Environment Agency

Solway Tweed Flood Risk Management Plan

Habitats Regulations Assessment

December 2022

We are the Environment Agency. We protect and improve the environment.

We help people and wildlife adapt to climate change and reduce its impacts, including flooding, drought, sea level rise and coastal erosion.

We improve the quality of our water, land and air by tackling pollution. We work with businesses to help them comply with environmental regulations. A healthy and diverse environment enhances people's lives and contributes to economic growth.

We can't do this alone. We work as part of the Defra group (Department for Environment, Food & Rural Affairs), with the rest of government, local councils, businesses, civil society groups and local communities to create a better place for people and wildlife.

Published by:

Environment Agency
Horizon House, Deanery Road,
Bristol BS1 5AH

www.gov.uk/environment-agency

Further copies of this report are available from our publications catalogue: www.gov.uk/government/publications or our National Customer Contact Centre: 03708 506 506

Email: enquiries@environment-agency.gov.uk

Table of Contents

1. Non-Technical Summary

Introduction

1.1 This is the Habitats Regulations Assessment (HRA) of the Solway Tweed River Basin District (RBD) Flood Risk Management Plan (FRMP). The HRA has been undertaken in accordance with The Conservation of Habitats and Species Regulations (The Habitat Regulations) 2017 (as amended) and considers the potential implications of the FRMP on designated European conservation sites. These sites contain species and habitats that are important at a European scale.

1.2 The FRMP, covering the years between 2021 and 2027, seeks to manage significant flood-related issues in the Solway Tweed RBD. It covers an area of 17,500 km^2 in parts of Cumbria and Northumberland. The FRMP seeks to reduce a range of flooding threats, including from rivers, the sea, surface water, groundwater and sewers / canals / reservoirs.

1.3 The need for protecting human receptors should be viewed in the context of the environmental challenges present in the Solway Tweed RBD. Many geographic areas in the RBD are experiencing growth and need to mitigate climate change. Therefore, many freshwater and coastal habitats in the RBD, important in sustaining wintering wildfowl, fish populations and terrestrial species (e.g. otters), are subject to a wide range of human impacts, such as recreational pressure, reduced water flow / level, declining water quality and coastal squeeze. This HRA assesses the potential for the Solway Tweed FRMP to result in Likely Significant Effects (LSEs) and, where applicable, adverse effects on the integrity of European sites (i.e. the ability of those sites to achieve their conservation objectives).

Methodology

1.4 The Habitats Regulations 2017 (as amended) set out the specific assessment steps required for the HRA process.

1.5 The first step in the sequence of tests, often referred to as HRA screening, establishes whether a more detailed analysis known as Appropriate Assessment is required. The purpose of HRA screening is to determine, in view of the best available scientific knowledge, whether a plan or project, either alone or in-combination with other plans or projects, could result in (LSEs) on European sites in view of their Conservation Objectives.

Test of Likely Significant Effects

1.6 All measures included in the Solway Tweed RBD were assessed for LSEs on the European sites across and within 10km of the RBD. None of the measures were identified to result in LSEs on any European site for a range of reasons, including that they are too non-specific to assess meaningfully, already being implemented (thus having undergone HRA previously), being subjected to a separate consenting process (as applies to Local Flood Risk Management Plans, Shoreline Management Plans (SMPs) and Coastal Strategies), desk-based and involving no physical activity on the ground, remote from vulnerable sites or worded such they are about ‘investigating’, ‘reviewing’ and ‘identifying opportunities’.

1.7 One group of measures was found to commit to physical work on the ground by 'delivering' or 'implementing' flood management interventions, such as coastal defence structures or natural flood management approaches. The broad location of some measures, is known, enabling a broad assessment of their proximity to European sites and potential linking impact pathways. However, detailed HRA (including Appropriate Assessment) was deferred to either lower-tier plans or the planning application stage when details on the nature of proposals are available. This approach was adopted to account for the strategic (and thereby necessarily non-specific) nature of the FRMP, while also identifying the measures with the highest impact potential on European sites.

1.8 This document also identified that a range of measures in the Solway Tweed FRMP have the potential to improve the hydrological condition of European sites across the RBD, particularly with regard to the numerous bog sites that have unfavourable drainage and the measure in the FRMP to 'Collaborate with environmental partners and major landowners to significantly increase upland and lowland peat and wetland restoration in northern England to reduce flood risk, restore natural habitats and allow for carbon sequestration to counter the impacts of climate change'. Increasing peat and wetland restoration would help to rectify the existing deteriorating situation.

Other Plans and Projects

1.9 The potential for the FRMP to result in LSEs on European sites in-combination with (i.e. when considered alongside) other plans and projects was also assessed. Many such plans are proposed across the RBD, which are associated with their own impact potential. For example, local authorities are proposing a minimum of 50,000 new dwellings within the timescales of their current Local Plans and Core Strategies. There is also a potential for cumulative impacts with Water Resource Management Plans and SMPs.

1.10 Potential in-combination LSEs with Local Plan development were excluded due to most measures not being negatively linked to European sites, the fact that some measures are only included for completeness being driven by entirely separate plan processes, and the strategic nature of the FRMP, meaning that those measures with potential interactions with European sites depend upon considerable further development before the presence of any impact pathways can be clearly identified and are too high-level and non-specific to allow for an in-combination assessment.

Conclusion

1.11 LSEs of the FRMP on all European sites, both alone and in-combination, were excluded for all measures and an Appropriate Assessment was not required. This was based on various factors, including some measures being carried over from the cycle 1 FRMP (which would have been subject to the statutory consenting process, including HRA), already implemented, not associated with impact pathways linking to European sites or too non-specific (either in terms of specific location, their nature or both) to allow for a detailed, meaningful assessment.

1.12 Notably, 10 measures were screened out at the strategic FRMP level but recommended for down-the-line HRA since the measures are sufficiently broadly expressed that they could be delivered without adverse effects but this will need to be reassessed as actual schemes are developed. As the details of potential schemes are developed towards the planning application stage, the HRA process will ensure

that adequate mitigation measures, where relevant, are incorporated and the integrity of European sites will be protected.

2. Introduction and Approach to Assessment

Background and Description of the Solway Tweed River Basin District

2.1 The Solway Tweed river basin is a cross border river basin that includes Scottish and English waterbodies that flow into the Solway and Tweed estuaries. The river basin is jointly managed by the Environment Agency and the Scottish Environment Protection Agency. This Flood Risk Management Plan (FRMP) covers the English portion of the Solway Tweed River Basin District (RBD) only.

2.2 The river basin has an area of around 17,500km^2, and incorporates the Scottish Borders, Dumfries and Galloway and parts of Cumbria and Northumberland. The river basin includes the important salmon rivers of the Tweed, the Eden and those within Dumfries and Galloway. The natural characteristics of these waters vary considerably from upland streams running over granite rocks to the wide-open mud flats of the Solway estuary.

2.3 The area is home to approximately 450,000 people and important economic activities include:

- agriculture
- tourism
- forestry
- manufacturing

2.4 The water environment is a major part of the Solway Tweed's best known and loved landscapes, including parts of the Southern Uplands and the Lake District and Northumberland National Parks. The river basin is largely rural and supports a wide range of internationally important habitats and wildlife with many of the waterbodies designated as Special Areas of Conservation and Special Protection Areas. There are no Flood Risk Areas (FRAs) within the English portion of the Solway Tweed RBD.

2.5 The Environment Agency leads development of the Flood Risk Management Plans (FRMP) for River Basin Districts in England and delivery of flood warning services. The draft second cycle FRMP is a plan to manage significant flood risks in designated flood risk areas (FRAs). The ambition is that the FRMP is a strategic, place-based plan which shows what is happening in flood risk management across the River Basin District. FRMPs focus on the more significant areas of flooding and describe the risk of flooding now and in the future. These plans will help:

- identify actions that will reduce the likelihood and consequences of flooding update plans to improve resilience whilst informing the delivery of existing flood programmes
- work in partnership to explore wider resilience measures, including nature-based solutions for flood and water
- set longer-term, adaptive approaches to help improve the nation’s resilience

2.6 This document forms the Habitats Regulations Assessment (HRA) for the Solway Tweed FRMP. This document considers the potential effects of the draft FRMP on Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites, either alone or in combination with other plans or projects, and in view of best scientific knowledge.

Legislative context

2.7 The National Site Network of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) is protected via the Conservation of Habitats and Species Regulations 2017 (as amended, most recently in 2019 to reflect Brexit). These regulations also set out the process for assessing potential adverse effects on such sites, known as HRA. Paragraph 181 of the National Planning Policy Framework[1] clarifies that, in England, the HRA process is also applied to another category of internationally important wildlife site called Ramsar sites.

2.8 The legislative basis for HRA is set in the Conservation of Habitats and Species Regulations 2017 (as amended). This states that 'A competent authority, before deciding to … give any consent for a plan or project which is likely to have a significant effect on a European site … shall make an appropriate assessment of the implications for the site in view of that sites conservation objectives… The authority shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site'.

2.9 The competent authority that carries out the HRA (in this case the Environment Agency) is required to apply the precautionary principle to European sites and can only adopt a plan once it has been ascertained that it will not adversely affect the integrity of the site concerned. However, even if significant adverse effects on the designated site are predicted, and in the absence of a suitable alternative solution, the plan can still be adopted in exceptional circumstances where there are deemed sufficient imperative reasons of over-riding public interest (IROPI). In such cases, however, compensatory measures must be implemented.

Overview of HRA process

2.10 The Habitats Regulations do not prescribe a particular methodology for carrying out an appraisal of plans or projects. However, it does set out the specific assessment steps involved. In February 2021 the government provided broad guidance on the HRA process[2]. The most detailed guidance on the HRA process in the UK has been produced by Scottish Natural Heritage (now NatureScot). They outline a series of thirteen steps. However, with cognisance of recent case law (refer to Table1) clarifying when mitigation can be taken into account in the HRA process, the process has been revised to constitute eleven stages (see Figure 1).

2.11 A four-stage methodology for HRA would therefore include:

- HRA Stage 1 – screening (including a 'likely significant effect' judgement)
- HRA Stage 2 – appropriate assessment
- HRA Stage 3 – assessment of alternative solutions
- HRA Stage 4 – assessment where no alternative solutions exist and where adverse effects remain (i.e. consideration of Imperative Reasons of Overriding Public Interest (IROPI)) and identification of compensatory measures

2.12 The first step in the sequence of tests is to establish whether an appropriate assessment is required. This is often referred to as HRA screening. The purpose of HRA screening is to determine, in view of best available scientific knowledge, whether a plan or project, either alone or in combination with other plans or projects, could have likely significant effects (LSE) on a European site, in view of that site's conservation objectives.

2.13 For this purpose, and as a result of case law 'likely' means 'possible', while a 'significant' effect is one which could undermine the Conservation Objectives of a European site. To this end the HRA process applies the 'Precautionary Principle'[3] to European sites. If the competent authority determines that there are no LSE (including 'in combination' effects from other plans or projects), then no further assessment is necessary and the plan or project can, subject to any other issues, be taken forward. If, however, the competent authority determines that there are LSE, or if there is reasonable scientific doubt, then the next step in the process must be initiated and a detailed appropriate assessment undertaken. While a judgment over likely significant effects must be precautionary, the court in R (Boggis) v Natural England [2009] EWCA Civ 1061 also noted that there must be a 'real', rather than a hypothetical, risk to European sites.

2.14 This is relevant to the assessment of the FRMP measures; while many measures commit to the production, update and/or delivery of other plans (such as Water Level Management Plans, WLMPs), or the assessment of options for, or a general commitment to, flood risk management assets in certain locations, the ability to identify 'real' rather than hypothetical impacts is constrained by the fact that considerable further work is needed at lower tiers to develop the plans or schemes in question before specific impact pathways can be identified with any confidence. For example, whether a given WLMP poses a likely significant effect on a given European site will depend entirely on the proposals it contains, which are not set by FRMP measures that commit to updating WLMPs. Similarly, the potential for likely significant effects to arise from 'implementing flood risk management improvements' will vary significantly depending on what is proposed and how it is to be delivered, which may not be determined at the FRMP level; a set-back flood embankment or a flood relief channel may have no implications for a given European site compared to sheet piling in the river.

2.15 The purpose of the appropriate assessment is to carry out sufficient scientific investigation to ascertain whether the plan or project, alone or in combination with other plans or projects, will not adversely affect the integrity of European sites, in view of their conservation objectives and considering any design modifications or mitigation (but not compensatory measures, which can only be considered in exceptional circumstances when requirements for the above HRA Stages 3 and 4 have been met).

2.16 Plans and projects can only be permitted having ascertained that there will be no adverse effect on the integrity of the European site(s) in question. Plans and projects with predicted adverse impacts on European sites may still be permitted if there are no alternatives to them and there are Imperative Reasons of Overriding Public Interest (IROPI) as to why they should go ahead. In such cases, compensation would be necessary to ensure the overall integrity of the site network. To ascertain whether or not site integrity will be affected, an Appropriate Assessment should be undertaken of the plan or project in question.

2.17 Over time the term HRA has come into wide currency to describe the overall process set out in the Regulations from screening through to IROPI. This has arisen in order to distinguish the process from the individual stage described in the law as an 'Appropriate Assessment'.

2.18 The HRA has been carried out being mindful of the implications of European case law in 2018, notably the Holohan ruling and the People over Wind ruling, both discussed below.

Figure 1. Stages of the HRA process (adapted from SNH (2015))

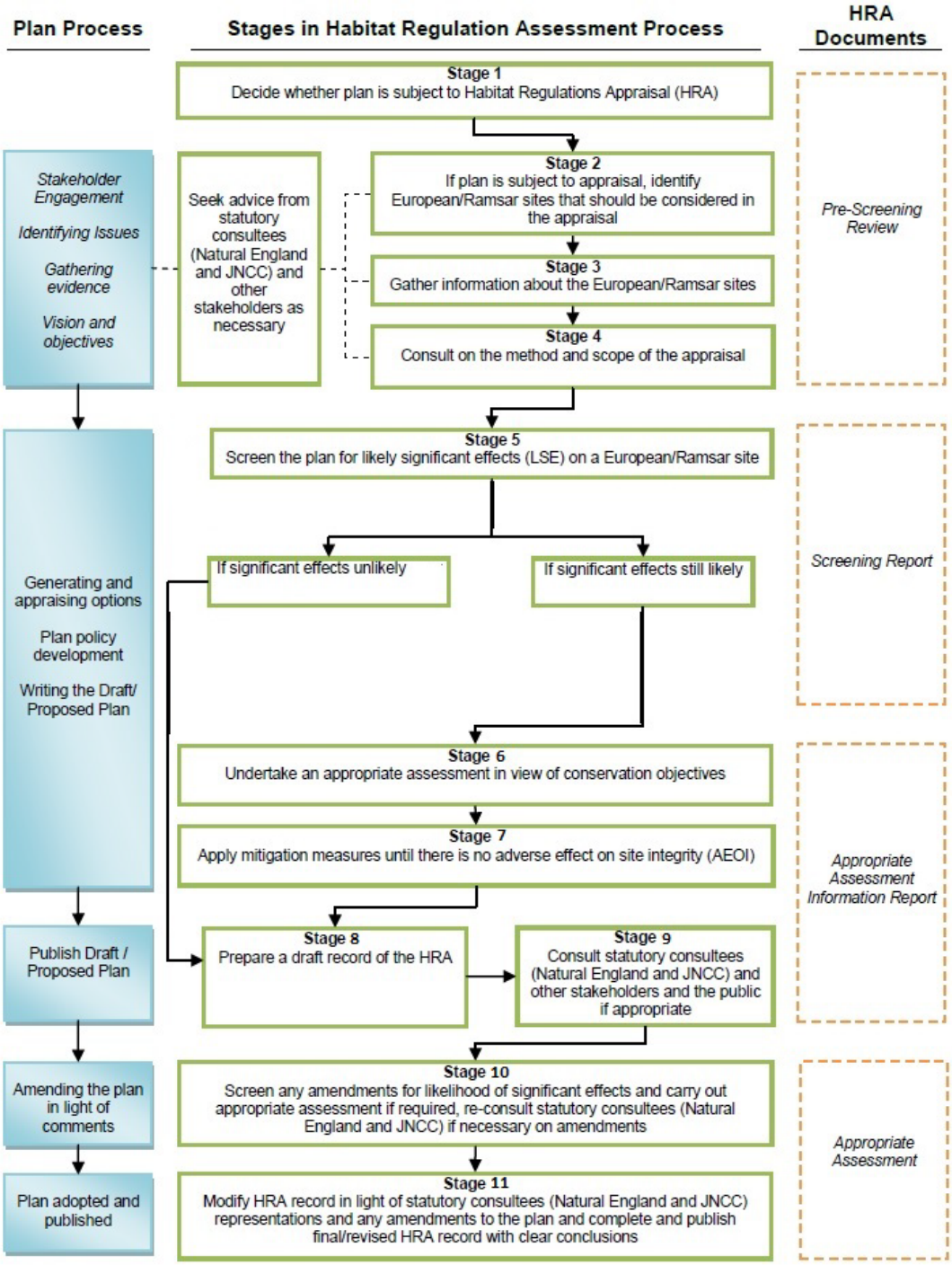


Figure 1 accessible description

Figure 1 shows the plan process, stages in Habitat Regulation Assessment process and HRA documents involved in the HRA process.

