO have been evaluated in terms of their benefits and costs and subject to environmental assessment in accordance with RAPID's Gate 1 requirements. This process has informed the selection of a preferred list of 27 feasible options for the SRO including groundwater enhancement, improved reservoir release control, local interconnection and treatment, and river abstraction. The preferred list of feasible options is presented in **Section 2** of this Technical Note.

1.2.5 It should be noted that, at this stage, the preferred solution for the UUS SRO has not been selected. The solution will be selected by Gate 2 (October 2022) taking into account further assessment (including NCA and BNG Assessment), investigation and the volume of water required for trading.

### 1.3 RAPID's Environmental Requirements

1.3.1 RAPID has requested environmental information from water companies to support their respective SROs as part of the Gate 1 submission (July 2021). To meet RAPID's Gate 1 submission requirements<sup>6</sup>, UU is to provide the following information for the UUS SRO options being taken forward:

- Initial option-level environmental assessments that meet local requirements and comply with Strategic Environmental Assessment (SEA) and Habitats Regulations Assessments (HRA) requirements, including consideration of in-combination effects and identification of environmental risks that need mitigating through the solution design and costing.
- Initial environmental, social, and economic valuations (or metric benefits) consistent with principles in the National Planning Statement and Water Resource Planning Guidelines.

1.3.2 To meet RAPID's requirements, the following environmental assessments have been completed:

- Strategic Environmental Assessment<sup>7</sup> (SEA);

<sup>6</sup> See Ofwat (2019) *PR19 final determinations: Strategic regional water resource solutions* and RAPID (2020) *Accelerated Gate One Assessment –summary of process and criteria Version 2*.

<sup>7</sup> *Statutory Instrument No.1633 - The Environmental Assessment of Plans and Programmes Regulations 2004*.

- Habitats Regulations Assessment<sup>8</sup> (HRA) Review;
- Water Framework Directive (WFD) Screening Assessment<sup>9</sup>;
- Natural Capital Assessment (NCA);
- Biodiversity Net Gain (BNG) Assessment;
- Invasive Non-native Species (INNS) Risk Assessment.

1.3.3 This Technical Notes relates to the NCA and BNG Assessment of the UUS SRO.

## 1.4 Natural Capital Background

### Natural Capital Concept

1.4.1 Natural capital is central to Defra's 25 Year Environment Plan<sup>10</sup>, as a measure of the state of the environment. The concept is becoming of increasing interest to regulators, land managers and developers, providing them with a new approach to considering environmental benefits. While the principles of ecosystem services have been established for some time, complementary and more formalised approaches for implementing natural capital assessments are now being developed<sup>11</sup>. In January 2020, Defra released a range of guidance entitled "Enabling a Natural Capital Approach" (Defra, 2020)<sup>12</sup>, which provides a clear steer for land management at a range of scales.

1.4.2 The Defra (2020) ENCA guidance explains the concept of natural capital as:

*"Natural capital includes certain stocks of the elements of nature that have value to society, such as forests, fisheries, rivers, biodiversity, land and minerals.... Stocks of natural capital provide flows of environmental or 'ecosystem' services over time. These services, often in combination with other forms of capital (human, produced and social) produce a wide range of benefits. These include use values that involve interaction with the resource and which can have a market value (minerals, timber, freshwater) or non-market value (such as outdoor recreation, landscape amenity). They also include non-use values, such as the value people place on the existence of particular habitats or species."*

1.4.3 The guidance also describes a natural capital approach as a way of "thinking of nature as an asset, or set of assets, that benefit people".

### Relevance to Water Resources Management Planning and Strategic Resource Options

1.4.4 Natural capital has been incorporated into the scope of environmental assessments for water resource planning, to reflect emerging regulator requirements, and promote a holistic approach to maintaining and enhancing the natural environment and the benefits it provides. Key relevant guidance includes:

<sup>8</sup> Statutory Instrument No.1012 - Conservation of Habitats and Species Regulations 2017.

<sup>9</sup> Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (the Water Framework Directive).

<sup>10</sup> Defra (2018). A Green Future: Our 25 Year Plan to Improve the Environment. HM Government.

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/693158/25-year-environment-plan.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf)

<sup>11</sup> It should be noted that Natural England are due to release a new Natural Capital Assessment tool in June 2021. Details of this tool were not available at the time of writing.

<sup>12</sup> Defra (2020) Enabling a Natural Capital Approach: Guidance. HM Government.

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/869801/natural-capital-enca-guidance\\_2\\_March.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/869801/natural-capital-enca-guidance_2_March.pdf)

- Water Resource Planning Guideline (UK Government, March 2021);
- Water Resource planning guideline supplementary guidance- Environment and society in decision-making (Environment Agency, 2021);
- Environmental Assessment Guidance for Water Resources Management Plans and Drought Plans (UKWIR, 2021);
- Enabling Natural Capital Approaches (ENCA) (Defra, 2020);
- Natural Capital Register and Account Tool (NCRAT) (EA, 2021).

- 1.4.5 With specific regard to SROs, the ACWG has published 'WRMP environmental assessment guidance and applicability with SROs' (Mott MacDonald, 2020). The National Assessment Unit (NAU)<sup>13</sup> and Natural Resources Wales (NRW) have also confirmed that their Gate 1 expectations include for initial NCA and BNG requirements to be taken into account in the initial environmental assessments completed for the UUS SRO.
- 1.4.6 Methods for NCA include a progression from qualitative to quantitative to monetised assessment. The ACWG guidance (Mott MacDonald, 2020) recommends that a core of five ecosystem services should be assessed for Gate 1, which could be qualitative or quantitative assessments; these are identified in **Table 1**. The NAU has confirmed to UU that its expectations for Gate 1 are for the NCA to comprise of a high level screening of options, establishment of the natural capital baseline and a qualitative assessment of ecosystem services only. In addition, for options in Wales, the impacts on recreation and tourism should be considered, in line with the principles of the Sustainable Management of Natural Resources (SMNR) established in the Environment (Wales) Act 2016<sup>14</sup>. For consistency and to provide a broader view of overall impacts on natural capital, recreation and tourism have been assessed for all options in this report.
- 1.4.7 Biodiversity is included as one of the ecosystem services that the water company guidance recommends. However, there are separate approaches to considering impacts on biodiversity, via the BNG Assessment. The other five ecosystem services are assessed together in the NCA. For the remainder of this report, therefore, the BNG Assessment and NCA are presented separately.

**Table 1** Summary of ecosystem services considered in the assessment

Ecosystem service	Description
<b>Biodiversity</b>	Provision of biodiversity through areas of landcover. This may sometimes be considered a supporting ecosystem service, from which other services are enabled.
<b>Carbon sequestration</b>	Removal and storage of carbon from the air by soil and vegetation.
<b>Water purification</b>	Influence on water quality of land cover (e.g. ability to retain soil and nutrients).
<b>Water regulation</b>	Balanced availability of water for people and the environment.
<b>Natural hazard regulation</b>	Regulation of flood flows from land, for example through increased surface roughness (e.g. trees) or natural areas of storage.
<b>Recreation and tourism</b>	Public use or enjoyment of open spaces, including visual and landscape impacts.

<sup>13</sup> The NAU includes representatives from the Environment Agency (EA) and Natural England (NE) and has been established to provide strategic advice and guidance to water companies on environmental matters pertaining to the SROs, including the UUS SRO.

<sup>14</sup> Available from <https://www.legislation.gov.uk/anaw/2016/3/contents/enacted> [Accessed April 2021].

- 1.4.8 For Gate 2 (as suggested in the ACWG guidance), a broader range of ecosystem services could be included, if relevant. For example, the list could be expanded to include any ecosystem services identified by customers as being a priority. At Gate 2 there will also be an expectation to progress to a monetised assessment (where possible and appropriate).

## 1.5 Biodiversity Net Gain Background

- 1.5.1 BNG is a concept that in principle is simple – i.e. to provide more biodiversity than that which is lost to development. In order to quantify biodiversity losses and gains, Defra introduced a “Biodiversity Offsetting Metric” in 2012 with the aim of developing a universally (within England) applied system to allow effective measurement of BNG. This metric was piloted by a number of local authorities between 2012 and 2014. The system has been used sporadically across England since this time, its implementation has been very patchy, and its use is the exception rather than the rule. This metric has been expanded and improved over the following 8/9 years and is now published as the Biodiversity Metric v2.0 (v3.0 to follow in spring/summer 2021).
- 1.5.2 Following publication of Defra’s “A Green Future: Our 25-year plan to improve the environment” (2018), a consultation was held on the delivery of mandatory BNG for all development projects (with limited exemptions), leading to the requirement being written in to draft legislation as part of the Environment Bill in 2019 (assumed to be passed in Autumn 2021 based on the current parliamentary schedule). The National Planning Policy Framework<sup>15</sup> (or relevant National Policy Statements<sup>16</sup> for Development Consent Order projects) also seeks the delivery of BNG where possible, as do local plans in some local authority areas. In consequence, the delivery of a 10% BNG is, therefore, likely to be mandatory in respect of the UUS SRO (where planning permission or a Development Consent Order is required).
- 1.5.3 From a water resources planning perspective, the guidance introduced in **Section 1.4** sets out an expectation for BNG to be considered as a component of the assessment of water resource planning options, including SROs.
- 1.5.4 The Defra metric works by considering the extent of habitat affected by a proposal (measured in hectares (ha)<sup>17</sup>), how distinctive it is (i.e. its complexity, rarity, diversity etc.), its condition (i.e. its structure and management), its strategic location and its connectivity to other similar habitats. These elements are both used to determine the biodiversity value (measured in generic biodiversity units) of the losses due to a particular development, but also the gains made from its proposed habitat enhancement and creation measures. However, the biodiversity value of the gains is refined based on a number of risk multipliers that account for the difficulty of habitat creation (e.g. it is easier to create a semi-improved grassland than an active raised bog), the time it takes for a habitat to reach target condition (e.g. a grassland reaches target condition quicker than a woodland), and the location of delivery (i.e. habitat creation local to the biodiversity loss is worth more than habitat creation unrelated to the impact).
- 1.5.5 The metric is also framed by a set of principles that seek to ensure:

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<sup>15</sup> Ministry of Housing, Communities and Local Government (2019) National Planning Policy Framework. HM Government. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/810197/NPPF\\_Feb\\_2019\\_revised.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf)

<sup>16</sup> Defra (2018) Draft National Policy Statement for Water Resources Infrastructure. HM Government. [https://consult.defra.gov.uk/water/draft-national-policy-statement/supporting\\_documents/draftnpwaterresourcesinfrastructure.pdf](https://consult.defra.gov.uk/water/draft-national-policy-statement/supporting_documents/draftnpwaterresourcesinfrastructure.pdf)

<sup>17</sup> Hedgerows, treelines and rivers and streams are measured in kilometres and considered separately within the Biodiversity Metric v2.0. However, given the uncertainty surrounding design and the desk-top approach to assessment, only habitats measured in hectares are considered at this stage of the process.