The first part of the plan process involves stakeholder engagement, identifying issues, gathering evidence and the vision and objectives. Advice may be needed from statutory consultees, such as Natural England and JNCC, and other stakeholders as necessary. The stages include:

1. Decide whether the plan is subject to Habitat Regulations Appraisal.
2. If the plan is subject to appraisal, identify European and Ramsar sites that should be considered in the appraisal.
3. Gather information about European sites and Ramsar sites.
4. Consult on the method and scope of the appraisal.

A pre-screening review document is needed for stages 1 to 4.

The second part of the plan process involves generating and appraising options, planning policy development and writing the draft/proposed plan. The stages include:

5. Screen the plan for likely significant effects (LSE) on a European or Ramsar site. If the significant effects are unlikely, then move on to stage 8. If significant effects are likely, then continue to stage 6.
6. Undertake an appropriate assessment in view of conservation objectives.
7. Apply mitigation measures until there is no adverse effect on site integrity (AEOI).

A screening report is needed for stage 5 and appropriate assessment information report is needed for stage 6 to 9.

The third part of the plan process involves publishing the draft or proposed plan. The stages include:

8. Prepare a draft record of the HRA.
9. Consult statutory consultees (Natural England and JNCC), other stakeholders and the public if appropriate.

The fourth part of the plan process involves amending the plan in light of comments. This includes stage 10:

10. Screen any amendments for likelihood of significant effects and carry out appropriate assessment if required, re-consult statutory consultees (Natural England and JNCC) if necessary, on amendments.

An appropriate assessment document is needed for stage 10 and 11 of the plan process.

In the fifth and final part of the process the plan is adopted and published. This includes stage 11:

11. Modify HRA record in light of statutory consultees (Natural England and JNCC) representations and any amendments to the plan and complete and publish final/revised HRA record with clear conclusions.

Relevant case law

2.19 As a consequence of the UK's exit from the EU, it was necessary for various amendments to be made to the Habitats Regulations. These changes were required to ensure that England and Wales (and Scotland through separate regulations) continue to maintain the same standard of protection afforded to European sites. The Habitats Regulations remain in force, including the general provisions for the protection of European sites and the procedural requirements to undertake HRA. The changes made were only those necessary to ensure that they remain operable following the UK's exit from the EU.

2.20 Although the UK is no longer part of the EU, a series of prior rulings of the Court of Justice of the European Union (CJEU) are relevant and have been considered when preparing this document. These rulings and their implications for this HRA are summarised in Table 1.

Table 1. Case law relevant to the HRA of the FRMP

Case	Ruling	Relevance to the HRA of the FRMP
People Over Wind and Sweetman v Coillte Teoranta (C-323/17)	The ruling of the CJEU in this case requires that any conclusion of 'no likely significant effect' on a European site must be made prior to any consideration of measures to avoid or reduce harm to the European site. The determination of likely significant effects should not, in the opinion of the CJEU, constitute an attempt at detailed technical analyses. This should be conducted as part of the appropriate assessment.	NatureScot has published guidance on the implications of this ruling for HRA (SNH, 2019). It will be necessary to distinguish between those measures which are intended to avoid or reduce harmful effects on a European site and those elements of the flood management plan that may incidentally provide some degree of mitigation, but which are intrinsic or essential parts of the plan itself. SNH advises that intrinsic parts of a plan can be considered at the screening stage of HRA. If it can be concluded that the Flood management plan area will have no adverse effect on any European site, in the absence of mitigation, it will be possible to conclude 'no likely significant effects', and the need for further detailed appropriate assessment will be 'screened out'.

Case	Ruling	Relevance to the HRA of the FRMP
Waddenzee (C-127/02)	The ruling in this case clarified that appropriate assessment must be conducted using best scientific knowledge, and that there must be no reasonable scientific doubt in the conclusions drawn. The Waddenzee ruling also provided clarity on the definition of 'significant effect', which would be any effect from a plan or project which is likely to undermine the conservation objectives of any European site.	Adopting the precautionary principle, a 'likely' effect in this HRA is interpreted as one which is 'possible' and cannot be objectively ruled out. The test of significance of effects has been conducted with reference to the conservation objectives of relevant European sites.
Holohan and Others v An Bord Pleanála (C-461/17)	The conclusions of the Court in this case were that consideration must be given during appropriate assessment to: effects on qualifying habitats and/or species of a SAC or SPA, even when occurring outside of the boundary of a European site, if these are relevant to the site meeting its conservation objectives, and effects on non-qualifying habitats and/or species on which the qualifying habitats and/or species depend and which could result in adverse effects on the integrity of the European site.	This relates to the concept of 'functionally-linked habitat', i.e. areas outside of the boundary of a European site which supports its qualifying feature(s). In addition, consideration must be given to non-qualifying features upon which qualifying habitats and/or species rely.
T.C Briels and Others v Minister van Infrastructuur en Milieu (C-521/12)	The ruling of the CJEU in this case determined that compensatory measures cannot be used to support a conclusion of no adverse effect on site integrity.	Compensation can only be considered at the relevant stage of HRA and not during appropriate assessment. Compensation must be delivered when appropriate assessment concludes that there will be adverse effects on site integrity.

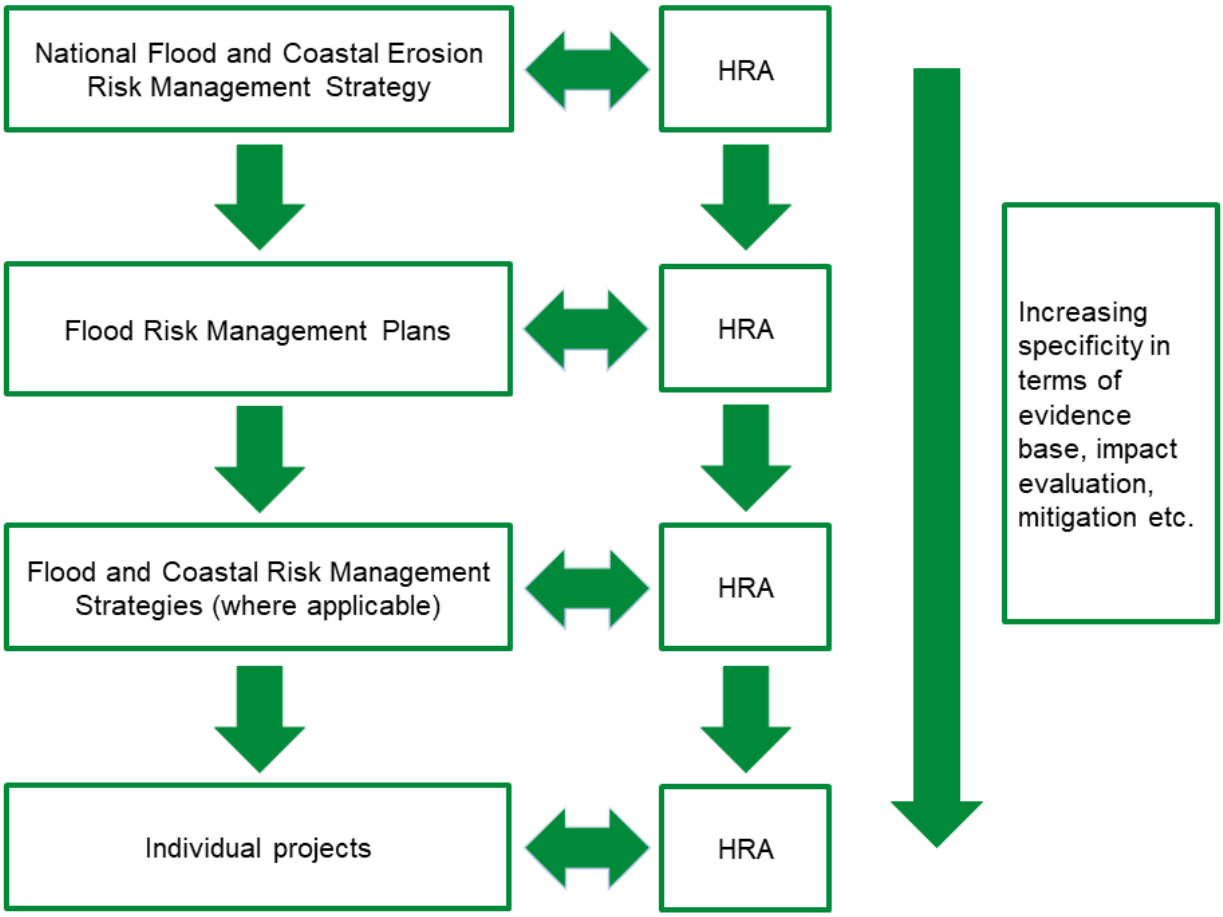
Purpose of this document

2.21 This report forms the HRA of the Solway Tweed FRMP. It has been prepared with regard to best scientific knowledge and an examination of potential impacts of the Flood Risk Management Plan on European Sites.

2.22 Project-related HRA often requires bespoke survey work and novel data generation in order to accurately determine the significance of effects. In other words, to look beyond the risk of an effect to a justified prediction of the actual likely effect and to the development of avoidance or mitigation measures.

2.23 However, there is a tacit acceptance that HRA can be tiered and that all impacts are not necessarily appropriate for consideration to the same degree of detail at all tiers as illustrated in Figure 2 below. Note that some measures in the FRMPs come from other plans and are reflected in the FRMP for consistency and completeness.

Figure 2. Tiering in HRA of Land Use Plans



2.24 In any strategic plan, there are numerous measures for which there is a limit to the degree of assessment that is possible at this plan level. This is because either:

- the measure in question does not contain any specific details describing what will be delivered or where so literally cannot be assessed in detail at the plan level
- development of a specific type is identified but the nature of the potential impacts are dependent on exactly how the development will be designed and constructed and therefore cannot be assessed in detail at the plan level but rather at the scheme level

2.25 For example, NatureScot has published guidance[4] that indicates a measure or initiative in a higher tier plan can be screened out without further analysis if:

a. they are intended to protect the natural environment

b. they will not themselves lead to development or other change

c. they make provision for change but could have no conceivable effect on a European site

d. they make provision for change but could have no significant effect on a European site, or

e. effects on any particular European site cannot be identified because the measures are too general or lack any spatial definition

2.26 Similarly, the Habitats Regulations Assessment Handbook[5] sets out three criteria in section F.10.1.5, that it considers would make it reasonable to defer further assessment to a lower tier plan or project:

a. the higher level plan assessment cannot reasonably predict any effect on a European site in a meaningful way

b. the lower level plan or project, which will identify more precisely the nature, timing, duration, scale or location of the measure, and thus its potential effects, will have the necessary flexibility over the exact nature, timing, duration, scale and location of the measure to enable an adverse effect on site integrity to be avoided

c. the HRA of the lower tier plan or project is required as a matter of law or government policy

2.27 In these cases, the HRA focusses on setting down-the-line requirements for more detailed assessment at the scheme level that can be included in the plan to ensure that whatever proposals come forward will not result in adverse effects on integrity. On these occasions the advice of Advocate-General Kokott[6] should be considered. She commented that: 'It would …hardly be proper to require a greater level of detail in preceding plans [rather than planning applications] or the abolition of multi-stage planning and approval procedures so that the assessment of implications can be concentrated on one point in the procedure. Rather, adverse effects on areas of conservation must be assessed at every relevant stage of the procedure to the extent possible on the basis of the precision of the plan. This assessment is to be updated with increasing specificity in subsequent stages of the procedure**'**.

2.28 Similarly, published EU guidance on HRA states: 'Where one or more specific projects are included in a plan in a general way but not in terms of project details, the assessment made at plan level does not exempt the specific projects from the assessment requirements of Article 6(3) at a later stage, when much more details about them are known.'[7]

2.29 It is also important to consider the approach taken regarding coastal defence schemes and strategies. The stance throughout all FRMP HRAs is that, provided measures are already covered by the SMP/Coastal Strategy process or another HRA process, then these measures are effectively included in the FRMPs for completeness. The FRMPs are not the source plans for these schemes and they are already committed elsewhere. The SMP and Coastal Strategies will be updated as part of their normal cycle and that will include revision to their HRAs which will take account of any changes in evidence. Each scheme will also have its own HRA before it is consented. In these cases, the DTA handbook states that plan elements can be screened out if they have, or will be subject to, HRA under another plan and this plan (the FRMP) would not materially change if they were omitted.

2.30 This is the approach taken in the HRA of the FRMP to avoid confusing the FRMP with other plan processes (such as Shoreline Management Plan (SMP) and Coastal

Strategy processes) that have their own separate HRA, or the individual schemes that are referenced in the FRMP and will be taken forward subject to significant further work including outline design, detailed design, securing of funding, community consultation and securing of necessary consents and permits. The fact that a scheme is referenced in the FRMP does not prejudge the down-the-line permitting processes.

The 'in Combination' Scope

2.31 It is a requirement of the Habitats Regulations that the impacts and effects of any land use plan being assessed are not considered in isolation but in combination with other plans and projects that may also be affecting the European site(s) in question.

2.32 When undertaking this part of the assessment it is essential to bear in mind the principal intention behind the legislation, i.e. to ensure that those projects or plans which in themselves have minor impacts are not simply dismissed on that basis but are evaluated for any cumulative contribution they may make to an overall significant effect. In practice, in combination assessment is therefore of greatest relevance when the plan would otherwise be screened out because its individual contribution is inconsequential. The overall approach is to exclude the risk of there being unassessed likely significant effects in accordance with the precautionary principle. This was first established in the seminal Waddenzee[8] case.

2.33 For the purposes of this HRA, in-combination assessment is focussed on the plans and projects identified in the Strategic Environmental Assessment (SEA) Environmental Report of the FRMP. The plans and projects were identified in the SEA as having a significant interaction with the FRMP for biodiversity, flora and fauna and required consideration. The key relevant plans and projects with a potential for in-combination effects are:

- Carlisle Local Plan
- Allerdale Local Plan
- Eden Local Plan
- Northumberland Local Plan
- Dumfries & Galloway Local Development Plan
- Scottish Borders Local Development Plan
- River Basin Management Plan (RBMP) for the Solway Tweed RBD
- North West England and North Wales Shoreline Management Plan (SMP) 2
- Northumbria Shoreline Management Plan 2
- United Utilities Final Water Resources Management Plan 2019
- Northumbrian Water's plan for 2020-2025
- Northern Powerhouse Strategy
- Scottish Solway Tweed RBD FRMP

2.34 The potential for 'in combination' effects between these plans and projects and the FRMP are discussed later in this document.

3. Pathways of Impact

Direct habitat loss

3.1 Any permanent, irreversible, habitat loss from a designated site that will result in the loss of qualifying habitats and / or species, or habitats that support the designated species, will be adverse, although to affect the integrity of the site (the coherence of its structure and function) the loss must be sufficiently adverse that it materially impairs the achievement of the Conservation Objectives for the site.

3.2 Various developments can result in the loss of habitat in European Sites, either temporary or permanent. Temporary habitat loss (e.g. such as due to the need for a construction period footprint to encroach on a site) is potentially reversible depending on what the site is designated for, and there is also potential for deploying mitigation measures to avoid adverse effects on site integrity. In contrast, the permanent loss of designated habitat will result in a reduction of coverage of a potentially very rare ecosystem, with potential knock-on impacts on dependent qualifying species.

3.3 Plans or projects that result in the loss of land from a SAC can be approved in certain situations (please see Defra (2012)[9], even if the loss is sufficient to adversely affect the integrity of an SAC, if three sequential tests are met:

- no feasible alternative solutions to the plan or project exist that are less damaging
- imperative reasons of overriding public interest (IROPI)
- compensatory measures secured to ensure that the overall coherence of the European Site network is maintained

Inappropriate Coastal Management Including Coastal squeeze

3.4 Inappropriate coastal management covers any coastal management activities that would interfere with natural coastal processes to such an extent that they would potentially interfere with the ability of European sites to achieve their conservation objectives. Examples of inappropriate coastal management include:

- Reduced sediment supply to adjacent frontages, resulting in loss of habitat area. For example, defending the Holderness Coast in East Yorkshire results in a reduction in the amount of longshore sediment that would otherwise be transported into the Humber Estuary SAC/SPA/Ramsar site and this in turn could affect the persistence of features that require a continued supply of sediment, such as Spurn Point.
- Presence of flood risk management defences causing habitat erosion seawards of those defences due to wave reflection. This is more of an issue with some types of defence (such as sheet metal piling) than with other types of defence.
- Restriction of the area of intertidal habitat in front of the flood risk management defences.

- Coastal squeeze.

3.5 Coastal squeeze is defined by government as 'the loss of natural habitats or deterioration of their quality arising from anthropogenic structures or actions, preventing the landward transgression of those habitats that would otherwise naturally occur in response to sea level rise in conjunction with other coastal processes. Coastal squeeze affects habitat on the seaward side of existing structures.'[10]

3.6 Measures which involve a 'Hold the Line' approach by establishing a hard structure or maintaining the existing standard of protection by improving the defences, have the potential to result in the loss of seaward habitats as a consequence of coastal squeeze. The process of coastal squeeze prevents the landward transgression of habitats in response to climate change and resulting sea level rise. Over time, unmitigated coastal squeeze would inevitably lead to the cumulative loss of designated habitats and supporting functionally-linked habitats. Coastal squeeze impacts due to measures have already been fully explored and mitigation or compensation quantified if necessary through the SMP and Coastal Strategy process and their HRAs, and through the Flood and Coastal Erosion Risk Management (FCERM) National Strategy 2021 and compensation delivered in the form of the Habitat Compensation Programme. Therefore, coastal squeeze is scoped out of this HRA.