- Adherence to the mitigation hierarchy (i.e. avoid, mitigate, compensate, enhance) – this is mainly relevant to development projects, but also needs to be considered for major habitat creation schemes.
- The exclusion of designated sites and irreplaceable habitats from standard calculations (encouraging their avoidance and ensuring any losses are compensated for on a case by case basis. It also accounts for the conservation works of designated sites usually being secured through a management agreement).
- The “like for like or better” replacement of high value habitats (e.g. removal of valuable woodland, requires replacement of woodland habitat).

1.5.6 At Gate 1, losses to biodiversity can be broadly quantified to enable comparison between options. However, the options for the delivery of BNG are only discussed qualitatively given the level of information available at this stage; at subsequent gates it is expected that this quantification will be refined to take into account of (inter alia) more detailed option information and the outcomes of environmental monitoring/surveys.

## 1.6 This Technical Note

1.6.1 This Technical Note presents the findings of the initial NCA and BNG Assessment for the preferred list of UUS SRO feasible options. The remainder of this Technical Note is structured as follows:

- **Section 2:** Describes the options identified for the UUS SRO;
- **Section 3:** Outlines the methodology for the assessments;
- **Section 4:** Summarises the results of the assessments;
- **Section 5:** Provides an overview of the opportunities to deliver BNG and natural capital;
- **Sections 6:** Sets out the next steps in the assessment process.

# 2. The United Utilities Sources SRO Options

## 2.1 Overview

2.1.1 The options for the UUS SRO being taken forward at Gate 1 have been selected following a process of options identification and appraisal. UU initially identified a long list of possible options that were subject to screening (Primary Screening) to identify a total of 37 feasible options for the SRO. These feasible options were then assessed in terms of their Average Incremental Cost (AIC), modelled to determine their water resource benefit and subject to initial environmental assessment. Taking into account the AIC and the findings of the initial environmental assessments, as well as ongoing engagement with stakeholders, a preferred list of 27 feasible options for the UUS SRO has been identified.

## 2.2 United Utilities Sources SRO Options

2.2.1 The 27 UUS SRO options being taken forward by UU at Gate 1 are summarised in **Table 2**.

Table 2 UUS SRO options

Option Number	Gate 1 Ref	Option Name	Summary Description
STT019	24	Transfer from Wirral to Liverpool via Mersey Tunnel	[✂]
STT029	6	River Lune Transfer	[✂]
STT034	11	Hollingworth Lake	[✂]
STT041	13	Heaton Park	[✂]
WR001	14	River Alt to Prescot WTW	[✂]
WR010	5	River Greta River Wenning to Lancaster	[✂]
WR049b	9	Abstraction from Ribble (lower) - Rivington	[✂]
WR076	25	New river abstraction, Upper Mersey (e.g. Bollin @ Lymm)	[✂]
WR099b	8	Worsthorne BH	[✂]
WR101	7	Franklaw BHs	[✂]
WR102b	17	Widnes BH Group	[✂]
WR102e	15	Bold Heath BHs	[✂]
WR105a	18	Lymm BH and WTW	[✂]
WR107b	12	Randles Bridge (Royal Oak).	[✂]
WR112	21	Bramhall Borehole	[✂]

Option Number	Gate 1 Ref	Option Name	Summary Description
WR113	19	Tytherington BH	[✂]
WR123	23	Helsby and Foxhill BHs PBD	[✂]
WR141	10	New river abstraction, River Irwell (e.g. Medlock)	[✂]
WR149	16	Lightshaw increased WTW capacity (SW)	[✂]
WR153	20	Simmonds Hill WTW (Manley Quarry BH)	[✂]
WR154	22	Sandiford Increased Capacity	[✂]
WR159	2	Individual Reservoirs Compensation Release Control	[✂]
WR810	3	Cow Green to Heltondale	[✂]
WR812	1	Kielder to Heltondale	[✂]
WR814a	26	Increased treatment capacity at Huntington WTW	[✂]
WR815	4	Killington Reservoir to Thirlmere Aqueduct	[✂]
WR821	27	Llangollen Canal	[✂]

## 3. Methodology

### 3.1 Biodiversity Net Gain Assessment

#### Habitat classification

- 3.1.1 Habitats have been described in accordance with the UK Habitats Classification<sup>18</sup> and the condition criteria provided in the technical guidance that accompanies the Biodiversity Metric v.2.0<sup>19</sup>. These elements have been determined, as accurately as possible, through desk study. This has used: a time series of satellite imagery to enable broad habitats to be mapped and a high-level understanding of current and former land management to be gained; Google Street View to provide additional information on structure and species types; and publicly available information from the priority habitats inventory and the Ancient Woodland inventory. The results have been mapped to a set of boundaries based on design information provided by UU using ArcGIS. It has been assumed that for all options the following applies (referred to within this report as the “defined area” for each option):
- Indicative pipeline routes are buffered by 15m on each side (in total 30m wide corridor) to allow for installation works (e.g. trenches, laydowns, soil storage and haul road);
  - Water treatment works / pumping station locations are assumed to be the central point of a square measuring 150m x 150m to account for temporary/permanent land take;
  - Penstocks, boreholes and other infrastructure are assumed to be the central point of a square measuring 20m x 20m to account for temporary/permanent land take.
- 3.1.2 It is acknowledged that the defined areas of each option are based on high-level information only at this stage and any future designs will evolve during the gated process with emphasis on avoiding local constraints such as biodiversity rich habitats wherever possible.
- 3.1.3 This desk-based method for habitat classification does mean that those identified are an approximation of what is actually present (for example, differentiating different types of grassland is very challenging from satellite imagery versus field surveys). However, the approach taken was consistent across all sites and therefore the BNG values provided can be considered a reasonable index of the baseline situation. It should be understood, however, that the results presented in **Section 4** for each option and their merit relative to each other with regards BNG, may change following design refinement and field survey.
- 3.1.4 The habitat type, their extent and assumptions about habitat condition, connectivity and strategic significance have then been entered into the Biodiversity Metric v2.0 for each option. These assumptions have been based on guidance provided by Natural England<sup>20</sup> and a balanced approach to habitat condition based on previous survey experience (see below). The outcomes presented in **Table 4** account for potential losses to biodiversity only as opportunities to provide uplift are unknown at this juncture at the level of the individual option.