3.7 All the FRMPs contain measures which refer to implementing or updating SMPs or Coastal Strategies or flood and coastal erosion risk management schemes that are contained within those documents. In commenting on the draft version of this report Natural England advised the SMP Health Check documents will include detail on what changes to SMP HRAs will be required to account for (for example) changes in sea level rise predictions. However, these reports have not yet been completed or published, and as such this information is not yet available.

3.8 The approach taken throughout all FRMP HRAs is that, provided such schemes are already covered by the SMP/Coastal Strategy process or another HRA process, these measures are effectively included in the FRMPs for completeness. The FRMPs are not the source plans for these schemes and they are already committed elsewhere. The SMP and Coastal Strategies will be updated as part of their normal cycle and that will include revision to their HRAs which will take account of any changes in evidence. Each scheme will also have its own HRA before it is consented.

Disturbance

3.9 Flood risk management construction works can result in noise or visual disturbance of qualifying species in European sites, both during the construction and operational periods. For example, noise and visual disturbance arising from construction may result in temporary behavioural changes in otters (e.g. disturbance in holts, displacement from specific stretches of the river). Piling noise during construction of defences could displace over wintering or breeding birds for which an SPA is designated. Three of the most important factors determining the magnitude of disturbance from construction schemes appear to be species sensitivity, proximity of the disturbance source and timing / duration of the disturbance.

Birds

3.10 Development schemes (such as those for flood risk management assets) can result in the disturbance of qualifying SPA / Ramsar bird species in European sites or functionally linked habitats and this can apply whatever activity the bird is undertaking, whether nesting, foraging, loafing or roosting. Noise and visual disturbance arising from construction activities may result in behavioural changes (e.g. flight from the nest, cessation of foraging) in birds. Furthermore, post-construction disturbance from site usage, road traffic and operational lighting might also arise. Three of the most important factors determining the magnitude of disturbance appear to be species sensitivity, proximity of the disturbance source and timing / duration of the disturbance. Generally, the most disturbing visual and auditory stimuli are likely to involve irregular, infrequent, unpredictable loud noise events, movements or vibrations. Birds are least likely to be disturbed by activities that involve regular, predictable and quiet patterns of sound or movement. The further any activity is from the birds, the less likely it is to result in disturbance.

3.11 An increasing amount of research on visual and noise disturbance of waterfowl from construction (and other activities) is now available. Both visual and noise stimuli may elicit disturbance responses, potentially affecting the fitness and survival of waterfowl and waders. Noise is a complex disturbance parameter requiring the consideration of multiple parameters, including the fact that it is not described on a linear scale, its nonadditive effect and the source-receptor distance. A high level of noise disturbance constitutes a sudden noise event of over 60dB or prolonged noise of over 72dB. Bird responses to high noise levels include major flight or the cessation of feeding, both of which might affect the survival of birds if other stressors are present (e.g. cold weather, food scarcity).

3.12 Generally, research has shown that above noise levels of 84 dB waterfowl show a flight response, while at levels below 55dB there is no effect on their behaviour[11]. These two thresholds are therefore considered useful as defining two extremes. The same authors have advised that regular noise levels should be below 70 dB at the bird, as birds will habituate to noise levels below this level[12]. The Waterbird Disturbance Mitigation Toolkit published by the Institute of Estuarine & Coastal Studies in 2013, summarises the key evidence base relating to the noise disturbance impact pathway[13]. Generally, noise is attenuated by 6 dB with every doubling of distance from the source. Impact piling, the noisiest construction process of approx. 110 dB at 0.67m from source, will therefore reduce to 67-68dB by 100m away from the source. The loudest construction noise should therefore have fallen to below disturbing levels by 100m, and certainly by 200m, away from the source even without mitigation. Note that this is a rule of thumb and does not obviate the need for application-level noise modelling. However, comparison with baseline noise levels will also be important in any assessment rather than purely using comparison with the 70 dB metric (see paragraph below).

3.13 An alternative approach to assessment is to consider the relative change in the noise levels experienced by birds, rather than an absolute noise threshold. There are no formal guidelines that define a change threshold that is deemed disturbing to waterfowl and waders, but they are thought to have hearing comparable to humans. For humans a change of 3 dB defines the threshold for a change in noise to be perceptible (in other words, a change of 1 or 2 dB cannot be detected by the human ear). However, there is a significant difference between being able to notice that a noise has gotten louder and finding the increase in noise to be sufficiently intolerable that it causes displacement or otherwise significantly disrupts activity. Therefore, 3 dB

may be an excessively precautionary threshold to use for judging disturbance. Due to the logarithmic nature of the decibel scale a change of 5 dB increase at the receptor is approximately a 50% increase in perceived loudness while a 10 dB increase is a doubling in perceived loudness or sound intensity. It is reasonable to assume that an increase of 10 dB would run a high risk of causing adverse impacts to bird behaviour such as flushing, for the duration of exposure.

3.14 Visual disturbance is generally considered to have a higher impact than noise disturbance as, in most instances, visual stimuli will elicit a disturbance response at much greater distances than noise[14]. For example, a flight response is triggered in most species when they are approached to within 150m across a mudflat. Visual disturbance can be exacerbated by workers operating equipment outside machinery, undertaking sudden movements and using large machinery. Some species are particularly sensitive to visual disturbance[15], including curlew (taking flight at 275m), redshank (at 250m), shelduck (at 199m) and bar-tailed godwit (at 163m). In some areas, greater distances have been agreed between Environment Agency and Natural England, at least for purposes of HRA Screening. For example, in the Humber Estuary area have agreed a precautionary distance of 300m for the purposes of assessment of bird disturbance.

Fish / Marine Mammals

3.15 Fish use sound for vital life functions, requiring it for completion of their life cycle as well as maintaining productivity. A review of 115 primary studies (66 of which were investigating fish species) highlights that noise disturbance leads to a wide range of impacts in fish, including their development, anatomy, physiology, stress levels and behaviour[16]. A study comparing the foraging behaviour of perch and roach, found that both species showed significantly fewer feeding attempts when exposed to motorboat noise[17]. For roach, which are better hearing than perch, no habituation to noise occurred over time. In a study of pink snappers (similar to many other commercial species such as tuna, cod and haddock), it was determined that a single seismic air gun with a source noise level of 222.6dB re 1uPa resulted in extensive damage to the ears, with no apparent recovery after 58 days[18]. The impacts of noise may not be immediately visible, as demonstrated by a noise playback experiment on perch, carp and gudgeon. Exposure of the fish to underwater ship noise, resulted in cortisol increases of between 81% to 120% compared to control values[19]. Notwithstanding this evidence, it is important to note that extrapolations from noise impact studies to different settings or species should be made with caution.

3.16 Construction noise also presents a significant threat (both regarding injury and mortality) to marine mammals, including harbour porpoise and grey seals. For example, the density of harbour porpoise has been shown to be significantly reduced for several kilometres surrounding seismic surveys and impact piling activities[20] [21]. Cetaceans produce and receive sound over a great range of frequencies for use in communication, orientation, predator avoidance and foraging. Interference with these important behaviours has the potential to result in significant negative impacts. Harbour porpoise are high frequency cetaceans that have low sensitivity thresholds to impulsive sound sources. Anthropogenic sound has the potential to result in direct effects on the hearing ability of mammals (among other impacts, such as behavioural responses and masking of other underwater sounds), including Permanent Threshold Shifts (PTS) and Temporary Threshold Shifts (TTS)[22]. Some construction works within the marine environment may require Unexploded Ordnance (UXO) detonation, which involves impulsive sound elements stretching over tens of kilometres. In

practice, it is typically not known whether such works will be required. Guidance from the Joint Nature Conservation Committee (as utilised for example in the HRA of the South-West England Marine Plan) confirms that a likely significant effect via underwater noise could affect European sites up to 50km distant depending on the nature of the works.

Hydrology

3.17 The water level, its flow rates and the mixing conditions are important determinants of the condition of European sites and their qualifying features. Hydrological processes are critical in influencing habitat characteristics in wetlands and coastal waters, including current velocity, water depth, dissolved oxygen levels, salinity and water temperature. In turn these parameters indirectly determine the short- and long-term viability of plant and animal species, as well as overall ecosystem composition.

3.18 Many animal species are directly sensitive to hydrological changes, including the drying and excessive flooding of habitat. For example, many species (partially) restricted to the aquatic environment are sensitive to periodic or permanent drying, because this reduces the extent of supporting habitat available. This includes species such as the great-crested newt, southern damselfly, white-clawed crayfish and a diverse array of fish (e.g. Atlantic salmon, river lamprey, sea lamprey). In contrast, excessive flooding can result in sub-optimal water levels for foraging birds, such as small waders. If water is too deep, some species may not be able to access their primary prey species, with potential implications for foraging efficiency.

3.19 Wetland, riverine, estuarine and coastal habitats rely on hydrological connections with other surface water systems. A supply of water within natural limits is fundamental to maintaining the ecological integrity of sites. However, while the natural fluctuation of water levels within narrow limits is desirable, excess or too little water supply might cause the water level to be outside of the required range of plant and animal species. This might lead to the loss of the structure and function of aquatic habitats.

3.20 FRMPs generally propose measures to reduce the magnitude and impacts of potential flooding events. This may involve a wide range of interventions, such as flood defences and natural flood management techniques. If any such measures are delivered in the proximity to hydrology-dependent European sites, they may have implications for the water level in designated site boundaries. For example, a natural flood management intervention delivered immediately upstream of a designated floodplain or waterbody, while intended to restore the hydrological regime to a natural baseline, could reduce the volume of freshwater input to and flooding regime in that downstream European site.

Pollution

3.21 The quality of the water that feeds European sites is an important determinant of the nature of their habitats and the species they support. Poor water quality can have a range of environmental impacts:

- At high levels, toxic chemicals and metals can result in immediate death of aquatic life, and can have detrimental effects even at lower levels, including increased vulnerability to disease and changes in wildlife behaviour.
- Eutrophication, the enrichment of water with nutrients, increases plant growth and consequently results in oxygen depletion. Algal blooms, which commonly

result from eutrophication, increase turbidity and decrease light penetration. The decomposition of organic wastes that often accompanies eutrophication deoxygenates water further, augmenting the oxygen depleting effects of eutrophication. In freshwater ecosystems, plant growth is primarily determined by phosphorus concentrations, which are determined by a wide range of sources, including treated sewage effluent from Wastewater Treatment Works and urban surfaces such as roads.

- Some pesticides, industrial chemicals, and components of sewage effluent are suspected to interfere with the functioning of the endocrine system, possibly having negative effects on the reproduction and development of aquatic life.

3.22 There is an obligation for flood risk protection, management and resilience schemes to consider water quality impacts. Under the Environmental Damage (Prevention and Remediation) (England) Regulations 2015 and the Environmental Permitting (England and Wales) Regulations 2016, it is illegal to pollute watercourses. Individual planning proposals will undergo Preliminary Ecological Appraisal (PEA) or Environmental Impact Assessment (EIA), if identified as Schedule 1 or Schedule 2 proposals by the Town and Country Planning (Environmental Impact Assessment) Regulations 2017. As such, water quality protection measures must by law be introduced on any scheme that could affect the water quality of the river or coastal environment, irrespective of whether part of that environment is designated as an SAC or SPA.

3.23 For this reason, this particular impact pathway has not been used as a basis to screen in measures in this FRMP or identify the need for down-the-line HRA at lower planning tiers, as protecting water quality will be an inherent element in delivery of all measures irrespective of the designation status of linked waterbodies, watercourses and sensitive sites.

Functionally-Linked Land

3.24 While most European sites have been geographically defined in order to encompass the key features that are necessary for coherence of their structure and function, this is not the case for all such sites. Due to the highly mobile nature of waterfowl, it is inevitable that areas of habitat of crucial importance to the maintenance of their populations are outside the physical limits of the European site for which they are an interest feature. However, this area will still be essential for maintenance of the structure and function of the interest feature for which the site was designated and land use plans that may affect this land should still therefore be subject to further assessment. This has been underlined by a recent European Court of Justice ruling (C-461/17, known as the Holohan ruling[23]) which in paragraphs 37 to 40 confirms the need for an appropriate to consider the implications of a plan or project on habitats and species outside the European site boundary provided that those implications are liable to affect the conservation objectives of the site.

3.25 Certain management approaches, while positive for coastal processes, could result in the loss of landward habitats, such as coastal grazing marsh, grassland, reedbeds and arable land. Birds are mobile species and are also dependent on sites outside of formal designations and rely on the availability of a network of feeding and roosting resources over the winter period.

Spread of invasive non-native species

3.26 Invasive non-native species can have detrimental impacts on native species and habitats. Their spread can occur during construction and operation of a development, and via multiple pathways (for example via watercourses or on the treads of construction machinery).

3.27 Under the Wildlife and Countryside Act 1981, as amended, and the Invasive Alien Species (Enforcement and Permitting) Order 2019, it is an offence to cause any plant to spread or grow in the wild outside of its native range. Appropriate biosecurity measures will therefore also be implemented during works carried out during both the construction and operational phases of any scheme to prevent the spread of invasive non-native species, irrespective of whether there are European sites in the vicinity.

4. Test of Likely Significant Effects

4.1 When seeking to identify relevant European sites, consideration has been given primarily to identified impact pathways and the source-pathway-receptor approach, rather than adopting a purely 'zones'-based approach. The source-pathway-receptor approach is a standard tool in environmental assessment. In order for an effect to occur, all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism means there is no possibility for an effect to occur. Furthermore, even where an impact is predicted to occur, it may not result in significant effects (i.e. those which undermine the conservation objectives of a European site). Briefly defined, pathways are routes by which a change in activity can lead to a significant effect upon a European site.

4.2 The likely zone of impact (also referred to as the likely 'zone of influence') of a plan or project is the geographic extent over which significant ecological effects are likely to occur. The zone of influence of a plan or project will vary depending on the specifics of a particular proposal and must be determined on a case-by-case basis with reference to a variety of criteria, including:

- the nature, size / scale and location of the plan
- the connectivity between the plan and European sites, for example through hydrological connections or because of the natural movement of qualifying species
- the sensitivity of ecological features under consideration
- the potential for in-combination effects

4.3 There is no geographical limit beyond which plans need not be considered by HRA. However, as a first step in identifying European sites which may be relevant, a search was made for sites within the River Basin District, or within 10km of the River Basin District. Consideration was then given to their hydrological sensitivity and the potential for them to be connected to flood risk management measures. The European sites identified within this search area is given in Table 2. The locations of these sites are shown on Appendix A. Note that there are numerous European sites within the River Basin District or within 10km of it which are not hydrologically sensitive or likely to be affected by flood defences or are hydrologically sensitive but would not be linked to potential flood risk management activities. These are not listed below as they are scoped out of the HRA process.

4.4 There are clusters of hydrologically sensitive European sites across the Solway Firth River Basin District, which can be divided into freshwater and coastal sites. These European sites are characterised by a gradient in their extent of hydrological dependency. While some sites (e.g. the River Eden SAC) form an integral component of the RBD because they constitute freshwater bodies, others (e.g. Ford Moss SAC) are not themselves freshwater bodies but rely on continuous freshwater input from surface waterbodies and groundwater sources for sustained flooding and / or permanent standing water. A third category of European sites have impeded drainage and rely on freshwater supply from a combination of sources, including groundwater and surface water. Generally, rivers and sites with strong hydrological linkages (e.g. those on floodplains or bisected by major freshwater bodies), are likely to be most at risk from the measures contained in the Solway Tweed FRMP. Regardless, European

sites with less obvious or unclear hydrological connections that rely on extended periods of wetting, are nonetheless included in this assessment.

4.5 Estuarine, coastal and some inland terrestrial European sites have additional sensitivities (beyond hydrology) potentially linking to FRMP measures. For example, marine SPAs, Ramsars and SACs (e.g. Solway Firth SAC/SPA and Northumbria Coast SPA/Ramsar) are designated for, or depend on, intertidal habitats such as Atlantic saltmarshes and mudflats. These estuarine / coastal habitats are under threat from coastal squeeze, whereby development or flood defences immediately inland, prevent their landward migration in response to sea level rise. FRMP measures adjoining these sites have the potential to contribute to habitat loss from estuarine and coastal sites through coastal squeeze. Furthermore, all SPAs / Ramsars, whether inland or on the coast, are sensitive to visual and noise disturbance arising during the implementation period of FRMP schemes, for example due to the presence of construction workers or the use of noisy construction equipment (e.g. piling).

Freshwater European sites

4.6 There are two main concentrations of freshwater sites in the Solway Firth River Basin District, which reflect the fact that this RBD is split into two parts, in the north-west and north-east of England:

- Cumbria – Principally River Eden SAC, as this runs through the Cumbrian part of the River Basin District, although there are also relevant bog and lake SACs such as South Solway Mosses SAC and Lake District High Fells SAC; and
- Northumberland – Principally River Tweed SAC, which forms the north-east boundary of the River Basin District, but also inland bog sites such as Ford Moss SAC.