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<sup>18</sup> <https://ukhab.org/>

<sup>19</sup> <http://publications.naturalengland.org.uk/publication/5850908674228224>

<sup>20</sup> Natural England (2019) Biodiversity Metric 2.0 – Users Guide – Beta Test.  
<http://publications.naturalengland.org.uk/publication/5850908674228224>

## Assumptions

- 3.1.5 The priority habitat inventory/ancient woodland inventory has been assumed to be correct as part of a precautionary approach unless there is obvious indications from satellite imagery that land use change has occurred (e.g. woodland felled, new infrastructure delivered etc.). The priority habitat inventory is often based on high-level information and is not necessarily accurate; however, this is usually only determined following field survey.
- 3.1.6 No habitats measured linearly (e.g. hedgerows, treelines and watercourses) have been included in the calculations. This is because they are difficult to categorise remotely, will account for relatively small lengths (as they tend to be crossed, as opposed to being removed along their length) and are usually crossed using techniques to minimise loss (e.g. use of gateways, trenchless crossings etc.). Further, in order to provide clarity, a single measure of biodiversity loss is provided, as opposed to three (e.g. area based units only, without hedgerow units or river units).
- 3.1.7 Habitat condition has been assumed based on habitat type (and therefore its distinctiveness) as follows:
- All habitats with a distinctiveness of low<sup>21</sup> - condition = poor;
  - All habitats with a distinctiveness of medium<sup>4</sup> - condition = moderate;
  - All habitats with a distinctiveness of high / very high - condition = good;
  - All "Urban" habitats with a distinctiveness value of very low - condition = N/A – other;
- 3.1.8 The condition assumption has been made to ensure there is a consistent comparison between sites. Other considerations taken into account in setting the assumptions were the extent of habitats within each category (i.e. ensuring results are reflective of typical experience), the degree of overlap with the sites supporting highly distinctive habitats with designated sites (e.g. Sites of Special Scientific Interest<sup>22</sup>) and habitats on the ancient woodland inventory or priority habitats inventory and the structure of the condition criteria set by Natural England.
- 3.1.9 The ecological connectivity for all habitats was specified according to Natural England instruction, so that all habitats of medium, low or very low distinctiveness are assigned a connectivity of "low" and all habitats of very high or high distinctiveness are assigned a connectivity of "medium". This instruction is given as the connectivity tool that accompanies the Biodiversity metric v2.0 is incomplete and thus cannot yet be applied across all habitats.
- 3.1.10 The strategic significance of the location of all sites are considered to fit into the category "area / compensation not in local strategy / no local strategy". This is because there are no Local Nature Recovery Strategies currently published (their production being mandated by the Environment Bill).
- 3.1.11 The interface of the Biodiversity Metric v2.0 identifies habitats where loss is unacceptable. Within this note, these habitats are referred to as "irreplaceable habitat". Where this type of habitat occurs, it is referenced with regards the relevant option in **Table 3**. Should this habitat loss be unavoidable, bespoke compensation is likely required and additional consenting risk would be encountered. However, for the purposes of the calculation these habitats are included.

<sup>21</sup> Other than for habitats within the "cropland" category where condition is "N/A – agricultural" as per Natural England guidance

<sup>22</sup> It is noted that designated sites are usually excluded from assessment of BNG. However, whilst using the Biodiversity Metric as a tool to evaluate options it allows for the value of its status to be captured.

## Delivering biodiversity net gain

- 3.1.12 A discussion of the opportunities for environmental gain (a combination of natural capital and BNG) that the delivery of any of the UUS SRO options may bring is provided within **Section 4**. Given the current stage of design, both with regards permanent infrastructure and construction delivery, and uncertainties regarding elements such as land ownership, the information provided applies across the SRO options (rather than being specific to individual options).

## 3.2 Natural Capital Assessment

### Methodology

- 3.2.1 The NCA methodology relates to five of the ecosystem services in **Table 1** (i.e. excluding biodiversity): carbon sequestration, water purification, water regulation, natural hazard regulation, and recreation and tourism.
- 3.2.2 For Gate 1, each option has been subject to a high level screening assessment, in order to determine the potential benefits or disbenefits to ecosystem services within the defined area for each. The assessment also identifies opportunities to promote natural capital net gain.
- 3.2.3 Assessments of natural capital stocks are commonly based on land use or habitat types, and assessed via individual ecosystem services. The ENCA guidance uses eight broad habitats, as set out in **Table 3**, and WRMP-related guidance suggests the same approach. Therefore, the habitat mapping described in **Section 3.1** has been used, with habitats aggregated to the eight broad habitats.

Table 3 Summary of habitat types categorised under the broad habitats

Broad habitat	Habitat types
<b>Enclosed farmland</b>	All types of cropland
<b>Semi-natural grassland</b>	All types of (non-urban) semi-natural grassland
<b>Mountains, moors and heath</b>	All types of heathland and shrub
<b>Freshwater</b>	All lakes, ponds, reservoirs and rivers All wetlands
<b>Urban habitat</b>	All areas of urban habitat (unsealed surfaces), such as allotments, cemeteries and churchyards, amenity grassland, vegetated gardens, areas of urban woodland
<b>Woodland</b>	All types of (non-urban) woodland and forest
<b>Coastal</b>	Not relevant to any options
<b>Marine</b>	Not relevant to any options

- 3.2.4 A high-level assessment has been undertaken of the impact that each option is likely to have on each of the five ecosystem services. The assessment uses a combination of information sources including habitat mapping, flood zones, WFD status, Ordnance Survey mapping and satellite imagery.

- 3.2.5 A numerical scoring from -2 to +2 has been adopted, to represent the potential benefits and disbenefits that may be associated with each option. These ratings are assigned based upon the presumed impact to ecosystem service provision. The benefits and disbenefits are considered separately in the screening assessment, so that potential gains and losses are not overlooked (through cancelling each other out).
- 3.2.6 The scoring criteria for each ecosystem service is presented in detail in **Appendix A**. Where, as part of that scoring, habitats have been assigned “high” or “low” potential to deliver a particular ecosystem service, this has been based on information from the Services Databook in the ENCA guidance (Defra, 2020).
- 3.2.7 A descriptive summary of relevant information is also provided for each option, including context on the scale (local/regional) and potential duration of the impacts (temporary/permanent). These details are relevant as they have weighting on the assigned rating, particularly in regard to the disbenefits.

## Assumptions

- 3.2.8 Not all locations for infrastructure are known precisely. The defined areas (as set out in **Section 3.1**) have been included to provide a buffer around each site. However, in most cases it is unlikely that all land within the defined area will be impacted. Therefore, it is possible that the benefits or disbenefits could be overstated (for example, if areas of woodland fall within the defined area but would be avoided during development). It is possible that the actual location of infrastructure may ultimately be sited outwith the defined area, in which case the impacts may differ. This assessment has taken a reasonable view of the likely impacts based on the information available.
- 3.2.9 With regards to water regulation, the assessment has been based on the best available information at the time, in relation to the necessity for new or increased consumptive abstractions, and the availability of water for that abstraction. This could change as a result of engagement with the Environment Agency, and may need to be reviewed in future to ensure continued consistency across the suite of assessments (e.g. SEA, WFD).
- 3.2.10 The assignment of ratings makes the assumption that all habitats within a particular broad habitat provide optimal ecosystem service delivery. Condition factors that could be used to appreciate or depreciate the ratings have been excluded due to the high level of the assessment; this is appropriate as it is unlikely this information would influence the assigned ratings significantly at this stage and is therefore, not considered to be necessary detail.

# 4. Results

## 4.1 Biodiversity Net Gain Assessment

- 4.1.1 The results of the BNG calculations for the UUS SRO options are presented in the accompanying spreadsheets. **Table 4** provides a summary of the outcome of the calculations performed within the Biodiversity Metric v2.0.

Table 4 The area based habitat units potentially lost in the delivery of each UUS SRO option

SRO Option	Area based habitat units (ABHU) – baseline	ABHU / ha	Notes
[✂]	174.21	2.66	<p>Small area of highly distinctive habitat present (2.34 ha of open mosaic habitat on previously developed land). Approximately 3.5ha of woodland (of different types) present within the defined area.</p> <p>Woodland habitats should be avoided where possible; compensatory planting requires significant amounts of land due to the temporal multiplier present in the metric (i.e. increased risk is factored in as woodland takes 32+ years to reach functionality).</p>
[✂]	37.84	2.95	<p>Approximately 0.94 ha of irreplaceable habitat present (allotted to fen habitat). Habitat should be avoided through design.</p> <p>Away from fen habitat, the habitats present are of low biodiversity value being dominated by arable fields. If avoidance of fen habitat was possible, the losses per hectare of land take would be low.</p>
[✂]	50.47	4.77	<p>Although no highly distinctive habitats are present, almost half of the area identified for potential land use change comprises habitats of medium distinctiveness. This provides a relatively high number of units per hectare for this option.</p>
[✂]	132.36	5.30	<p>Approximately 1.17 ha of irreplaceable habitat present (allotted to fen habitat). Habitat should be avoided through design.</p> <p>In addition to the fen habitat, there is 7.44 ha (of 30.78 ha total) of habitats of medium, high or very high distinctiveness. This drives a relatively high number of units per hectare for this option. If taken forward the design should seek to avoid these habitats.</p>
[✂]	203.29	2.92	<p>Approximately 0.09 ha of irreplaceable habitat present (allotted to fen habitat). Habitat should be avoided through design.</p> <p>The defined area includes a mix of habitats of low, medium and high distinctiveness although arable fields and pasture are the most abundant habitat types.</p>
[✂]	575.71	7.45	<p>Two habitats potentially present where losses unacceptable (fen – 1.15ha and blanket bog 3.85ha). Habitat should be avoided through design if option selected.</p> <p>Even without the habitats noted above, the biodiversity value per ha is high. This is because of substantial areas of highly distinctive woodland and heathland present.</p>
[✂]	264.70	4.93	<p>Approximately 3.46ha of irreplaceable habitat present (allotted to fen habitat). Habitat should be avoided through design.</p> <p>The defined area includes a mix of habitats from high to low distinctiveness, hence number of units potentially lost per hectare. However, the dominant habitats are agricultural in nature and potential losses could be reduced via avoidance through detailed design.</p>