4.7 None of the measures have been identified to result in likely significant effects on any hydrologically sensitive freshwater sites. This is generally because the measures are:

- too non-specific to assess meaningfully
- already being implemented
- already subjected to a separate HRA process (e.g. a Coastal Strategy or a SMP will have its own HRA process)
- essentially desk-based
- remote from European sites
- worded such that they are about ‘investigating’ or ‘reviewing’ or ‘identifying opportunities for’ interventions, rather than committing to any specific interventions or actions the ground - any specific schemes that subsequently emerge from the investigation/review will be subject to their own down-the-line HRA process

4.8 One group of measures goes beyond ‘investigating’, ‘reviewing’ or ‘identifying’ by committing to ‘delivering’ or ‘implementing’ flood management interventions, making it clear that physical work on the ground will occur. In some instances, particularly for Management Catchment measures, the broad (and, occasionally, specific) location for these measures is known, while details of their implementation are not. Given the absence of details at the FRMP level, and in line with the approach to tiering of HRA set out in Section 2, HRA (including Appropriate Assessment as necessary) must be

deferred to later scheme development, lower tier plans, the outline business case and/or the planning application stage. Measures where this screening outcome applies have been categorised as ‘No Likely Significant Effect, but down-the-line HRA required’. This approach has been adopted to account for the strategic (and thereby necessarily non-specific) nature of the FRMP, while also identifying the measures with the highest impact potential on European sites.

4.9 One broader matter requiring consideration as part of the Likely Significant Effects process is the extent to which any measures, through committing to the status quo, may be contributing to the exacerbation or persistence of an existing water-related problem at European sites. However, for the Solway Tweed region no specific measures have been identified that contain proposals that would reinforce a negative situation, subject to down-the-line HRA for any schemes that may emerge from the numerous studies committed to in the FRMP.

4.10 Although not technically within the remit of HRA, it is nonetheless noted that there are several measures that present opportunities for improving the hydrological situation at European sites in affected areas, in conjunction with nature recovery plans and catchment sensitive farming, particularly as applied to the key foci for hydrologically sensitive European sites in the Solway Tweed region: Cumbria and Northumberland. This is discussed in the following sections within the context of the current hydrological vulnerability of relevant freshwater European sites.

4.11 Although non-specific, the following broad measures applicable to the River Basin District could give rise to initiatives and opportunities to improve European site hydrology:

- ‘Continue to monitor, advise on and work with natural flood processes as far as possible, within identified areas in northern England to ensure the actions are still proportionate to that area's level of flood risk’.
- ‘Exploit opportunities to store water or manage run-off in identified areas in northern England to provide overall flood risk reduction and environmental benefits’.
- ‘Identify and map opportunities to deliver nature-based solutions on Risk Management Authority owned land in northern England to provide a shared resource that can be used to deliver schemes that reduce flood risk and benefit the natural environment’.
- ‘Work in unison to map opportunity catchments for habitat creation and develop a programme for joint delivery in northern England to ensure integrated flood risk is tackled and investment is focussed where there will be greatest socio-environmental benefit’.
- ‘Work together to deliver conventional, innovative and nature-based improvements to flood risk, water and habitat quality in northern England to reduce community flood risk and improve future collaborative working’.

4.12 Between them these measures could provide opportunities to improve the hydrological situation in sensitive European sites as well as protecting homes and economic assets.

4.13 The Site Improvement Plan for the River Eden SAC notes that ‘Diffuse water pollution from agriculture (DWPA) is causing failure of water quality targets on specific tributaries… Inappropriate grazing levels resulting in erosion, loss of bank stability and lack of complex vegetation in the riparian zone all cause stretches of the SAC to

be in unfavourable condition… Physical modification of the river channel has resulted in 176 km of river being included in the Eden River Restoration Strategy as requiring 'Assisted Natural Recovery' or 'Significant Channel Restoration'… ' and includes targets to implement the River Restoration Plan allowing natural hydrogeomorphological processes to occur and maintain and expand wet and riparian woodland.

4.14 This is reflected in the Supplementary Advice on the Conservation Objectives (SACO) for the SAC which states 'The River Eden has been heavily modified in parts, in the past, and has been subject to being straightened, deepened, widened and embanked resulting in the loss of dynamic processes and subsequent loss of range of biotopes which would be associated with an unmodified river. Implementation of the River Restoration Strategy aims to restore naturally functioning geomorphological processes wherever possible'. The latest condition assessment for the underlying SSSI notes that whilst restoration projects have started in other units, there has been no action in Mallerstang. The SACO also notes that '…a significant proportion of the upper catchment is outside of the SAC boundary. These areas are known to generate a significant amount of sediment which in turn impacts upon and adds to that generated within the SAC. The natural sediment regime therefore needs to be restored throughout the whole catchment'.

4.15 Although not specifically associated with the River Eden SAC, the measures listed in paragraph 4.9 above could all be used to advance the restoration requirements of River Eden SAC and assist in the site achieving its conservation objectives.

4.16 The Site Improvement Plan for River Tweed SAC notes that the site has suffered from excessive abstraction and notes that to remedy this, among other things it is necessary to 'incentivise and encourage landowners to construct winter storage reservoirs to reduce water take at low flows'. This could be dovetailed with the FRMP measure to 'Exploit opportunities to store water or manage run-off in identified areas in northern England to provide overall flood risk reduction and environmental benefits'.

4.17 The Site Improvement Plan for South Solway Mosses SAC states that 'Past drainage and industrial scale peat cutting have damaged the natural hydrology of the SAC. Most lagg has been lost to agriculture, and in many places there is no buffer against agricultural use or room for the natural bog hydrology. Restoration work aims to raise water levels and re-wet the peat to recreate peat-forming conditions. Oxidised cut faces, scrub, bracken and Molinia encroachment still persist where appropriate water levels have not yet been restored'. It also contains a target to 'Continue monitoring and research on the South Solway Mosses to inform the future use of techniques in peatland restoration, including revegetation techniques and water level monitoring'. This is reflected in the SACO which states 'The Mosses still suffer from the de-watering effects of boundary drains, often dug into the clay and now maintained to protect the adjacent agricultural land… All these impacts lead to the gradual drying out, shrinkage and gradual erosion of the peat bodies themselves, resulting in the loss of the water holding, peat forming and carbon locking benefits that peatlands provide'. The SSSI condition assessment classifies over 20% of the SAC as unfavourable declining mainly due to poor management such as the continued presence of active drains on the bog leading it to dry out. The Site Improvement Plan also notes that 'The attitudes of the general public towards hydrological restoration work can vary widely due to differences in perspective, misunderstanding or miscommunication. Open engagement with landowners, stakeholders, all partners

and people in the local catchment must become integral to the early stages of any proposals, and throughout projects'.

4.18 Tarn Moss SAC, Walton Moss SAC and Bolton Fell Moss SAC, which are all also in the Solway Tweed RBD, have variable levels of hydrological degradation: the underlying SSSI for Tarn Moss has 'hydrological changes from existing ditches (possible peat wastage)', while the underlying SSSI for Walton Moss and Bolton Fell Moss is '…surrounded by active perimeter drains and extraction areas… with re-wetting management, much of the damaged bog edge has potential to be effective 'hydrological' lagg, despite the current vegetative communities'.

4.19 Within this context it is noted that one of the measures in the Solway Firth FRMP states 'Collaborate with environmental partners and major landowners to significantly increase upland and lowland peat and wetland restoration in northern England to reduce flood risk, restore natural habitats and allow for carbon sequestration to counter the impacts of climate change'. Increasing peat and wetland restoration would help to rectify the existing deteriorating situation. However, it is noted that the map on Flood Plan Explorer restricts this measure to the Cumbria coastal belt and thus the opportunity to extend this to inland peat and wetland sites such as South Solway Mosses SAC, Tarn Moss SAC, Walton Moss SAC and Bolton Fell Moss SAC. This could be addressed in an amendment to the mapping of the FMRP for this measure.

Coastal European sites

4.20 Hydrologically sensitive coastal European sites occupy the Solway Firth, and the entire Northumbria coast within the River Basin District. There are several measures in the Solway Tweed FRMP which refer to implementing or reviewing Coastal Strategies and SMPs. Such plans and strategies present considerable potential for impacts on sensitive coastal sites as set out in Section 3, particularly coastal squeeze, direct habitat loss from coastal defence footprints and (depending on use of land outside SPA boundaries by qualifying wildfowl and waders) loss of functionally-linked land.

4.21 However, the FRMP does not decide the content of either SMP's or Coastal Strategies (including the package of underlying schemes) as these are subject to their own independent development and assessment processes, including HRA. The FRMP's are essentially referencing these strategies and plans to create a complete picture of flood risk management in coastal areas. Therefore, despite the potential SMPs and Coastal Strategies possess for affecting European sites, the FRMP measures relating to those plans will not result in likely significant effects.

4.22 Measures that commit to 'reviewing' SMP's or Coastal Strategies do contain within them the potential to also commit to shaping those plans with a view not simply to managing flood risk to human assets but also positively influencing persistence and/or recovery of coastal habitats. This is not strictly an HRA consideration, since HRA is fundamentally about identifying whether given measures will interfere with the ability of European sites to achieve their conservation objectives, rather than shaping them to positively contribute towards achievement of those objectives. However, those measures could be amended to include reference to shaping the next generation of SMP's and Coastal Strategies to not only take account of the latest sea level rise projections but also opportunities to improve achievement of conservation objectives for the European sites on the relevant frontage.

Table 2. European sites within 10km of the Solway Tweed River Basin District and that are potentially linked to local flood risk management measures

Site name	Qualifying feature(s) (*and latest assessed condition taken from Natural England SSSI search website*[24])	Summary of connectivity with the River Basin District
River Eden SAC	Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels, rivers with floating vegetation often dominated by water-crowfoot, alder woodland on floodplains, white-clawed crayfish, sea lamprey, brook lamprey, river lamprey, Atlantic salmon, bullhead and otter. Underlying SSSI is 22.74% unfavourable no change. This is because one unit is identified as having much hydrogeological restoration potential in the River Restoration Strategy, but whilst projects have started in other units, there has been no action in Mallerstang.	River Eden SAC flows through the RBD and as a riverine site is hydrologically sensitive.
Solway Firth SAC/SPA	SAC is designated for subtidal sandbanks, estuaries, intertidal mudflats/sandflats, reefs, perennial vegetation of stony banks, *Salicornia* and other annuals colonising mud and sand, Atlantic salt meadows, dune grassland, sea lamprey and river lamprey. SPA is designated for a large number of non-breeding waterfowl, waders and seabirds, including red-throated diver, bar-tailed godwit, barnacle goose, pink footed goose, pintail, scaup, oystercatcher, knot and curlew. 0.26% of the underlying SSSI is unfavourable no change and is otherwise favourable or recovering.	SAC and SPA adjoins the RBD and is hydrologically sensitive
South Solway Mosses SAC	Active raised bogs and degraded raised bogs still capable of natural regeneration. Underlying SSSI is 0.24% unfavourable no change and 20.46% unfavourable declining. This is mainly due to poor management such as the continued presence of active drains on the bog leading it to dry out.	Located within the RBD boundary and as bog habitat hydrologically sensitive. However, raised bogs are rainwater fed and won't be affected by FRMP measures.

Site name	Qualifying feature(s) (*and latest assessed condition taken from Natural England SSSI search website*[24])	Summary of connectivity with the River Basin District
Lake District High Fells SAC	Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels, wet heathland with cross-leaved heath, European dry heaths, Alpine and subalpine heaths, juniper on heaths or calcareous grasslands, montane acid grasslands, species-rich grassland with mat-grass in upland areas. Underlying SSSI is 49.22% unfavourable no change, with the remainder favourable or unfavourable recovering.	Located within the RDB boundary and the lakes and wet heathland are hydrologically sensitive.

Site name	Qualifying feature(s) (*and latest assessed condition taken from Natural England SSSI search website*[24])	Summary of connectivity with the River Basin District
Border Mires, Kielder – Butterburn SAC	The SAC is made up of several individual sites running north-east from Carlisle. Designated for its blanket bogs, petrifying springs with tufa formation, European dry heaths, Northern Atlantic wet heaths, transition mires and quaking bogs. The SAC comprises 7 SSSI components: 1) Butterburn Flow SSSI – 100% favourable 2) Caudbeck Flow SSSI – 15.99% unfavourable – recovering; 78.45% unfavourable – no change; 5.56% unfavourable – declining 3) Kielderhead and Emblehope Moors SSSI – 57.87% favourable; 3.79% unfavourable – recovering; 3.15% unfavourable – no change; 35.19% unfavourable – declining 4) Kielder Mires SSSI – 59.85% favourable; 31.16% unfavourable – recovering; 8.99% unfavourable - no change 5) Lampert Mosses SSSI – 100% unfavourable – no change 6) Muckle Moss SSSI – 100% favourable 7) Spadeadam Mires SSSI – 93.46% unfavourable – recovering; 6.54% unfavourable – no change	The Site is partially within the RBD. Transition mires and quaking bogs represent a freshwater ecosystem that is likely to depend on a combination of rainwater and surface water / groundwater. Both Annex I habitat types are hydrologically sensitive.
Tarn Moss SAC	Transition mires & quaking bogs. Underlying SSSI is 6.44% unfavourable no change.	Site is just within the RBD and as bog habitat is hydrologically sensitive.

Site name	Qualifying feature(s) (*and latest assessed condition taken from Natural England SSSI search website*[24])	Summary of connectivity with the River Basin District
Cumbrian Marsh Fritillary Site SAC	Marsh fritillary. Underlying SSSI is 100% favourable.	The SAC is within the RBD. The marsh fritillary inhabits damp grassland on site and is therefore hydrologically sensitive.
Walton Moss SAC/Bolton Fell Moss SAC	Active raised bogs and degraded raised bogs still capable of natural regeneration. Underlying SSSI is 19.74% unfavourable no change, with remainder of site being favourable or recovering.	SAC within the RBD and as bog habitat is hydrologically sensitive. However, raised bogs are rainwater fed and won't be affected by FRMP measures.
North Pennine Moors SAC/SPA	SAC is designated for wet heathland with cross-leaved heath, dry heaths, juniper on heaths or calcareous grasslands, grasslands on soils rich in heavy metals, montane acid grasslands, dry grasslands and scrublands on chalk or limestone, blanket bogs, hard-water springs depositing lime, calcium-rich springwater-fed fens, acidic scree, plants in crevices in base-rich rocks, plants in crevices on acid rocks, western acidic oak woodland and marsh saxifrage. SPA is designated for breeding hen harrier, marsh harrier, golden plover and peregrine falcon. Closest SSSI is Geltsdale & Glendue Fells SSSI, which is 1.51% unfavourable no change with the remainder favourable or recovering.	Beyond the RBD but several SAC features are hydrologically sensitive. However, no hydrological connection to the RBD.
Tweed Estuary SAC	Estuaries, intertidal mudflats & sandflats, sea lamprey, river lamprey. Underlying SSSI is 80.61% unfavourable no change with the remainder favourable or recovering. This seems to be mainly due to water quality particularly diffuse agricultural pollution.	Adjacent to the RBD and as a coastal intertidal site it is hydrologically sensitive.

Site name	Qualifying feature(s) (*and latest assessed condition taken from Natural England SSSI search website*[24])	Summary of connectivity with the River Basin District
Northumbria Coast SPA	Breeding little tern and non-breeding purple sandpiper and turnstone. Closest underlying SSSI (Lindisfarne SSSI) is 50.57% declining and 8.02% unfavourable no change, with the remainder favourable or recovering. This is due, among other considerations, to physical damage and the fact that poor water quality flowing into Budle Bay has resulted in the growth of the macroalgae *Ulva*, which has a direct impact on the feeding habitat of SPA birds.	Adjacent to the RBD and as a coastal intertidal site it is hydrologically sensitive.
Lindisfarne SPA	Breeding roseate tern and little tern and non-breeding whooper swan, greylag goose, light-bellied brent goose, shelduck, wigeon, eider, long-tailed duck, common scoter, red-breasted merganser, ringed plover, golden plover, grey plover, sanderling, dunlin, bar-tailed godwit, redshank. Underlying SSSI (Lindisfarne SSSI) is 50.57% declining and 8.02% unfavourable no change, with the remainder favourable or recovering. This is due, among other considerations, to physical damage and the fact that poor water quality flowing into Budle Bay has resulted in the growth of the macroalgae Ulva, which has a direct impact on the feeding habitat of SPA birds.	Forms the south-east boundary of the RDB and as a coastal intertidal site it is hydrologically sensitive.
North Northumberland Dunes SAC	Embryonic shifting dunes, shifting dunes with marram, dune grassland, dunes with creeping willow, humid dune slacks and petalwort. Underlying SSSI	Adjacent to the RBD and humid dune slacks are somewhat hydrologically sensitive, although they depend on topography and water retention in superficial deposits rather than flooding or the water table.

Site name	Qualifying feature(s) (*and latest assessed condition taken from Natural England SSSI search website*[24])	Summary of connectivity with the River Basin District
Berwickshire & North Northumberland Coast SAC	Intertidal mudflats and sandflats, shallow inlets and bays, reefs, sea caves, grey seal. No underlying SSSI.	Adjacent to the RBD and as a coastal intertidal site it is hydrologically sensitive.
River Tweed SAC	Rivers with floating vegetation often dominated by water-crowfoot, Atlantic salmon, otter, sea lamprey, brook lamprey, river lamprey. Underlying SSSI is 80.61% unfavourable no change with the remainder favourable or recovering. This seems to be mainly due to water quality particularly diffuse agricultural pollution.	Forms part of the western boundary of the RDB and as a riverine site is hydrologically sensitive.
Ford Moss SAC	Active raised bogs. Underlying SSSI is 100% favourable condition.	Within the RBD and as a bog is hydrologically sensitive. However, raised bogs are rainwater fed and won't be affected by FRMP measures.
Holburn Lake & Moss SPA	Non-breeding greylag goose. Underlying SSSI is in 100% favourable or recovering condition.	Within the RBD and as a lake is hydrologically sensitive

4.23 Having identified the European sites within 10km that are likely to be hydrologically linked to flood risk management activities, consideration was next given to the potential impact sources from the FRMP at all stages and pathways to European sites (including those located at distances of more than 10km if there is connectivity) by which effects could arise on qualifying features.

4.24 Based on all possible impacts, pathways, and receptors, the Test of Likely Significant Effects for each measure in the FRMP is undertaken in the tables below.

Table 3. Screening table showing the Test of Likely Significant Effects results for Lead Local Flood Authority (LLFA) national measures contained within all Flood Risk Management Plans

Measure ID	Measure	Likely Significant Effects on European sites
0299999007	Act as a consultee for major planning applications in their area	No likely significant effect – This measure describes the role of LLFAs
0299999011	Designate third party flood risk assets and maintain a register of designated flood risk assets in their area	No likely significant effect – Designating assets and maintaining a register will not affect European sites
0299999003	Implement relevant government guidance on taking climate change into account where necessary for flood risk decision making in their area	No likely significant effect – Taking climate change into account will not affect European sites
0299999018	Investigate local flood events where appropriate and necessary in their area	No likely significant effect – Investigating local flood events will not affect European sites
0299999002	Maintain, keep under review, apply and monitor a local flood risk management strategy in their area	No likely significant effect – The production of a local flood risk management strategy will not itself affect European sites
0299999015	Plan flood risk management projects to achieve wider environmental benefits where appropriate in their area	No likely significant effect – Ensuring that flood risk projects achieve wider environmental benefits will not negatively affect European sites
0299999006	Provide information to inform spatial and infrastructure planning, development and regeneration in their area	No likely significant effect – The provision of information will not affect European sites

Measure ID	Measure	Likely Significant Effects on European sites
0299999013	Regulate the condition of, and third party activity on, ordinary watercourses and review new works on ordinary watercourses in their area	No likely significant effect – Regulating activities and works will not affect European sites
0299999004	Start implementing steps to work towards net zero carbon in their area	No likely significant effect – Implementing net zero carbon will not affect European sites
0299999016	Support communities to increase their resilience to flooding in their area	No likely significant effect – Supporting communities to increase resilience to flooding will not affect European sites
0299999017	Support emergency response partners and communities to plan, prepare and exercise for future flood scenarios in their area	No likely significant effect – Supporting planning for emergency response to flooding will not affect European sites
0299999012	Take a risk based approach to develop and maintain a register of flood risk assets/features in their area	No likely significant effect – Maintaining a register of assets will not affect European sites
0299999005	Work in partnership with other risk management authorities to reduce the risk of flooding from all sources in their area	No likely significant effect – This is a wide-ranging measure and the details include that by 2027, risk management authorities will have developed and/or delivered a programme of flood risk management capital schemes and/or maintenance to reduce risk of flooding and coastal change and its adverse consequences for human health and wellbeing. Individual capital schemes may have an effect on European sites depending on what and where they are and how they are to be delivered. However, developing a programme of capital schemes will not itself lead to likely significant effects on European sites. Any individual capital schemes will need to be subject to HRA before being consented, in order to comply with legislation.

Measure ID	Measure	Likely Significant Effects on European sites
0299999009	Work with other flood asset owners and riparian landowners to raise awareness of, and where necessary enforce, maintenance responsibilities in their area	No likely significant effect – specific maintenance measures could have an adverse effect on European sites (although they are unlikely to be approved measures if so) but a requirement to raise awareness of, and enforce where required, necessary flood asset maintenance will not adversely affect European sites.
0299999010	Work with other risk management authorities to identify a programme of nature based approaches in their area	No likely significant effect – working with other authorities to identify a programme of nature-based approaches will not adversely affect European sites.
0299999008	Work with other risk management authorities to provide information where necessary to update flood maps in their area	No likely significant effect – providing information will not adversely affect European sites.
0299999014	Work with other risk management authorities to support the delivery of flood projects in their area	No likely significant effect – providing support to other authorities will not adversely affect European sites.
0299999019	Work with others to support communities through the recovery phase of a significant flood event in their area	No likely significant effect – supporting communities will not adversely affect European sites.

Table 4. Screening table showing the Test of Likely Significant Effects results for Environment Agency national measures contained within all Flood Risk Management Plans

Measure ID	Measure	Likely Significant Effects on European sites
0299999041	Continue to review flood events to improve and develop flood services in England	No likely significant effect – reviewing flood events will not adversely affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0299999025	Designate flood risk assets where necessary in England	No likely significant effect – designating flood risk assets will not adversely affect European sites.
0299999046	Drive down carbon emissions and deliver the required flood risk management outcomes when planning and carrying out flood risk management works in England	No likely significant effect – driving down carbon emissions will not adversely affect European sites.
0299999030	In its strategic overview role, work with risk management authorities, including facilitating effective partnerships in local places in England	No likely significant effect – working with risk management authorities will not adversely affect European sites.
0299999044	Invest in flood risk management projects to contribute to improving the natural, built and historic environments	No likely significant effect – investing in projects will not adversely affect European sites.
0299999035	Issue and maintain guidance on taking climate change into account for flood risk decision making in England	No likely significant effect – issuing guidance will not adversely affect European sites.
0299999026	Maintain and update a database of its flood risk assets in England	No likely significant effect – maintaining a database will not adversely affect European sites.
0299999020	Monitor weather, tidal, rainfall and river conditions to provide flood forecasts in England	No likely significant effect – monitoring will not adversely affect European sites.
0299999042	Plan all flood risk management projects in England to achieve biodiversity net gain and wider environmental benefits	No likely significant effect – planning for biodiversity net gain will not adversely affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0299999043	Plan all flood risk management projects in England to help achieve river basin management plan objectives	No likely significant effect – this measure is about achieving the environmental objectives of river basin management plans. This will not adversely affect European sites.
0299999033	Provide quality and timely planning advice to help avoid inappropriate development in areas at risk of flooding in England	No likely significant effect – provision of planning advice will not adversely affect European sites.
0299999031	Regulate large, raised reservoirs in England	No likely significant effect – regulating reservoirs to reduce the risk of flooding from dam and reservoir failures will not adversely affect European sites.
0299999028	Regulate new works to main rivers and sea defences in England	No likely significant effect – regulating new works to reduce the likelihood of flooding will not adversely affect European sites.
0299999039	Respond to flood events and support other emergency responders in England	No likely significant effect – responding to flood events to reduce the consequences of flooding will not adversely affect European sites.
0299999040	Support communities to increase their resilience to flooding in England	No likely significant effect – supporting communities to help them increase their resilience will not adversely affect European sites.
0299999023	Take a risk based approach to inspect, maintain and operate assets in England	No likely significant effect – adopting a risk based approach will not adversely affect European sites.
0299999027	Take targeted enforcement action where there are blockages or unpermitted structures in England	No likely significant effect – taking enforcement action regarding blockages or unpermitted structures will not adversely affect European sites.
0299999024	Understand the long term needs of its assets and plan for their whole life management in England	No likely significant effect – developing an understanding of long-term asset needs will not adversely affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0299999045	Work with catchment partnerships, communities and other risk management authorities to maximise the use of nature based solutions in England	No likely significant effect – working to maximise the use of nature-based solutions rather than other methods of flood risk management will not adversely affect European sites.
0299999021	Work with emergency response partners to issue appropriate flood warnings in England	No likely significant effect – issuing flood warnings will not adversely affect European sites.
0299999022	Work with emergency response partners to plan, prepare and exercise for future flood scenarios in England	No likely significant effect – preparing for flood scenarios will not adversely affect European sites.
0299999032	Work with local planning authorities, developers and other place makers in England	No likely significant effect – working with other authorities to ensure all new development is resilient to flooding will not adversely affect European sites.
0299999029	Work with research partners and the wider scientific community in England	No likely significant effect – working with research partners into new approaches to reduce risk of flooding will not adversely affect European sites.
0299999036	Work with risk management authorities and other partners to implement the National Flood and Coastal Erosion Risk Management Strategy in England	No likely significant effect – individual proposals within the National Flood and Erosion Risk Management Strategy may pose likely significant effects to European sites but the Strategy has been subject to its own HRA. The measure concerns working with other authorities to implement the Strategy, which will not itself adversely affect European sites.
0299999038	Work with risk management authorities to identify a programme of future flood risk management projects in England	No likely significant effect – a commitment to identify a programme of future projects will not adversely affect European sites. Individual schemes and projects may have an effect on European sites depending on what and where they are and how they are to be delivered. However, all schemes will need to be subject to HRA before being consented, in order to comply with legislation.

Measure ID	Measure	Likely Significant Effects on European sites
0299999034	Work with risk management authorities to maintain and update where necessary flood maps in England	No likely significant effect – maintaining and updating flood maps will not adversely affect European sites.
0299999037	Work with risk management authorities to support the delivery of flood risk management projects in England	No likely significant effect – supporting risk management authorities in delivering flood risk management projects will not itself adversely affect European sites. Individual schemes and projects may have an effect on European sites depending on what and where they are and how they are to be delivered. However, all schemes will need to be subject to HRA before being consented, in order to comply with legislation.

Table 5. Screening table showing the Test of Likely Significant Effects results for measures contained within the Solway Tweed Flood Risk Management Plan

Measure ID	Measure	Likely Significant Effects on European sites
0201202022	Aim to establish a North West Coastal Centre of Excellence, sharing expertise, resources and innovative approaches for coastal schemes in northern England to reduce the risk of flooding to coastal communities.	No Likely Significant Effect – Establishing a centre of excellence will not affect European sites.
0201202003	Align principles for modelling climate change and projected growth scenarios in northern England to identify priority locations for detailed studies that will improve the estimation of future flood risk	No Likely Significant Effect – Aligning principles for modelling climate change will not affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0201202025	Assess the way flood risk is managed in the identified areas in northern England (Carlisle, Penrith, Appleby-in-Westmoreland) to preserve the current approach using the best and most efficient means for the longer term	No Likely Significant Effect, but down-the-line HRA required – Assessing the way flood risk is managed will not itself affect European sites. In line with the guidance quoted in paragraph 2.25, down-the-line assessment will be required as further details emerge regarding what will be done to deliver this measure. River Eden SAC flows through Carlisle and is adjacent to Penrith and Appleby-in Westmoreland. Any schemes that arise from the assessment of how flood risk is managed in that settlement will need to consider implications for the SAC in order to avoid any adverse effects on qualifying interest features, including ensuring that it does not impede the passage of otter, salmon, sea lamprey or river lamprey along the River Eden corridor. A down-the-line HRA is also likely to be needed before any scheme is consented.

Measure ID	Measure	Likely Significant Effects on European sites
0201202024	Assess the way flood risk is managed within identified areas in northern England to keep actions proportionate to that area's current level of flood risk	No Likely Significant Effect, but down-the-line HRA assessment required – Assessing the way flood risk is managed will not itself affect European sites. In line with the guidance quoted in paragraph 2.25, down-the-line assessment will be required as further details emerge regarding what will be done to deliver this measure. River Eden SAC flows through this area and any schemes that arise from the assessment of how flood risk is managed will need to consider implications for the SAC in order to avoid any adverse effects on qualifying interest features, including ensuring that it does not impede the passage of otter, salmon, sea lamprey or river lamprey along the River Eden corridor. A down-the-line HRA is also likely to be needed before any scheme is consented.
0201202020	Begin to implement long-term whole-life asset management plans in northern England to deliver improved work planning, stakeholder engagement, carbon reduction and future funding to enhance the strategic investment programme for reducing flood risk	No Likely Significant Effect – A commitment to implementing whole-life asset management plans will not itself affect European sites.
0201202034	Carry out a strategic review of Environment Agency debris screens in northern England to identify opportunities to reduce the risk of flooding to properties	No Likely Significant Effect, but down the line HRA required – Reviewing debris screens will not affect European sites. Depending on where the debris screens are located they could lead to visual and noise disturbance and water quality changes in the installation period as well as impeding the passage of anadromous fish post-installation. However, that cannot be assessed until the study covered by this measure is completed.

Measure ID	Measure	Likely Significant Effects on European sites
0201202015	Collaborate with environmental partners and major landowners to significantly increase upland and lowland peat and wetland restoration in northern England to reduce flood risk, restore natural habitats and allow for carbon sequestration to counter the impacts of climate change	No Likely Significant Effect – significantly increasing peatland and wetland restoration will not adversely affect European sites and could benefit them.
0201202039	Collate information, including condition and maintenance activities, on sea defence and coastal protection assets in northern England to ensure that asset owners can be readily identified and work together to manage coastal flooding and erosion risk	No Likely Significant Effect – collating information will not adversely affect European sites and could benefit them.
0201202004	Consider the potential implications of climate change to flood risk, water resource requirements and the sustainable management of water in northern England to aid optioneering and help prioritise future investment needs	No Likely Significant Effect – considering the implications of climate change will not adversely affect European sites and could benefit them.
0201202017	Continue to monitor, advise on and work with natural flood processes as far as possible, within identified areas in northern England to ensure the actions are still proportionate to that area's level of flood risk	No Likely Significant Effect – monitoring and advising on natural flood processes will not adversely affect European sites and could benefit them.

Measure ID	Measure	Likely Significant Effects on European sites
0201202023	Deliver existing and updated coastal strategies in northern England to reduce the risk of flooding to coastal communities	No Likely Significant Effect – Solway Firth SAC/SPA, Berwickshire & North Northumberland Coast SAC, Lindisfarne SPA North Northumberland Dunes SAC and Northumbria Coast SPA all overlap with the area covered by this measure. However, Coastal Strategies exist independently of FRMPs and are subject to their own HRA. This has confirmed any mitigation needed to avoid adverse effects on the integrity of European sites or has identified any need for compensation for those impacts where adverse effects on integrity cannot be avoided or mitigated but an Imperative Reasons of Overriding Public Interest/No Alternatives justification can be made, with compensation being/to be delivered in the form of the Habitat Compensation Programme. This measure in the FRMP is simply a commitment to implement adopted strategies and therefore no likely significant effects will arise from including the measure in the FRMP. This will include developing the specific schemes needed to implement the strategy which will be subject to their own HRAs once devised and before they are consented.

Measure ID	Measure	Likely Significant Effects on European sites
0201302043	Determine the feasibility of Flood and Coastal Erosion Risk Management Schemes on a priority basis for identified places in northern England to enable the regions community flood and coastal risk profile to be significantly reduced	No Likely Significant Effect, but down-the-line HRA assessment required – a commitment to determine the feasibility of schemes will not adversely affect European sites and a key part of determining feasibility will involve consideration of impacts on European sites. Specific schemes will then require down-the-line HRA before they are consented. In line with the guidance quoted in paragraph 2.25, down-the-line assessment will be required as further details emerge regarding what will be done to deliver this measure. The process of identifying FCERM schemes is separate from the FRMP process and is undertaken through the Lead Local Flood Authority via their Coastal Strategy process or their Local Flood Risk Management Plan process. Both these processes have their own HRA requirements and each plan must be subject to HRA before it is adopted. Each scheme that falls out of each plan must also be subject to HRA by law before being consented. This measure is simply a commitment to implementing adopted plans and prioritising the schemes in those plans in line with greatest need.
0201202041	Develop an engagement plan with shared priority communities to improve how we work together in northern England to help them improve their response to and recovery from flooding	No Likely Significant Effect – developing an engagement plan will not adversely affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0201202002	Establish an outline investment programme, identifying priorities over 10 years, based on shared flood risk drivers, ambition and strategic objectives in northern England to deliver investment efficiency, reduce flood risk and improve community engagement	No Likely Significant Effect – Establishing an outline investment programme will not adversely affect European sites.
0201202027	Exploit opportunities to store water or manage run-off in identified areas in northern England to provide overall flood risk reduction and environmental benefits	No Likely Significant Effect, but down-the-line HRA assessment required – Exploiting opportunities to store surface water and manage surface water runoff to provide environmental benefits may adversely affect European sites but the measure does not commit to specific opportunities (just opportunities in the general sense) and a specific objective of the measure is to achieve environmental benefits. In line with the guidance quoted in paragraph 2.25, down-the-line assessment will be required as further details emerge regarding what will be done to deliver this measure.
0201202035	Identify and assess opportunities to trial sites for surface water separation in northern England to assess the impacts and create a portfolio of examples that demonstrate the multiple benefits for flood risk reduction and environmental improvement.	No Likely Significant Effect – Exploring opportunities for appropriate trial sites will not adversely affect European sites. The trial siting process will need to take into account environmental and other sensitivities including European sites.
0201202012	Identify and map opportunities to deliver nature-based solutions on Risk Management Authority owned land in northern England to provide a shared resource that can be used to deliver schemes that reduce flood risk and benefit the natural environment	No Likely Significant Effect – Identifying opportunities for nature-based solutions will not adversely affect European sites and could benefit them.