SRO Option	Area based habitat units (ABHU) – baseline	ABHU / ha	Notes
[✂]	73.68	3.40	<p>Approximately 1.06ha of irreplaceable habitat present (allotted to fen habitat). Habitat should be avoided through design.</p> <p>The majority of the defined area lies within an agricultural landscape, although potential losses per unit area are affected by the greater than 10% area dominated by fen and woodland.</p>
[✂]	8.37	2.17	The majority of the defined area lies within an agricultural landscape, hence relatively low number of units per hectare potentially lost.
[✂]	7.48	1.03	Defined area dominated by a developed area with no biodiversity value, added to this is the relatively small footprint of the option resulting in a very low predicted loss of biodiversity units.
[✂]	65.10	2.13	<p>The defined area covers a mixture of mainly agricultural and urban type habitats limiting the biodiversity unit loss per hectare.</p> <p>Avoidance through detailed design has the potential to reduce losses further.</p>
[✂]	58.27	1.92	<p>The defined area covers a mixture of mainly agricultural and urban type habitats limiting the biodiversity unit loss per hectare.</p> <p>Avoidance through detailed design has the potential to reduce losses further.</p>
[✂]	65.8	4.80	Although there are no very highly or highly distinctive habitats present within the defined area, over 50% is characterised by habitats of medium distinctiveness. This results in a relatively high loss per hectare.
[✂]	214.64	2.85	The defined area is dominated by agricultural habitats, although there are a variety of habitats of high or medium distinctiveness also present. Many of these may be avoided through detailed design, although due to their distribution it is likely that some would be lost to this option.
[✂]	34.84	2.00	The defined area is dominated by modified grassland, some of which is related to a new by-pass development (note that signs of development are still present in the satellite imagery adding uncertainty as final landscape design may not yet be established).
[✂]	32.73	2.17	<p>The defined area is dominated by agricultural and urban habitats, although there is a relatively large area of woodland present.</p> <p>Avoidance of this woodland would substantially reduce the potential losses associated with this option.</p>
[✂]	66.91	4.71	Although there are a number of agricultural and urban habitats present, a relatively large area of woodland and mixed scrub provides a relatively high potential loss per hectare for this option.
[✂]	116.24	6.42	Although there is a number of agricultural and urban habitats present, a relatively large area of woodland and neutral grassland provides a relatively high potential loss per hectare for this option.

SRO Option	Area based habitat units (ABHU) – baseline	ABHU / ha	Notes
[✂]	148.41	5.60	Although there is a number of agricultural and urban habitats present, a relatively large area of woodland provides a relatively high potential loss per hectare for this option.
[✂]	23.17	2.86	Potential losses from the defined boundary are largely driven by the presence of ~1.5ha of woodland. If this was avoided, the losses associated with this option would be low.
[✂]	86.91	3.25	Although there is a number of agricultural and urban habitats present a reasonable area of woodland and neutral grassland provides a medium potential loss per hectare for this option.
[✂]	1,475.80	9.47	<p>This option has four irreplaceable habitats within its defined boundary. These are limestone pavement, blanket bog, fen and purple moor grass and rush pasture. There are also a range of other habitats of high and medium distinctiveness present. This results in a very high potential loss per hectare.</p> <p>Given the extent and distribution of habitats of biodiversity value, the potential for a design solution to avoid these is low.</p>
[✂]	2,129.05	7.30	<p>This option has four irreplaceable habitats within its defined boundary. These are upland hay meadow, blanket bog, fen and purple moor grass and rush pasture. There are also a range of other habitats of high and medium distinctiveness present. This results in a very high potential loss per hectare.</p> <p>Given the extent and distribution of habitats of biodiversity value, the potential for a design solution to avoid these is low.</p>
[✂]	5.52	0.78	The majority of the area within the defined boundary is developed land with no biodiversity value, with the remainder being low biodiversity value pasture.
[✂]	119.92	4.43	<p>Approximately 1.39ha of irreplaceable habitat present (allotted to fen habitat). Habitat should be avoided through design.</p> <p>The presence of other habitats of high and medium distinctiveness within the defined area also help ensure a relatively high potential loss per hectare for this option.</p>
[✂]	98.49	2.96	<p>Approximately 0.43ha of irreplaceable habitat present (allotted to fen habitat). Habitat should be avoided through design.</p> <p>Although there are several other habitats of high and medium distinctiveness within the defined area, the potential losses per hectare are somewhat managed as they cover only a relatively small percentage of the area.</p>

4.1.2 It should be noted that Option WR159 (Individual Reservoirs Compensation Release Control) has not been assessed at this stage as the required information is not available. This option requires new penstock arrangements to be constructed at 76 different reservoirs. It is assumed from the information that is available that this would involve changes to existing infrastructure and would not result in the loss of semi-natural habitat, or any losses would be very small. Therefore, little or no BNG provision would be necessary.

- 4.1.3 The ABHU shown in **Table 4** are driven both by the extent of habitat loss and the types of habitat present within the defined area of each option. The potential loss per hectare reflects the types of habitat present. Both of these measures are important considerations when seeking to minimise biodiversity loss, whilst also managing the potential financial and delivery risks associated with providing BNG. **Table 5** below provides the options listed in groups, with those most favourable from the BNG perspective being in Group 1. The groups are defined by following the scoring system below:
- ABHU of 100 or below (1 point), 101 to 200 (2 points) and 201 or above (3 points);
  - ABHU/ha of 3 or below (1 point), 3.01 to 6 (2 points) and 6.01 or above (3 points).
- 4.1.4 Five groups have been identified, scoring cumulatively 2, 3, 4, 5 or 6 points respectively. The higher the combined total, the poorer the potential outcome with respect to BNG, both in terms of biodiversity loss and the effects it may have on financial and delivery risks.
- 4.1.5 Where irreplaceable habitats within a defined area for an option have been identified, these are marked with an \* in **Table 5**. Although bespoke compensation may be offered as part of an application, avoidance through design should be a priority. These habitats, if confirmed as present via field survey, pose a risk to consent and are likely to be costly and difficult to compensate for.