Measure ID	Measure	Likely Significant Effects on European sites
0201202006	Implement the shoreline management plan action plan and co-ordinate wider activities along the coastline in line with the Shoreline Management Plan in northern England to reduce the risk of flooding and manage coastal change	No likely significant effect – Numerous European sites overlap with the area covered by this measure: Solway Firth SAC/SPA, Berwickshire & North Northumberland Coast SAC, Lindisfarne SPA North Northumberland Dunes SAC and Northumbria Coast SPA. However, the SMPs were subject to their own HRA and this confirmed any mitigation needed to avoid adverse effects on the integrity of European sites or identified any need for compensation for those impacts where adverse effects on integrity cannot be avoided or mitigated but an Imperative Reasons of Overriding Public Interest/No Alternatives justification can be made, with compensation being/to be delivered in the form of the Habitat Compensation Programme. This measure in the FRMP is simply a commitment to continue with implementation of the adopted SMP via implementation of the Action Plan and therefore no likely significant effects will arise from including the measure in the FRMP. This will include developing the specific coastal strategies and schemes needed to implement the SMP, which will be subject to their own HRAs once devised and before they are consented.
0201202008	Improve engagement with Local Authorities with responsibility for estuaries in northern England to ensure flood risk is understood and mitigated in estuary environments, reducing flood risk to coastal communities, businesses and critical infrastructure	No Likely Significant Effect – Improving engagement will not adversely affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0201202036	Improve ways to share data to identify and understand combined flood risk sites, that reflects future levels of risk associated with climate change, in northern England to enable the development and assessment of integrated solutions that reduce the risk of flooding	No Likely Significant Effect – Improving data sharing to identify sites at flood risk from multiple pathways will not adversely affect European sites.
0201202007	In-light of climate change predictions, investigate innovative approaches to coastal monitoring and access to data in northern England to facilitate pooling of resources and to develop new approaches to the long-term sustainable management of the north-west coastline	No Likely Significant Effect – Investigating innovative approaches to coastal monitoring and data access will not adversely affect European sites.
0201202014	Influence planning and policy in relation to coastal erosion and flood risk at landfill and contaminated sites in northern England to affect long term investment to reduce coastal pollution from waste sites	No Likely Significant Effect – The relevant European sites on the frontage covered by this measure are Solway Firth SAC and SPA. Influencing long-term investment in defending landfill and contaminated sites to improve pollution will not adversely affect these European sites and will benefit them.
0201202029	Inform Local Planning Authorities of any significant consequences of proposed flood risk management asset decommissioning in northern England to ensure that Local Development Plans reflects the related future flood risk	No Likely Significant Effect – Informing LPAs of the consequences of asset decommissioning will not adversely affect European sites.
0201602046	Investigate and quantify flood risk issues associated with unmanaged and unadopted third party assets in northern England to explore potential remedial actions that will reduce the risk of flooding	No Likely Significant Effect – Investigating and quantifying flood risk issues from unadopted assets will not adversely affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0201202033	Engage with businesses and community groups in northern England to promote clear, consistent and endorsed guidance regarding; (1) the use of public open spaces to manage flooding, (2) responsibilities of riparian ownership and (3) the maintenance of third party assets in a sustainable manner; to prevent the increase in flood risk	No Likely Significant Effect – Promoting clear and consistent guidance will not adversely affect European sites.
0201202042	Manage flood risk and coastal erosion scheme investment in northern England to maximise the scheme's benefits to sustainable coastal regeneration and for physical and mental health and wellbeing of communities	No Likely Significant Effect – Managing investment to maximise sustainability and physical and mental wellbeing will not adversely affect European sites.
0201202031	Promote the Shoreline Management Plan with Local Planning Authorities in northern England to ensure it is fully considered in the next revision of land use plans and associated planning decisions so they account for flood and coastal erosion risks	No Likely Significant Effect – Ensuring the adopted SMPs (which are subject to a process separate from the FRMP and have had their own HRAs prior to adoption) are fully considered in emerging local policy will not adversely affect European sites.
0201302048	Provide information and opportunities to the education sector, raising awareness of drainage, flood and coastal issues in northern England to influence the attitudes and behaviour of future generations towards flood risk and climate change	No Likely Significant Effect – Awareness raising in the education sector will not adversely affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0201202005	Review Shoreline Management Plan 2 Policies and capital investment programme taking account of current guidance and climate change predictions in northern England to update actions to reduce flood risk and manage coastal change	No Likely Significant Effect - Numerous European sites overlap with the area covered by this measure: Solway Firth SAC/SPA, Berwickshire & North Northumberland Coast SAC, Lindisfarne SPA North Northumberland Dunes SAC and Northumbria Coast SPA. However, SMPs are a separate process from FRMPs and reviewing an adopted SMP in light of current climate change projections is standard good practice. The revised SMP (depending on what if any changes are made) may have effects on European sites but these are subject to their own HRA process that will ensure any mitigation needed to avoid adverse effects on the integrity of European sites is delivered, or any need for increased compensation through the Habitat Compensation Programme is identified.

Measure ID	Measure	Likely Significant Effects on European sites
0201202026	Take further action where the case is most compelling in identified areas in northern England to reduce the likelihood and adverse consequences of flooding	No Likely Significant Effect, but down-the-line HRA assessment required - The area covered by this measure is an area from a line between Carlisle to the north and Penrith to the south westwards to Threlkeld. One hydrologically sensitive European site lies within this area: Lake District High Fells SAC. This is a new measure but is unlikely to involve physical activity on the ground in the short term, and there is no information available at this stage as to what actions are involved (as these have not yet been determined). This means the measure if sufficiently broadly expressed that adverse effects on European sites should be avoidable. However, consideration of potential impacts on the European site will need to be factored into the prioritisation process for actions and down-the-line HRA will be required before any actions are committed or consented. In line with the guidance quoted in paragraph 2.25, down-the-line assessment will be required as further details emerge regarding what will be done to deliver this measure.

Measure ID	Measure	Likely Significant Effects on European sites
0201402044	Undertake Flood and Coastal Erosion Risk Management Schemes, on a priority basis for identified places in northern England to reduce the risk of flooding to communities	The River Tweed SAC, Tweed Estuary SAC, Berwickshire & North Northumberland Coast SAC and Ford Moss SAC all lie within the areas covered by this measure. However, the process of identifying FCERM schemes is separate from the FRMP process and is undertaken through the Lead Local Flood Authority via their Coastal Strategy process or their Local Flood Risk Management Plan process. Both these processes have their own HRA requirements and each plan must be subject to HRA before it is adopted. Each scheme that falls out of each plan must also be subject to HRA by law before being consented. This measure is simply a commitment to implementing adopted plans and prioritising the schemes in those plans in line with greatest need.
0201202021	Undertake joint training to improve capabilities, streamline approaches, make efficiencies and increase understanding of funding mechanisms in northern England to improve our ability to attract investment for reducing flood risk	No Likely Significant Effect – Undertaking training will not adversely affect European sites.
0201202013	Undertake prioritised estuary wide studies in northern England to establish intertidal linkages between flooding, erosion and habitat for identifying natural flood risk management and habitat gain opportunities	No Likely Significant Effect – Undertaking studies to better understand linkages between flooding, erosion and habitat will not adversely affect European sites and the identification of habitat gain opportunities may benefit them.
0201202037	Use new technology to improve their monitoring networks to have more accurate, timely and detailed flood information in northern England to improve their current and future incident responses, reducing the likelihood and impact of flooding	No Likely Significant Effect – Using new technology to improve monitoring will not adversely affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0201202019	Work collaboratively to plan, prioritise and deliver co-ordinated maintenance of new and existing assets in northern England to improve the agility and efficiency of flood response	No Likely Significant Effect, but down-the-line HRA assessment required – A general commitment to work collaboratively to take a coordinated approach to planning and delivery of maintenance of flood defence assets will not itself adversely affect European sites. Depending on what would be involved, steps required to protect assets could have effects on European sites but this is considered unlikely since the protection measures will normally be installed at the assets themselves (e.g. by raising or otherwise protecting key machinery at Water Recycling Centres) rather than at European sites. Since United Utilities is a competent authority, they will need to undertake an HRA for any proposals that could affect European sites before they are implemented. In line with the guidance quoted in paragraph 2.25, down-the-line assessment will be required as further details emerge regarding what will be done to deliver this measure.
0201202016	Work in unison to map opportunity catchments for habitat creation and develop a programme for joint delivery in northern England to ensure integrated flood risk is tackled and investment is focussed where there will be greatest socio-environmental benefit	No Likely Significant Effect – Collaborating to identify opportunities for habitat enhancement will not adversely affect European sites and could benefit them.

Measure ID	Measure	Likely Significant Effects on European sites
0201202018	Work together to align objectives for Flood Risk, River Basin and Drainage and Wastewater Management Plans up to 2030 in northern England to establish agreed strategic measures (activities) in a collaborative programme of flood risk management works	No Likely Significant Effect, but down-the-line HRA assessment required – A commitment to work together to align objectives will not adversely affect European sites. Once strategic measures are identified and prioritised they may pose likely significant effects on European sites and the potential for this should be factored into their selection. Such measures may then need to be subjected to down-the-line HRA before they are committed or consented. In line with the guidance quoted in paragraph 2.25, down-the-line assessment will be required as further details emerge regarding what will be done to deliver this measure.
0201202011	Work together to deliver conventional, innovative and nature-based improvements to flood risk, water and habitat quality in northern England to reduce community flood risk and improve future collaborative working	No Likely Significant Effect, but down-the-line HRA assessment required – A general commitment to collaborating to deliver nature based improvements to flood risk and habitat/water quality will not adversely affect European sites and could benefit them. The measure is very vaguely expressed so once individual initiatives are identified they may require down-the-line HRA before being consented. In line with the guidance quoted in paragraph 2.25, down-the-line assessment will be required as further details emerge regarding what will be done to deliver this measure.
0201202032	Work together with Planning authorities, Local Enterprise Partnerships and communities in northern England to ensure that investment to reduce flood risk contributes to sustainable growth in communities	No Likely Significant Effect – While this is non-specific a commitment to ensure that investment to reduce flood risk contributes to sustainable growth in communities will not adversely affect European sites. By definition any actions that led to adverse effects on European sites would not constitute sustainable growth.

Measure ID	Measure	Likely Significant Effects on European sites
0201202047	Work together with communities and stakeholders in northern England to improve collective learning that reduces flood risk	No Likely Significant Effect – A commitment to improve collective learning will not adversely affect European sites.
0201502045	Work together with communities so that they understand likely changes in future flood and coastal risk in northern England to take on adaptive approaches to its management over the long-term	No Likely Significant Effect – Working with communities so they understand changes in future flood risk will not adversely affect European sites.
0201202040	Contribute to increasing the amenity value of flood risk assets in northern England to improve the physical and mental health and wellbeing of communities	No Likely Significant Effect, but down-the-line HRA assessment required – A general commitment to improve the amenity value of flood risk assets will not adversely affect European sites. Increasing amenity use of some coastal flood risk assets could pose likely significant effects if for example it increased the disturbance risk of birds associated with the Solway Firth SPA or Northumbria Coast SPA but no specific commitments are made as part of the measure. Down-the-line HRA may be needed for such opportunities as part of the Outline Business Case. In line with the guidance quoted in paragraph 2.25, down-the-line assessment will be required as further details emerge regarding what will be done to deliver this measure.

Measure ID	Measure	Likely Significant Effects on European sites
0201202009	Work with communities for whom long term maintenance of current levels of flood protection is uneconomical, including those in pumped catchments, in northern England to proactively support them and improve their resilience to flooding by considering adaptation options including nature-based solutions, and improving incident warnings and management	No Likely Significant Effect, but down-the-line HRA required – A general commitment to help communities with resilience to flooding where it is no longer economic to maintain the standard of protection of existing defences will not adversely affect European sites. Delivering nature-based solutions is likely to be beneficial for both human and environmental receptors. Notwithstanding this, such measures can impact on the water quality and level in European sites, particularly in the construction period. Bespoke HRAs will be needed of more detailed proposals to adequately appraise LSEs and, where relevant, adverse effects on the integrity of European sites. In line with the guidance quoted in paragraph 2.25, down-the-line assessment will be required as further details emerge regarding what will be done to deliver this measure.
0201202028	Work with local planning authorities, developers and other placemakers to ensure the wider use and adoption of Sustainable Drainage practices in northern England to reduce flood risk and benefit the environment	No Likely Significant Effect – Encouraging improved use of SUDS to benefit the environment and reduce surface water flooding will not adversely affect European sites.
0201202038	Work with owners and operators of critical infrastructure to understand the full consequences that their failure due to flooding could bring in northern England to better develop investment business cases and access funding sources in order to reduce flood risk	No Likely Significant Effect – Improving understanding of consequences of flooding to develop investment business cases for defence of critical infrastructure will not adversely affect European sites.

Measure ID	Measure	Likely Significant Effects on European sites
0201202030	Work with the Regional Flood and Coastal Committee, Local Planning Authorities, developers and placemakers to promote adoption of best practices in northern England to maximise the benefit new development can bring to reducing flood risk and improving the environment	No Likely Significant Effect – A commitment to working with others to promote best practice in incorporating reduction of flood risk and improving the environment into new development will not adversely affect European sites.
0201202010	Work together to agree practices and principles for partnered schemes in northern England to contribute to achieving carbon reduction targets	No Likely Significant Effect – A commitment to working together to agree practices and principles will not adversely affect European sites.

5. Other plans and projects

5.1 This section covers potential for effects in combination with other plans and projects. While the potential for the FRMP to occur 'in combination' with other FRMPs was considered for inclusion, each FRMP is specific to a relatively hydrologically self-contained River Basin District, meaning that potential for effects in combination with each other generally only exists where a European site straddles multiple RBDs. In this case the Berwickshire & North Northumberland Coast SAC, Northumbria Coast SPA, Solway Firth SAC/SPA, Lake District High Fells SAC, Moor House-Upper Teesdale SAC, and North Pennine Moors SPA/SAC straddle the boundary between the Solway Tweed FRMP and the Northumbria and North West FRMPs respectively. However, no mechanism has been identified for the actual measures in this FRMP (rather than any schemes that may emerge down-the-line) to operate in combination with those in the other FRMPs.

5.2 Natural England suggested inclusion of Diffuse Water Pollution Plans in the 'in combination' assessment of FRMP HRAs. Diffuse Water Pollution Plans are environmentally positive and intended to reduce diffuse pollution through fairly broad measures such as 'influencing management of farm infrastructure such as farm tracks, yards, buildings etc' through agri-environment schemes and similar. As such, no adverse likely significant effects or conflicts are expected to arise with the FRMP HRAs.

5.3 Potential in combination effects with Minerals and Waste Local Plans were also considered. However, Waste Local Plans are rarely technology-specific and potential impacts depend very much on the type of facility the market decides to bring forward on a given allocated site, or within a broad area of search where these exist. Minerals excavation can affect hydrologically sensitive European sites through dewatering for example. However, many minerals allocations are extensions to existing consented facilities to enable the site to be worked for longer (rather than to enable a net increase in consented extraction) and whose acceptability of effects on European sites are kept under review through the minerals planning authorities' Review of Consents process as required by the Conservation of Habitats and Species Regulations 2017 (as amended). In addition, many Minerals Plans include 'areas of search' for minerals rather than making specific allocations, leaving the market to bring forward proposals at the planning application level. As such, no specific likely significant effects in combination with the FRMP measures have been identified.

Local Plans

5.4 The delivery of c. 50,000 dwellings to 2030 across the Solway Tweed area and adjacent Scottish local authorities will result in the potential for a range of likely significant effects on the European sites surrounding the sub-region. The Northern Powerhouse is a government-backed initiative to help improve the economic prospects of Northern cities. The project combines the Northern Powerhouse Investment Fund, the Northern Powerhouse Partnership, the European Regional Development Fund and Local Enterprise Partnerships (LEPS).

5.5 Potential impact pathways include recreational pressure, a potential for increased atmospheric pollution from an increase in traffic on the road network

close to European sites, possible loss of functionally-linked habitat for SPAs (depending on where the development takes place) and water quality impacts on European sites. Depending on where construction takes place direct disturbance impacts on SPA birds could also occur.

5.6 This section focusses only on hydrologically sensitive European sites and on the main European sites where adverse effects from residential and employment development have been identified in Local Plan HRAs. The main risk to European sites in the Solway Tweed area is from excessive nutrients and recreational pressure. The main site identified to be at risk due to recreational pressure is the Solway Firth SAC/SPA, associated with increased housing. Natural England have commissioned specific visitor surveys relating to this European site which are informing Local Plan considerations regarding potential impacts and need for mitigation.

5.7 Also of particular relevance is the River Caldew, which is part of the River Eden SAC and flows through Carlisle, the largest settlement in the RBD. There are currently proposals for delivery of up to 10,000 new dwellings south of Carlisle, known as St Cuthbert's Garden Village. The River Eden SAC (River Caldew) will flow to the immediate west of this new settlement and as identified in the HRA for the St Cuthbert's Garden Village Masterplan, there is potential for numerous impacts on the SAC including air quality impacts, hydromorphological impacts, water quality impacts and recreational pressure and disturbance impacts. These are all being investigated and solutions identified where necessary as the plan is developed.

5.8 Another key anthropological pressure relating to European sites in the RBD is excessive nitrogen and/or phosphorus inputs, particularly from agriculture and also from treated sewage effluent. In advice to local planning authorities in March 2022 Natural England flagged that the following European sites of relevant to the RBD were suffering from excessive nutrients leading to eutrophication: Esthwaite Water Ramsar site, River Derwent & Bassenthwaite Lake SAC, River Eden SAC, River Kent SAC, Teesmouth and Cleveland Coast SPA and Ramsar site.

5.9 However, it is considered that the nature of the FRMP is such that no in combination effects will arise between adoption of the FRMP and delivery of housing and associated development across the sub-region. This is due either to the fact that the measures in the FRMP do not pose mechanisms to connect negatively to European sites, or because the measures of the FRMP are sufficiently high level (generally consisting of identifying a scheme and committing to its further development, design and implementation without committing to details) that they allow flexibility for measures necessary to be designed into schemes to protect European sites to be incorporated at further planning tiers as each scheme is devised.

River Basin Management Plans

5.10 River Basin Management Plans (RBMPs) describe the challenges that threaten the water environment and how these challenges can be managed and funded. The Solway Tweed FRMP covers the same area as the Solway Tweed River Basin Management Plan.

5.11 The 2021 update to the RBMP sets out a series of measures to bring about improvements in the waterbodies covered by the RBMP. By definition, the

measures in the RBMP are positive and includes the following initiatives: partnership working with farmers and land managers, sustainable management of water resources, restoring rivers and removing man-made barriers to fish migration and controlling invasive non-native species.

5.12 The RBMPs generally include projects that improve the water environment, for example by:

- enhancing and restoring rivers and floodplains
- creating sustainable drainage
- cleaning up metal pollution
- improving habitats and water quality by addressing diffuse pollution issues
- adapting weirs to provide fish passage
- involving the community
- using existing regulations to tackle agricultural and rural land pollution, such as lagoon construction

5.13 Since the measures within RBMPs are positive and are often necessary to restore freshwater aquatic European sites to favourable condition, there is no mechanism for them to have a negative effect on European sites in combination with the measures in the FRMP.

Shoreline Management Plans and Local Flood Risk Management Plans

5.14 SMPs provide a policy context for shoreline/coastal zone management and development. As acknowledged throughout this document, SMPs and the Coastal Strategies that result from them often result in adverse effects on the integrity of European sites through a combination of coastal squeeze, loss of functionally-linked land for SPA/Ramsar birds, direct habitat loss due to defence footprint and changes to long-shore sediment transport and other aspects of natural sediment dynamics. They also present opportunities for positive effects on European sites if opportunities for managed realignment are included that will enable a more natural coastline to be established.

5.15 The following SMPs apply to the Solway Tweed RBD were considered for in-combination impacts:

- SMP 1 Scottish border to the River Tyne
- SMP 22 Great Ormes Head to Scotland

5.16 The assessments for any potential in-combination impacts between these plans and the measures contained within the Solway Tweed FRMP were considered with regards to spatial proximity and/or hydrological and/or hydrographical connectivity. No in-combination likely significant effects were identified in respect of the policies set out in the plans because the FRMP essentially draws upon measures in the SMP and subsequent Coastal Strategies for its measures in the coastal environment.

5.17 Similarly, Local Flood Risk Management Plan measures for relevant areas within the River Basin District have been included within the FRMP so there is

no potential for in combination effects as the same measures are contained in both sets of plans.

Water Resource Management Plans

5.18 United Utilities and Northumbria Water have both produced Water Resource Management Plans. Scottish Water a similar strategy covering the bordering parts of the RBD in Scotland. These set out the water supply strategy for their areas and could therefore have negative effects on European sites in their own right. For example, the Lake District is a major supply source for United Utilities and includes Haweswater as a principal reservoir. Haweswater is within the catchment of the River Eden SAC.

5.19 However, Water Resource Management Plans are required to have their own HRAs undertaken. The HRAs for each of the latest adopted WRMPs considered whether their future supply strategy to meet water needs would affect European sites and it was concluded that the supply needs of their areas could be met without an adverse effect on the integrity of European sites, primarily through a combination of improved water efficiency measures and bringing new water supply areas into consideration that do not result in increased abstraction from European sites. As such, there would be no in combination effect with the FRMPs.

5.20 In addition to the WRMP, United Utilities and Northumbria Water are also producing Drainage and Wastewater Management Plan (DWMP)s. However, those plans have not yet been published and therefore cannot be included in this assessment.

Scottish Solway and Tweed FRMPs

5.21 Within the Solway Tweed River Basin District there are cross border areas in which rivers and watercourses flow from Scotland into England or vice versa. This means that it is possible for flooding to result from activities on the other side of the border. However, the work undertaken by the Environment Agency and Scottish Environmental Protection Agency (SEPA) to date suggests that there is a low likelihood of flood risk management activities impacting the other side of the border[25]. As such, the English Solway Tweed FRMP is not expected to result in any likely significant effects on European sites in Scotland. Cross border European sites (notably the Solway Firth SAC and SPA) have already been considered in this report.

Drought Plans, Permits and Orders

5.22 As discussed in the previous chapter, the Solway Tweed RBD encompasses European sites that are sensitive to a wide range of anthropogenic pressures, including hydrology, water quality, recreational pressure, coastal squeeze and others. Multiple simultaneously acting impacting pathways can compound negative impacts on qualifying habitats and species.

5.23 For example, water companies, under their duty of delivering potable water to households and businesses, can apply for drought permits, enabling them to abstract water beyond existing abstraction consents for an agreed period of time. Granting of drought periods has the potential for negative environmental impacts, particularly in European sites that are already subject to existing unfavourable flow conditions or water levels, including the River Eden SAC.

While most measures included in the FRMP are likely to be positive for European sites by re-naturalising hydrological function, inadequately planned or sited natural flood management and hard defence structures have the potential to negatively interact with Environment Agency Drought Orders and water company Drought Permits.

5.24 Drought conditions will also impose further pressures on designated sites such as by reducing water quality (reduced flows would typically result in higher nutrient concentrations, exacerbating the impact of treated sewage effluent) and water flow. In addition, climate change has the potential to increase the frequency and severity of drought conditions. Drought Plan Orders and Permits would compound drought issues and operate in-combination with impact pathways associated with the FRMP. However, drought plans will generally only operate at times of low water levels and low rainfall, which is the opposite scenario to when the majority of FRMP measures will be active.

5.25 Notwithstanding this, Drought Plans of water companies are subject to their own assessment process including HRA. This ensures that potential adverse effects on the integrity of European sites are adequately mitigated or, where this cannot be achieved, suitable compensation is provided. Overall, given that the Drought Plans of water companies undergo robust HRA appraisal, no in-combination effects with the FRMP will occur.

Environment Agency National Drought Plan

5.26 The potential for in-combination effects of the Solway Tweed FRMP with the Environment Agency's National Drought Action Plan has been assessed and no in-combination impacts are anticipated. However, this should be considered further at the time of any potential implementation of drought management measures in liaison with the Environment Agency, particularly regarding local actions in the supply and water source catchment areas utilised by United Utilities. Moreover, drought plans will generally only operate at times of low water levels and low rainfall, which is the opposite scenario to when the majority of FRMP measures will be active.

Conclusion

5.27 In summary, is considered that the nature of the FRMP is such that no in combination effects will arise between adoption of the FRMP and delivery of housing and associated development across the sub-region. This is due either to the fact that the measures in the FRMP do not pose mechanisms to connect negatively to European sites, or because the measures of the FRMP are sufficiently high level (generally consisting of identifying a scheme and committing to its further development, design and implementation without committing to details) that they allow flexibility for measures necessary to be designed into schemes to protect European sites to be incorporated at further planning tiers as each scheme is devised.

6. Conclusion

6.1 All European sites have been screened out of further assessment. There are no likely significant effects on any European site as a result of the Solway Tweed Flood Risk Management Plan 2021-2027, either alone or in combination with

other projects and plans. This is due either to the fact that the measures in the FRMP do not pose mechanisms to connect negatively to European sites, or because the measures of the FRMP are sufficiently high level (generally consisting of identifying a scheme and committing to its further development, design and implementation without committing to details) that they allow flexibility for measures necessary to be designed into schemes to protect European sites to be incorporated at further planning tiers as each scheme is devised. It should be noted that notwithstanding references in the FRMP, scheme level HRAs will be undertaken as part of the business case for all schemes, and many schemes will also need planning consent, which will also be accompanied by an HRA, thus ensuring legal requirements are met.

Appendix A Information on European Sites

A.1 River Eden SAC

Qualifying Features

This SAC is designated for its Annex I habitats and Annex II species.

Annex I habitats that are a primary reason for selection of this site:

- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion-incanae, Salicion albae*). (Alder woodland on floodplains)*
- Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoeto-Nanojuncetea*. (Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels)
- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. (Rivers with floating vegetation often dominated by watercrowfoot)

Annex I priority habitats are denoted by an asterisk (*).

Annex II species present as a qualifying feature:

- Atlantic salmon *Salmo salar*
- Brook lamprey *Lampetra planeri*
- Bullhead *Cottus gobio*
- Otter *Lutra lutra*
- River lamprey *Lampetra fluviatilis*
- Sea lamprey *Petromyzon marinus*
- White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes*

Conservation Objectives

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed above), and subject to natural change.

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats and habitats of qualifying species
- the structure and function (including typical species) of qualifying natural habitats
- the structure and function of the habitats of qualifying species
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- the populations of qualifying species
- the distribution of qualifying species within the site

Threats/ Pressures to Site Integrity

The Site improvement Plan[26] identifies the following pressures and threats to the SAC:

- water pollution
- agricultural management practices
- physical modification
- invasive species
- changes in species distributions
- forestry and woodland management
- hydrological changes
- disease
- air pollution: risk of atmospheric nitrogen deposition

A.2 Solway Firth SAC

Qualifying Features

This SAC is designated for its Annex I habitats and Annex II species.

Annex I habitats that are a primary reason for selection of this site:

- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- Estuaries
- Fixed dunes with herbaceous vegetation (grey dunes). (Dune grassland)*
- Mudflats and sandflats not covered by seawater at low tide. (Intertidal mudflats and sandflats)
- Perennial vegetation of stony banks. (Coastal shingle vegetation outside the reach of waves)
- Reefs
- *Salicornia* and other annuals colonising mud and sand. (Glasswort and other annuals colonising mud and sand)
- Sandbanks which are slightly covered by sea water all the time. (Subtidal sandbanks)

Annex I priority habitats are denoted by an asterisk (*).

Annex II species present as a qualifying feature:

- River lamprey *Lampetra fluviatilis*
- Sea lamprey *Petromyzon marinus*

Conservation Objectives

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change.

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats and habitats of qualifying species

- the structure and function (including typical species) of qualifying natural habitats
- the structure and function of the habitats of qualifying species
- the supporting processes on which qualifying natural habitats and the habitats of
- qualifying species rely
- the populations of qualifying species
- the distribution of qualifying species within the site

Threats/ Pressures to Site Integrity

The Site improvement Plan[27] identifies the following pressures and threats to the SAC:

- energy production
- coastal squeeze
- water pollution
- air pollution: risk of atmospheric nitrogen deposition
- fisheries: commercial marine and estuarine
- invasive species
- change in land management

A.3 Solway Firth SPA

Qualifying Features

The site is designated as a SPA for its:

Qualifying Annex I species:

- Red-throated diver *Gavia stellata*
- Whooper swan *Cygnus cygnus*
- Barnacle goose *Branta leucopsis*
- Golden plover *Pluvialis apricaria*
- Bar-tailed godwit *Limosa lapponica*

The site supports migratory populations of European importance, of the following species:

- Pink footed goose *Anser brachyrhynchus*
- Shelduck *Tadorna tadorna**
- Teal *Anas crecca**
- Pintail *Anas acuta*
- Shoveler *Anas clypeata**
- Scaup *Aythya marila*
- Common scoter *Melanitta nigra**
- Goldeneye *Bucephala clangula**
- Goosander *Mergus merganser**
- Oystercatcher *Haematopus ostralegus*
- Knot *Calidris canutus*
- Ringed plover *Charadrius hiaticula*
- Grey plover *Pluvialis squatarola**
- Lapwing *Vanellus vanellus**
- Dunlin *Calidris alpina**

- Sanderling *Calidris alba**
- Redshank *Tringa totanus*
- Turnstone *Arenaria interpres**
- Curlew *Numenius arquata*
- Cormorant *Phalacrocorax carbo**
- Black–headed gull *Larus ridibundus**
- Common gull *Larus canus**
- Herring gull *Larus argentatus**

*Named qualifiers of the water bird assemblage.

Conservation Objectives

1. To ensure that the qualifying features of Solway Firth SPA are in favourable condition and make an appropriate contribution to achieving Favourable Conservation Status.

2. To ensure that the integrity of Solway Firth SPA is maintained or restored as appropriate, in the context of environmental changes by meeting objectives 2a, 2b and 2c for each qualifying feature:

2a. The populations of the qualifying features are viable components of the site.

2b. The distributions of the qualifying features throughout the site are maintained, or where appropriate, restored by avoiding significant disturbance of the species.

2c. The supporting habitats and processes relevant to the qualifying features and their prey/food resources are maintained or where appropriate, restored.

Threats/ Pressures to Site Integrity

The Site improvement Plan[28] identifies the following pressures and threats to the SPA:

- changes in species distributions
- energy production
- public access/ disturbance
- fisheries: aquaculture
- change in land management

A.4 South Solway Mosses SAC

Qualifying Features

This SAC is designated for its Annex I habitats and Annex II species.

Annex I habitats that are a primary reason for selection of this site:

- Active raised bogs*
- Degraded raised bogs still capable of natural regeneration

Annex I priority habitats are denoted by an asterisk (*).

Conservation Objectives

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed above), and subject to natural change.

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats
- the structure and function (including typical species) of qualifying natural habitats
- the supporting processes on which qualifying natural habitats rely

Threats/ Pressures to Site Integrity

The Site improvement Plan[29] identifies the following pressures and threats to the SPA:

- hydrological changes
- inappropriate water levels
- invasive species
- air pollution: impact of atmospheric nitrogen deposition

A.5 Lake District High Fells SAC

Qualifying Features

This SAC is designated for its Annex I habitats and Annex II species.

Qualifying Annex I habitats:

- Alkaline fens. (Calcium-rich springwater-fed fens)
- Alpine and Boreal heaths. (Alpine and subalpine heaths)
- Blanket bogs*
- Calcareous rocky slopes with chasmophytic vegetation. (Plants in crevices in base-rich rocks)
- European dry heaths
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (tall herb communities)
- *Juniperus communis* formations on heaths or calcareous grasslands. (Juniper on heaths or calcareous grasslands)
- Northern Atlantic wet heaths with *Erica tetralix.* (Wet heathland with cross-leaved heath)
- Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles. (Western acidic oak woodland)
- Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*. (Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels)
- Siliceous alpine and boreal grasslands. (Montane acid grasslands)
- Siliceous rocky slopes with chasmophytic vegetation. (Plants in crevices on acid rocks)
- Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*). (Acidic scree)

- Species-rich *Nardus* grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe). (Species-rich grassland with mat-grass in upland areas)

Annex I priority habitats are denoted by an asterisk (*).

Qualifying Annex II species:

- Slender green feather-moss *Drepanocladus (Hamatocaulis) vernicosus*

Conservation Objectives

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed above), and subject to natural change.

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats and habitats of qualifying species
- the structure and function (including typical species) of qualifying natural habitats
- the structure and function of the habitats of qualifying species
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- the populations of qualifying species
- the distribution of qualifying species within the site

Threats/ Pressures to Site Integrity

The Site improvement Plan[30] identifies the following pressures and threats to the SAC:

- inappropriate grazing
- deer
- air Pollution: impact of atmospheric nitrogen deposition
- unsustainable on-site population or habitat
- public access/disturbance
- managed rotational burning
- hydrological changes
- invasive species
- disease

A.6 Border Mires, Kielder – Butterburn SAC

Qualifying Features

This SAC is designated for its Annex I habitats.

Qualifying Annex I habitats:

- Blanket bogs*
- Petrifying springs with tufa formation (*Cratoneurion*). (Hard-water springs depositing lime)*

- European dry heaths
- Northern Atlantic wet heaths with *Erica tetralix.* (Wet heathland with cross-leaved heath)
- Transition mires and quaking bogs. (Very wet mires often identified by an unstable 'quaking' surface)

Annex I priority habitats are denoted by an asterisk (*).

Conservation Objectives

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed above), and subject to natural change.

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats
- the structure and function (including typical species) of qualifying natural habitats
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely

Threats/ Pressures to Site Integrity

The Site improvement Plan[31] identifies the following pressures and threats to the SAC:

- hydrological changes
- forestry and woodland management
- change in land management
- air pollution: impact of atmospheric nitrogen deposition
- species decline

A.7 Tarn Moss SAC

Qualifying Features

This SAC is designated for its Annex I habitats.

Qualifying Annex I habitats:

- transition mires and quaking bogs (Very wet mires often identified by an unstable 'quaking' surface)

Conservation Objectives

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change.

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of the qualifying natural habitats

- the structure and function (including typical species) of the qualifying natural habitats
- the supporting processes on which the qualifying natural habitats rely

Threats/ Pressures to Site Integrity

The Site improvement Plan[32] identifies the following pressures and threats to the SAC:

- water pollution
- forestry and woodland management
- invasive species
- air pollution: impact of atmospheric nitrogen deposition

A.8 Cumbrian Marsh Fritillary Site SAC

Qualifying Features

This SAC is designated for its Annex II species.

Qualifying Annex II species:

- Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia*

Conservation Objectives

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed above), and subject to natural change.

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of the habitats of qualifying species
- the structure and function of the habitats of qualifying species
- the supporting processes on which the habitats of qualifying species rely
- the populations of qualifying species
- the distribution of qualifying species within the site

Threats/ Pressures to Site Integrity

The Site improvement Plan[33] identifies the following pressures and threats to the SAC:

- habitat fragmentation
- inappropriate scrub control

A.9 Walton Moss SAC

Qualifying Features

This SAC is designated for its Annex I habitats.