Table 5 SRO groupings with regard BNG scoring

SRO	ABHU points	ABHU / ha points	Outcome
[✂]	1	1	Group 1*
[✂]	1	1	Group 1
[✂]	1	1	Group 1
[✂]	1	1	Group 1
[✂]	1	1	Group 1
[✂]	1	1	Group 1
[✂]	1	1	Group 1
[✂]	1	1	Group 1
[✂]	1	1	Group 1
[✂]	1	1	Group 1*
[✂]	2	1	Group 2
[✂]	1	2	Group 2
[✂]	1	2	Group 2*
[✂]	1	2	Group 2
[✂]	1	2	Group 2
[✂]	1	2	Group 2
[✂]	2	2	Group 3*

SRO	ABHU points	ABHU / ha points	Outcome
[✂]	3	1	Group 3*
[✂]	3	1	Group 3
[✂]	2	2	Group 3
[✂]	2	2	Group 3*
[✂]	3	2	Group 4*
[✂]	2	3	Group 4
[✂]	3	3	Group 5*
[✂]	3	3	Group 5*
[✂]	3	3	Group 5*

4.1.6 For the UUS SRO options, ten are within Group 1 suggesting that the ability to limit the loss of biodiversity and achieve an efficient delivery of BNG is high. A further six options lie within Group 2 and five within Group 3; it is likely that detailed design focused on minimising the loss of high value habitats and limiting the construction footprint would ease the financial and delivery risks of BNG for these options. The six options split between Groups 4 and 5 do not provide attractive options from a BNG perspective. However, it is likely that some reduction of the impacts and financial and delivery risks could be achieved through design.

## 4.2 Natural Capital Assessment

4.2.1 The results of the NCA are presented in full in the accompanying spreadsheet [✂] The assessment has shown that:

- Any option that will involve permanent land-take, on land that is not currently a sealed surface (i.e. has any kind of habitat present), will result in a loss of natural capital to some extent. However, for options requiring only small amounts of land-take (e.g. a new borehole), the loss will be very small, particularly if high-potential habitats are avoided. These cases have still been assigned a score of -1 for completeness; it is still important to recognise these losses, to acknowledge the cumulative effect that all small changes contribute towards.
- The greatest level of disbenefit to natural capital (i.e. a score of -2) is likely to be associated with options that involve the disturbance of significant extents of woodland or wetland. Options requiring, in theory, only temporary and relatively limited disturbance to those habitats (e.g. for pipe laying), have only been assigned a -1, in accordance with the criteria in **Appendix A**, although there is some uncertainty about the extent to which the current habitat would be disturbed and if or how it could be restored. Where temporary disturbances are spatially extensive in areas of woodland or wetland, a score of -2 has been assigned.
- In general, impacts on recreation and tourism are likely to be relatively minor, and temporary. The construction activities, involving short-term impacts on habitat extent and quality, may be noticeable and temporarily detrimental to the public. This is particularly the case in tourism-rich areas such as the Lake District National Park and UNESCO World Heritage Site and the Peak District National Park, where open landscapes may be disrupted by pipe laying and other construction activities. [✂]

- In general, the information available only allows disbenefits to be identified with any confidence. Only in one instance (for Option WR159) has a positive benefit score been assigned. This is in relation to water regulation, where the option has a clear consequence of more water being retained in the environment. However, other opportunities for benefit do potentially exist, as discussed further in **Section 5**.

4.2.2 The total disbenefit scores are summarised in **Table 6**, as calculated by summing the individual scores (of 0, -1 or -2 each). A higher disbenefit score may be taken to indicate a greater impact on natural capital overall, although the spatial scale may vary between options.

4.2.3 A summary of total benefit scores is provided in **Table 7**. As noted above, this applies only to a single option, and relates to improved control of compensation releases, allowing reservoir storage to be more effectively managed.

Table 6 Summary of total disbenefit scores for each option

Total disbenefit score	Options
-1	[X]
-2	[X]
-3	[X]
-4	[X]
-5	[X]
-6	[X]
-7	[X]
-8	[X]
-9	[X]

Total disbenefit score	Options
-10	[✂]

Table 7 Summary of total benefit scores

Total disbenefit score	Options
0	[✂]
+1	[✂]
+2 or more	[✂]

## 5. Opportunities

### 5.1 Opportunities to Deliver Gains in Biodiversity

5.1.1 BNG is provided through the enhancement or creation of habitats. These habitats can be both within any necessary planning boundary or elsewhere, although those at greater distances are worth less due to a spatial risk multiplier applied by the metric (to encourage local provision). All habitats that are restored (e.g. restoration of an arable field) or are created for other purposes (e.g. screening a water treatment works, providing additional foraging habitat for badgers affected by development etc.) all have biodiversity value. Therefore, designing these to deliver maximum biodiversity benefit as defined within the metric, reduces any shortfall for the provision of a target level of BNG.

5.1.2 BNG can be delivered in a number of ways. Given that the majority of land crossed by utilities is not fully controlled by UU (i.e. a wayleave is in place to operate and maintain the infrastructure) it is considered unlikely that major land use change within the planning boundary will be implemented (e.g. arable fields will be restored for future farming activity). The potential to compulsory purchase land for BNG provision is uncertain. As BNG can be provided off-site, compulsory purchase has largely been assumed as being unachievable to deliver it. However, the Secretary of State's decision to grant these powers for the delivery of BNG as part of a Development Consent Order (against advice from the Planning Inspectorate) for Cleve Hill Solar Farm challenges this assumption. Given the potential challenges that pursuing this path would elicit, it is not considered as an option below. Therefore, the following options are available:

- Habitat enhancement / creation across non-operational land surrounding existing UU facilities (preferably those that are associated with the chosen option(s) or are in the near vicinity). This could include the enhancement and subsequent change in the management of grassed areas and woodland screens surrounding water treatment works. The habitat enhancement / creation and subsequent management could be delivered directly or through agreement with a third party (e.g. a Wildlife Trust).
- Direct agreement with one or more landowners to deliver BNG; landowners could include wildlife charities, local authorities and private land holders such as farmers. This would require a legal agreement to be reached that would be underpinned by plans to create/enhance,

adaptively manage and monitor the measures over a period of 30 years (this is the time period described in the Environment Bill). These agreements would need to be legally secure (potentially underpinned with conservation covenants) and available for scrutiny by the relevant local planning authority.

- The buying of relevant biodiversity units from one or more providers of biodiversity units on the open market. The system, to be legislated for within the Environment Bill, allows for the creation of a market in biodiversity units. The details of this market (which will likely have local variation) is currently unclear but is beginning to develop in and across various local authority areas through calls for available land and development of systems to secure and allot the net gains.
- Should there be a shortfall in available units on the open market, central government will offer strategic biodiversity units for purchase (funding then being used to deliver local net gain). These units are likely to be more expensive than any locally based market, in order to discourage their usage.

5.1.3 It should be noted that the restoration of land following construction will count within the calculation of BNG. Therefore, opportunities to improve the baseline situation should be explored wherever possible.

## 5.2 Opportunities to Deliver Gains in Natural Capital

5.2.1 Opportunities that deliver BNG are likely also to deliver gains in natural capital, at least to some extent. For example, creation of new areas of woodland would increase the potential for carbon sequestration and flood regulation (as well as other ecosystem services that have not been assessed here, such as air quality). Enhancements to the condition of existing habitats can also, in some cases, provide improvements to these types of regulating ecosystem services.

5.2.2 Where more substantial areas of habitat enhancement or creation are proposed, there may be situations where this provides the potential to enhance recreation and tourism opportunities, for example, if public access could be improved.

5.2.3 Opportunities for enhancing biodiversity and natural capital may often be best realised through integration with wider schemes, for example by working with Catchment Partnerships or other regional nature recovery schemes. This will enable both improved connectivity and efficiency, increasing the effectiveness of measures at individual locations.

5.2.4 Most obviously in relation to strategic resource options (in general), there is potential to deliver gains to the water regulation ecosystem service. This has only been directly recognised as a benefit in the assessment for Option WR159 (compensation release controls), which would allow improved retention of reservoir storage. However, other options may also be enabling wider environmental improvements, by allowing reductions in abstraction elsewhere.

## 6. Next Steps

6.1.1 This Technical Note has presented the findings of the initial NCA and BNG Assessment of the UUS SRO options being taken forward at Gate 1. In accordance with the ACGW guidance, further NCA and BNG Assessment of the options will be undertaken prior to Gate 2 and will:

- reflect the assessment methodologies developed for the WRW Regional Plan and WRMP24;
- take account of the further investigations to be undertaken prior to Gate 2, as detailed in the

Environmental Monitoring Plan for the UUS SRO;

- draw upon further, ongoing engagement with regulators and other stakeholders to identify opportunities for BNG and environmental gain. This will include considering opportunities to tie in with other schemes to improve spatial extent and connectivity;
- reflect the most recent available information from UU on the options for the UUS SRO; and
- be undertaken with the most relevant tools for assessment (e.g. Biodiversity Metric 3.0, Natural England's Eco-metric v2).

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## Appendix A: Ecosystem Services Scoring Criteria

Scoring criteria for screening assessment

Ecosystem service	Rating (benefit/disbenefit)	Definition	Relevant habitats
<b>Carbon sequestration</b>	0	No change or Temporary change to habitat with low potential	Semi-natural grassland; urban; enclosed farmland; mountain, moor and heath.
	1	Permanent Change to habitat with low sequestration potential or Small scale temporary change to habitat with high potential.	Semi-natural grassland; urban; enclosed farmland; mountain, moor and heath.  Woodland, wetlands, coastal.
	2	Permanent change to woodland or habitat with high sequestering potential	Woodland, wetlands, coastal.
<b>Water purification</b>	0	No change or Temporary change to terrestrial habitats.	Woodland; semi-natural grassland; urban; enclosed farmland; mountain, moor and heath.
	1	Permanent change to terrestrial habitat. or Temporary change to rivers and wetlands.	Woodland; semi-natural grassland; urban; enclosed farmland; mountain, moor and heath.  Rivers, wetlands.
	2	Permanent change to rivers and wetlands.	Rivers, wetlands.
<b>Water regulation</b>	0	No change	Rivers.
	1	Change to water availability in a waterbody where the hydrology supports Good status.	Rivers.
	2	Change to water availability in a waterbody where the hydrology does not support Good status.	Rivers.
<b>Natural hazard regulation</b>	0	No change or Temporary change to habitat with low potential for natural hazard regulation.	Urban; enclosed farmland; mountains moors & heaths; semi-natural grassland
	1	Permanent change to habitat with low potential for natural hazard regulation.	Urban; enclosed farmland; mountains moors & heaths; semi-natural grassland

		or	
		Temporary change to habitat with high potential for natural hazard regulation.	Woodland; rivers and wetlands; coastal
		or	
		Temporary change to any habitat within a floodplain.	
	2	Permanent change to habitat with high potential for natural hazard regulation.	Woodland; rivers and wetlands; coastal
		or	
		Permanent change to any habitat within a flood plain.	Any habitat
<b>Recreation and tourism</b>	0	No change	Any habitat
		or	
		Temporary change to land access for the public.	
	1	Temporary change to recreational use.	Any habitat
		or	
		Temporary or minor change to landscape.	
		or	
		Permanent change to land access for the public.	
	2	Permanent change recreational use.	Any habitat
		or	
		Permanent major change to landscape.	