Qualifying Annex I habitats:

- Active raised bogs*

- Degraded raised bogs still capable of natural regeneration

Annex I priority habitats are denoted by an asterisk (*)

Conservation Objectives

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed above), and subject to natural change.

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats
- the structure and function (including typical species) of qualifying natural habitats
- the supporting processes on which qualifying natural habitats rely

Threats/ Pressures to Site Integrity

The Site improvement Plan[34] identifies the following pressures and threats to the SAC:

- drainage
- change in land management
- hydrological changes
- air pollution: impact of atmospheric nitrogen deposition

A.10 Bolton Fell Moss SAC

Qualifying Features

This SAC is designated for its Annex I habitats.

Qualifying Annex I habitat:

- Degraded raised bogs still capable of natural regeneration

Conservation Objectives

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed above), and subject to natural change.

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats
- the structure and function (including typical species) of qualifying natural habitats
- the supporting processes on which qualifying natural habitats rely

Threats/ Pressures to Site Integrity

The Site improvement Plan[35] identifies the following pressures and threats to the SAC:

- hydrological changes
- inappropriate water levels
- drainage
- unsustainable on-site population or habitat
- inappropriate scrub control
- wildfire/ arson
- water pollution
- biological resource use
- air pollution: impact of atmospheric nitrogen deposition
- change in land management
- public access/ disturbance

A.11 North Pennine Moors SAC

Qualifying Features

This SAC is designated for its Annex I habitats and Annex II species.

Qualifying Annex I habitats:

- European dry heaths
- *Juniperus communis* formations on heaths or calcareous grasslands
- Blanket bogs (*if active bog)
- Petrifying springs with tufa formation (*Cratoneurion*)*
- Siliceous rocky slopes with chasmophytic vegetation
- Old sessile oak woods with Ilex and Blechnum in the British Isles

Annex I priority habitats are denoted by an asterisk (*)

Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:

- Northern Atlantic wet heaths with *Erica tetralix*
- Calaminarian grasslands of the *Violetalia calaminariae*
- Siliceous alpine and boreal grasslands
- Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)
- Alkaline fens
- Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)
- Calcareous rocky slopes with chasmophytic vegetation

Annex I priority habitats are denoted by an asterisk (*)

Annex II species present as a qualifying feature, but not a primary reason for site selection:

- Marsh saxifrage *Saxifraga hirculus*

Conservation Objectives

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the ‘Qualifying Features’ listed above), and subject to natural change.

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats and habitats of qualifying species
- the structure and function (including typical species) of qualifying natural habitats
- the structure and function of the habitats of qualifying species
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- the populations of qualifying species
- the distribution of qualifying species within the site

Threats/ Pressures to Site Integrity

The Site improvement Plan[36] identifies the following pressures and threats to the SAC:

- managed rotational burning
- inappropriate grazing
- change in land management
- disease
- hydrological changes
- game management: grouse moors
- direct land take from development
- air pollution: risk of atmospheric nitrogen deposition
- fertiliser use
- inappropriate cutting/ mowing
- invasive species
- agricultural management practices
- vehicles
- vehicles: illicit
- public access/ disturbance
- deer
- feature location/ extent/ condition unknown
- climate change

A.12 North Pennine Moors SPA

Qualifying Features

This SPA is designated for its Annex I species.

Qualifying Annex I species:

- Hen harrier *Circus cyaneus*
- Merlin *Falco columbarius*
- Peregrine *Falco peregrinus*
- Golden plover *Pluvialis apricaria*

Conservation Objectives

With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed above), and subject to natural change.

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- the extent and distribution of the habitats of the qualifying features
- the structure and function of the habitats of the qualifying features
- the supporting processes on which the habitats of the qualifying features rely
- the population of each of the qualifying features
- the distribution of the qualifying features within the site

Threats/ Pressures to Site Integrity

The Site improvement Plan[37] identifies the following pressures and threats to the SPA:

- low breeding success/ poor recruitment
- managed rotational burning
- inappropriate grazing
- hydrological changes
- game management: grouse moors
- direct land take from development
- air pollution: risk of atmospheric nitrogen deposition
- agricultural management practices
- vehicles
- vehicles: illicit
- public access/ disturbance
- feature location/ extent/ condition unknown
- climate change

A.13 Tweed Estuary SAC

Qualifying Features

This SAC is designated for its Annex I habitats and Annex II species.

Qualifying Annex I habitats:

- estuaries
- mudflats and sandflats not covered by seawater at low tide. (Intertidal mudflats and sandflats)

Qualifying Annex II species:

- River lamprey *Lampetra fluviatilis*
- Sea lamprey *Petromyzon marinus*

Conservation Objectives

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed above), and subject to natural change.

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats and habitats of qualifying species
- the structure and function (including typical species) of qualifying natural habitats
- the structure and function of the habitats of qualifying species
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- the populations of qualifying species
- the distribution of qualifying species within the site

Threats/ Pressures to Site Integrity

None identified - there is no Site improvement Plan for this SAC.

A.14 Northumbria Coast SPA

Qualifying Features

This SPA is designated for its Annex I species.

Qualifying Annex I species:

During the breeding season the area regularly supports:

- Little tern *Sterna albifrons*
- Arctic tern *Sterna paradisaea*

Qualifying individual species not listed in Annex I:

- Purple sandpiper *Calidris maritima*
- Turnstone *Arenaria interpres*

Conservation Objectives

With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed above), and subject to natural change.

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- the extent and distribution of the habitats of the qualifying features
- the structure and function of the habitats of the qualifying features
- the supporting processes on which the habitats of the qualifying features rely
- the population of each of the qualifying features
- the distribution of the qualifying features within the site

Threats/ Pressures to Site Integrity

The Site improvement Plan[38] identifies the following pressures and threats to the SPA:

- public access/ disturbance
- water pollution
- invasive species
- changes in species distributions
- predation
- coastal squeeze
- direct impact from third party
- transportation and service corridors
- change in land management
- air pollution: risk of atmospheric nitrogen deposition
- fisheries: commercial marine and estuarine

A.15 Lindisfarne SPA

Qualifying Features

This SPA is designated for its Annex I species.

Qualifying Annex I species:

During the breeding season the area regularly supports:

- Roseate tern *Sterna dougallii*
- Little tern *Sterna albifrons*

During the non-breeding season the area regularly supports:

- Whooper swan *Cynus cygnus cygnus*
- Golden plover *Pluvialis apricaria*

Over winter the area regularly supports internationally or nationally important numbers of waterfowl: greylag goose *Anser anser*; light-bellied brent goose *Branta bernicla hrota*; shelduck *Tadorna tadorna*; wigeon *Anas penelope*; eider *Somateria mollissima*; long-tailed duck *Clangula hyemalis*; common scoter *Malanitta nigra*; red-breasted merganser *Mergus serrator*; ringed plover *Charadrius hiaticula*; grey plover *Pluvialis squatarola*; sanderling *Calidris alba*; dunlin *Calidris alpina*; bar-tailed godwit *Limosa lapponica* and redshank *Tringa totanus*.

Conservation Objectives

With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change.

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- the extent and distribution of the habitats of the qualifying features
- the structure and function of the habitats of the qualifying features
- the supporting processes on which the habitats of the qualifying features rely

- the population of each of the qualifying features
- the distribution of the qualifying features within the site

Threats/ Pressures to Site Integrity

The Site improvement Plan[39] identifies the following pressures and threats to the SPA:

- public access/disturbance
- water pollution
- invasive species
- changes is species distributions
- predation
- coastal squeeze
- direct impact from third party
- transportation and service corridors
- change in land management
- fisheries: commercial marine and estuarine

A.16 North Northumberland Dunes SAC

Qualifying Features

This SAC is designated for its Annex I habitats and Annex II species.

Qualifying Annex I habitats:

- Fixed dunes with herbaceous vegetation (grey dunes). (Dune grassland)*
- Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*). (Dunes with creeping willow)
- Embryonic shifting dunes
- Humid dune slacks
- Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes). (Shifting dunes with marram)

Annex I priority habitats are denoted by an asterisk (*).

Qualifying Annex II species:

- Petalwort *Petalophyllum ralfsii*

Conservation Objectives

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change.

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats and habitats of qualifying species
- the structure and function (including typical species) of qualifying natural habitats
- the structure and function of the habitats of qualifying species

- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- the populations of qualifying species
- the distribution of qualifying species within the site

Threats/ Pressures to Site Integrity

The Site improvement Plan[40] identifies the following pressures and threats to the SAC:

- invasive species
- air pollution: risk of atmospheric nitrogen deposition
- public access/disturbance

A.17 Berwickshire & North Northumberland Coast SAC

Qualifying Features

This SAC is designated for its Annex I habitats and Annex II species.

Qualifying Annex I habitats:

- large shallow inlets and bays
- mudflats and sandflats not covered by seawater at low tide (Intertidal mudflats and sandflats)
- reefs
- submerged or partially submerged sea caves

Qualifying Annex II species:

- Grey seal *Halichoerus grypus*

Conservation Objectives

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change.

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats and habitats of qualifying species
- the structure and function (including typical species) of qualifying natural habitats
- the structure and function of the habitats of qualifying species
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- the populations of qualifying species
- the distribution of qualifying species within the site

Threats/ Pressures to Site Integrity

The Site improvement Plan[41] identifies the following pressures and threats to the SAC:

- public access/ disturbance
- water pollution
- invasive species
- changes in species distributions
- coastal squeeze
- direct impact from third party
- transportation and service corridors
- change in land management
- fisheries: commercial marine and estuarine

A.18 River Tweed SAC

Qualifying Features

This SAC is designated for its Annex I habitats and Annex II species.

Qualifying Annex I habitats:

- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. (Rivers with floating vegetation often dominated by watercrowfoot)

Qualifying Annex II species:

- Atlantic salmon *Salmo salar*
- Brook lamprey *Lampetra planeri*
- Otter *Lutra lutra*
- River lamprey *Lampetra fluviatilis*
- Sea lamprey *Petromyzon marinus*

Conservation Objectives

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change.

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats and habitats of qualifying species
- the structure and function (including typical species) of qualifying natural habitats
- the structure and function of the habitats of qualifying species
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- the populations of qualifying species
- the distribution of qualifying species within the site

Threats/ Pressures to Site Integrity

The Site improvement Plan[42] identifies the following pressures and threats to the SAC:

- water pollution
- invasive species
- physical modification
- water abstraction

A.19 Ford Moss SAC

Qualifying Features

This SAC is designated for its Annex I habitats.

Qualifying Annex I habitat:

- Active raised bogs*

Annex I priority habitats are denoted by an asterisk (*).

Conservation Objectives

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change.

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of the qualifying natural habitat
- the structure and function (including typical species) of the qualifying natural habitat
- the supporting processes on which the qualifying natural habitat rely

Threats/ Pressures to Site Integrity

The Site improvement Plan[43] identifies the following pressures and threats to the SAC:

- hydrological changes
- forestry and woodland management
- air pollution: impact of atmospheric nitrogen deposition

A.20 Holburn Lake & Moss SPA

Qualifying Features

This SPA is designated for its Annex I species.

Qualifying Annex I species:

- Greylag goose *Anser answer* (non-breeding)

Conservation Objectives

With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change.

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- the extent and distribution of the habitats of the qualifying features
- the structure and function of the habitats of the qualifying features
- the supporting processes on which the habitats of the qualifying features rely
- the population of each of the qualifying features, and,
- the distribution of the qualifying features within the site.

Threats/ Pressures to Site Integrity

The Site improvement Plan[44] identifies the following pressures and threats to the SPA:

- changes in species distributions
- drainage
- natural changes to site conditions

References

[1] https://www.gov.uk/guidance/national-planning-policy-framework

[2] https://www.gov.uk/guidance/habitats-regulations-assessments-protecting-a-european-site

[3] The Precautionary Principle, which is referenced in Article 191 of the Treaty on the Functioning of the European Union, has been defined by the United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2005) as: *"When human activities may lead to morally unacceptable harm* [to the environment] *that is scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm. The judgement of plausibility should be grounded in scientific analysis".*

[4] SNH (2015). Habitats Regulations Assessment of Plans: Guidance for Plan-Making Bodies in Scotland. Version 3.0, January 2015. Available from: https://www.nature.scot/habitats-regulations-appraisal-plans-guidance-plan-making-bodies-scotland-jan-2015.

[5] https://www.dtapublications.co.uk/

[6] Opinion of Advocate General Kokott, 9th June 2005, Case C-6/04. Commission of the European Communities v United Kingdom of Great Britain and Northern Ireland, paragraph 49. http://curia.europa.eu/juris/document/document.jsf?docid=58359&doclang=EN

[7] https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/EN_art_6_guide_jun_2019.pdf

[8] Waddenzee case (Case C-127/02, [2004] ECR-I 7405)

[9] Department for Environment, Food and Rural Affairs. August 2012. Habitats Directive: Guidance on the application of article 6(4). Alternative solutions, imperative reasons of overriding public interest (IROPI) and compensatory measures. 9pp. Available at: www.defra.gov.uk [Accessed on the 03/11/2020].

[10] https://www.gov.uk/flood-and-coastal-erosion-risk-management-research-reports/what-is-coastal-squeeze

[11] Cutts N & Allan J. 1999. Avifaunal Disturbance Assessment. Flood Defence Works: Saltend. Report to Environment Agency).

[12] Cutts, N., Phelps, A. and Burdon, D. 2009. Construction and waterfowl: Defining Sensitivity, Response, Impacts and Guidance. Report to Humber INCA, Institute of Estuarine and Coastal Studies, University of Hull.

[13] The University's research is available at the following link: http://bailey.persona-pi.com/Public-Inquiries/M4%20-%20Revised/11.3.67.pdf.

[14] Research undertaken by the Institute of Estuarine & Costal Studies, University of Hull. 2013. Available at: http://bailey.persona-pi.com/Public-Inquiries/M4%20-%20Revised/11.3.67.pdf [Accessed on the 01/12/2020]

[15] Ibid. Response distances to visual stimuli are given in the Estuarine & Coastal Studies report.

[16] Weilgart L. (2018). The impact of ocean noise pollution on fish and invertebrates. Oceancare & Dalhousie University. 36pp.

[17] Magnhagen C., Johansson K. & Sigray P. (2017). Effects of motorboat noise on foraging behaviour in Eurasian perch and roach: A field experiment. *Marine Ecology Progress Series* **564**: 115-125.

[18] McCauley R., Fewtrell J. & Popper A.N. (2003). High intensity anthropogenic sound damages fish ears. *Journal of the Acoustic Society America* **113**: 638-642.

[19] Wysocki L.E., Dittami J.P. & Ladich F. (2006). Ship noise and cortisol secretion in European freshwater fishes. *Biological Conservation* **128**: 501-508.

[20] Thompson P.M., Brookes K.L., Graham I.M. Barton T.R., Needham K., Bradbury G. & Merchant N.D. (2013). Short-term disturbance by a commercial two-dimensional seismic survey does not lead to long-term displacement of harbour porpoise. *Proceedings of the Royal Society B* **280**, DOI: http://dx.doi.org/10.1098/rspb.2013.2001.

[21] Brandt M.J., Diederichs A., Betke K. & Nehls G. (2011). Responses of harbour porpoises to pile driving at the Horns Rev II offshore wind farm in the Danish North Sea. *Marine Ecology Progress Series* **421**: 205-2016.

[22] Southall B. L., Bowles A. E., Ellison W. T., Finneran J. J., Gentry R. J., Greene Jr C. R., Kastak D., Ketten D.R., Miller J.H., Nachtigall P.E., Richardson J.W., Thomas J.A, and Tyack P.L. (2007). Marine mammal noise exposure criteria: Initial scientific recommendations. *Aquatic Mammals* **33**: 411–522.

[23] The Holohan ruling also requires all the interest features of the European sites discussed to be catalogued (i.e., listed) in the HRA. That is the purpose of Appendix A.

[24] https://designatedsites.naturalengland.org.uk/SiteSearch.aspx; data correct as of 29/07/22

[25] https://consultation.sepa.org.uk/evidence-and-flooding/flood-risk-management-plan-solway/supporting_documents/Public%20facing%20cross%20border%20FRMP%20July2021.pdf

[26] http://publications.naturalengland.org.uk/publication/5920746052255744

[27] http://publications.naturalengland.org.uk/publication/6360561071685632

[28] http://publications.naturalengland.org.uk/publication/6360561071685632

[29] http://publications.naturalengland.org.uk/publication/6542037868347392

[30] http://publications.naturalengland.org.uk/publication/6534434434056192

[31] http://publications.naturalengland.org.uk/publication/4872132202856448

[32] http://publications.naturalengland.org.uk/publication/6448587097505792

[33] http://publications.naturalengland.org.uk/publication/4875311183298560

[34] http://publications.naturalengland.org.uk/publication/5913783809605632

[35] http://publications.naturalengland.org.uk/publication/5889099021942784

[36] http://publications.naturalengland.org.uk/publication/6534899699810304

[37] http://publications.naturalengland.org.uk/publication/6534899699810304

[38] http://publications.naturalengland.org.uk/publication/5340976100933632

[39] http://publications.naturalengland.org.uk/publication/5340976100933632

[40] http://publications.naturalengland.org.uk/publication/5340976100933632

[41] http://publications.naturalengland.org.uk/publication/5340976100933632

[42] http://publications.naturalengland.org.uk/publication/5407765459632128

[43] http://publications.naturalengland.org.uk/publication/6268562335334400

[44] http://publications.naturalengland.org.uk/publication/6514115992354816